PRIME RECOGNITION™

High Accuracy Optical Character Recognition

PRIMEOCR™

Access Guide

Version 6.00

High Accuracy OCR Engine

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Statement of Limited Warranty

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PROCR-1808-00600

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Preface

Scope of Access Guide

The PrimeOCR Access Guide provides information on the installation of the PrimeOCR engine, and its capabilities, and the installation and use of the PrimeOCR Job Server. It is intended for users of the PrimeOCR Job Server and for developers who will write programs that interface to, and control, the PrimeOCR engine.

In preparing this Guide, we assume that you have some experience with:

-basic Windows user skills

-basic OCR terminology

Developers should have some experience with:

-basic Windows programming

-interfacing with a Windows style DLL

The PrimeOCR engine offers unparalleled levels of OCR accuracy at cost levels an order of magnitude below other OCR accuracy improvement technologies. However, this document does not discuss performance characteristics in detail, please refer to the PrimeOCR datasheet for information in this area.

Prime Recognition also offers other products, such as PrimeZone, PrimeView, PrimeVerify and PrimePost. These other products are Windows based tools which “front end” and “back end” the PrimeOCR engine. They are an optional compliment to PrimeOCR's functionality. PrimeOCR does not require these other products to perform the functionality described in this guide. Contents of Access Guide

- **Chapter 1, Overview**
  This chapter gives a brief overview of the PrimeOCR engine, describing its form, its features, and the facilities available to the user/developer.

- **Chapter 2, System Requirements**
  This chapter provides detailed descriptions of the hardware and software required to support the PrimeOCR engine.

- **Chapter 3, Installation**
  This chapter provides instructions and procedures for installing PrimeOCR including the Prime Recognition hardware key.

- **Chapter 4, PrimeOCR Job Server**
  This chapter describes the functionality, configuration and operation issues of a prewritten application which allows end users to use the PrimeOCR engine without programming.

- **Chapter 5, String Options**
  This chapter describes “string options”, special commands that can be used by the PrimeOCR Job Server, or by a developer to invoke new functionality in the PrimeOCR engine.

- **Chapter 6, PrimeOCR Output Formats**
  This chapter provides descriptions of the output generated by PrimeOCR.

- **Chapter 7, Troubleshooting**
  This chapter provides suggestions that might be helpful in troubleshooting PrimeOCR, and directions to a listing of all error messages.

- **Chapter 8, Contacting Prime Recognition**
  This chapter describes how to contact Prime Recognition for sales or technical support.

- **Chapter 9, InputAccel Module**
  Installation, configuration and other details of running PrimeOCR as a InputAccel Module.

- **Chapter 10, Programming to the PrimeOCR API Module**
  Describes programming issues and all available API calls for PrimeOCR API.

- **Chapter 11, Example Applications**
  Provides a brief overview of the C and VB source code samples provided with the Access Kit.

- **Appendix A**
  A listing of all characters that can be recognized by PrimeOCR.

- **Index**
  This is a subject index of the contents of this Guide.

Other Publications

Other publications that may be of interest include:

- *PrimeView/PrimeVerify User’s Guide*
- *PrimePost User's Guide*
- *PrimeZone User's Guide*
- *Prime Recognition High Accuracy OCR Cost Justification (White Paper)*
- *Prime Recognition High Accuracy OCR "Cleaner Data” Justification (White Paper)*

Documentation Conventions

The following conventions are used in this *Access Guide*:

Convention	Usage
Bold	Bold text indicates emphasis
Italic	Italics indicate variable information in command lines and in dialog box entries. Variable information is the appropriate data that you enter *in place* of the italic entry in the example or instructions. Italics in text also indicate titles of manuals, chapters, or headings.
`Courier`	Courier is used when presenting messages from the program to the user.
[ ]	Square brackets indicate optional entries. If an optional entry is desired, enter the information between the brackets. Brackets are also used to denote keystrokes in text, e.g., [F1].
ⓘ	This icon points out important information.

Chapter 1

Overview

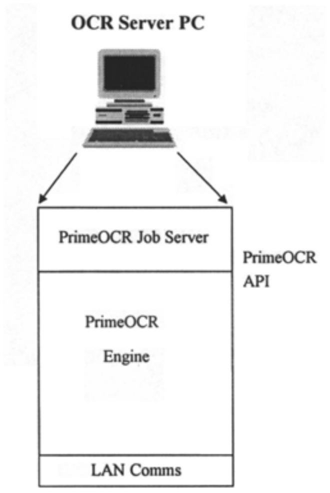
Prime Recognition’s High Accuracy OCR Engine, "PrimeOCR", is a software program that runs on one Windows based personal computer. It can recognize text, "marks", or save images from bit map images created from scanning, FAX, or other electronic means. PrimeOCR reduces the number of character recognition, confidence level, attributes, and location errors that occur in conventional OCR technology.

Note

Prime Recognition licenses its products as a base configuration with many options. This allows users to pay for only the features they need. The functionality described in this manual includes all options.

Product Architecture

PrimeOCR is designed as a DLL (Dynamic Link Library) that implements the PrimeOCR API. The PrimeOCR DLL will load and unload a series of DLLs, as required, that implement Prime Recognition's technology. All required technology is contained within the licensed PrimeOCR product and is managed by the PrimeOCR engine. No other products must be licensed, integrated, or managed by the developer and his/her code to enable OCR.



Users - However, the PrimeOCR engine is not a stand-alone application. A program must be written that interfaces to, and controls, PrimeOCR through API calls, which are defined in later in this guide. Prime Recognition has written several sophisticated applications, the PrimeOCR Job Server, PrimeView, and PrimeVerify, which allow you to use the PrimeOCR engine with no development. If you want to begin using the PrimeOCR engine right away, or you do not want to ever program your own PrimeOCR interface program then you should evaluate these programs (The Job Server is described in *Chapter 4*) .

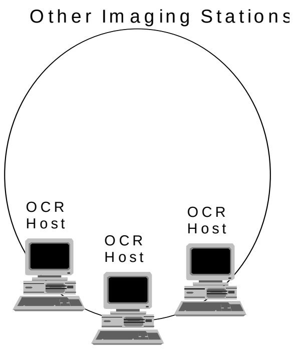
Developers - Two simple example programs, written by Prime Recognition, are included in the Toolkit in source code form and are described in *Chapter 11*.

If PrimeOCR is used as an OCR server in a LAN environment (a typical production imaging scenario), then the developer's application is responsible for all external communications to the imaging system, including all LAN traffic, except that PrimeOCR will read image files from a file server if the image path includes a DOS file mapping to the file server.

Note

Other applications can be run on the same PC as PrimeOCR but, because OCR is very CPU and memory intensive, OCR throughput will be reduced. We highly recommend that the PC be dedicated to the PrimeOCR engine and supporting programs. Only one instance of the engine can be running at any time on one PC.

Throughput



Single PC Throughput. For high speed place PrimeOCR on the fastest available Windows based PC, dedicated to OCR, with at the minimum amount of free RAM.

PrimeOCR can use multiple CPUs in a multiple CPU system.

System Throughput. Very high throughput can be achieved by implementing multiple PrimeOCR engines in parallel as logically separate units (see figure).

Inputs to PrimeOCR

Images are accepted as image files or as raw bitmaps in RAM through the API.

File based Images

Image files must be supplied with a filename and path, long file names and UNC paths are supported. The PrimeOCR engine will automatically find and read the image file header, automatically identify the file type (e.g., TIFF vs. PCX), and read the image into RAM for processing.
Supported file types are:

• TIFF Version 5.0 and above

- Uncompressed, Modified G3 (FAX), G3, G4, LZW, Multipage, Binary, Greyscale, Color

• PCX

• JPEG (Color, Greyscale) (including JPEG2000)

• PDF

-Black & White, Color, Greyscale.

-PDF Image only, PDF Image + Text.

PDF Normal is not officially supported since many PDF Normal files are non standard but the majority of files can be read. It would also be very unusual for PDF Normal files to be put through OCR since the text is already electronic and 100% accurate. Some types of PDF files can not be read including: protected with security/encryption, non standard, damaged PDF files.

PDF attributes such as bookmarks, author, subject, page mode, and hyperlinks can be saved from input PDF via PDF_RETAIN string option or via use of PRIMAGE.INI\[PDF2TIFF]\SuperImpose=2 (or 1).

RAM based Images (Developers Only)

RAM based images are passed to the engine via a pointer to the beginning of the image in RAM. The image must be in a raw binary (color/greyscale not supported in memory) bitmap format (not a Windows bitmap). A raw bitmap in RAM can be created by taking every row of pixels in an image and placing the rows sequentially into memory. For example, an image that looks like this on paper,

```
Row 0
Row 1
Row 2
Row 3
```

will be converted to this in memory:

```
Row 0Row 1Row 2Row 3
```

No special delimiters are placed in the bitmap. The pointer points to the beginning of the image (the "R" in Row 0).

Image Resolution

Image resolutions of 150, 200, 240, 300, 400, and 600 dpi (dots per inch) are supported. Both height and width resolution must be the same. (PrimeOCR can handle small variations in dpi from these standards.)

Note

PrimeOCR's accuracy is substantially better at 300 dpi vs. 200 dpi, so whenever possible generate images at 300 dpi. 400 dpi does generate better results than 300 dpi if a majority of the text in the image is smaller than 8 point (see *Font Sizes*). Other image types may or may not benefit from 400 dpi resolution. We recommend that you experiment with 400 dpi vs. 300 dpi on your target images. 400 dpi recognition is slower and 400 dpi images take substantially more RAM and disk space than 300 dpi images.

<u>FAX Resolutions</u>
Fine resolution FAX images (204 X 196 dpi) can be processed. Standard resolution FAX images (204 X 98) can also be processed. PrimeOCR automatically doubles the height to 204 X 196. FAX images are treated as 200 X 200 images, since PrimeOCR reports coordinates in a measure that is not resolution dependent this does not cause any location errors.

Image Size

The overall size of the image is limited by PrimeOCR to 32,700 pixels. (for example, 108.997 inches in height and width at 300 dpi). (For Asian language images the limit is 12,500 pixels and 22.5 inches in height and width). Note that this size limit may not be reached if other constraints occur. Below are some examples of other constraints that may decrease the actual size PrimeOCR is able to process:

-Not enough RAM on the PC (particularly if image is color)
-Complexity and number of internal PDF data structures if the input file is PDF

Also note that character recognition accuracy falls rapidly for zones over 4400 pixels in size (height or width). If the full page is treated as one zone the practical limit for the size of the image is 4400 pixels in height or width.

Image Quality

PrimeOCR will process all types of image quality, from excellent to poor. PrimeOCR can handle significant amounts of page skew, speckling, broken characters, and other image problems. Poor quality images cause a significant decrease in throughput, and a significant increase in the level of errors generated, for conventional OCR as well as PrimeOCR. However, PrimeOCR's average error generation will always be significantly lower than conventional OCR. One benefit of PrimeOCR is that images that were too bad for conventional OCR for cost effective processing, such as microfiche, can now be cost effectively processed.

Note – Image Preprocessing

Prime Recognition highly recommends that images be "cleaned up". For example, deskew the image (but only if the image has more than 1% skew). PrimeOCR can perform deskew, despeckle, auto rotation and other image clean up operations within its engine.

Note – Color

Color images get converted to bitonal (black & white) in the engine before processing. If color shading exists behind the text we recommend you use the despeckle image preprocessing option to remove this shading in the black and white image before OCR.

Note – Engineering Drawings & Image Enhancement

We do not recommend “strong” autorotate with engineering drawings (or similar types of images), nor line removal if you are using “clump” autozoning.

Image Source

Images can be created by FAX, microfiche, microfilm, scanner input or any other type of device that outputs images electronically. Similarly the type of source document can be a magazine, insurance claim form, newspaper, technical report, business memo, or any other source. The only restriction is that the resulting electronic image passed to PrimeOCR must fit the criteria described elsewhere in this *Guide*.

Font Types

A wide variety of fonts can be recognized accurately. PrimeOCR includes "omnifont" technology that can recognize new fonts it has never seen before. Heavily stylized, or script type fonts are examples of fonts that are difficult to recognize accurately.

Fixed and variable pitch fonts (sometimes called monospaced and variably spaced fonts) can be recognized. This attribute is automatically sensed and reported by the engine.

Font sizes

Font or type sizes within the following ranges will be accurately recognized:

200 dpi	12-40 points
300 dpi	8-35 points
400 dpi	6-30 points
600 dpi	3-20 points

Sizes outside these ranges may be recognized but accuracy will fall off rapidly. This attribute is automatically sensed by the engine.

Printer Type

PrimeOCR will recognize characters formed by the following printer types:

- Machine print (includes typewriter, inkjet, laser printer, typeset, and any other printing technology that can form regular, fully formed characters).
- Dot matrix
- Bar Code (1D and selected 2D)
- MICR (custom version of PrimeOCR)
- OCRA/OCRB (custom version of PrimeOCR)

This attribute must be specified by the user via the PrimeView application (See *PrimeView User's Guide*), or the PrimeOCR Job Server template file (See *Chapter 4 – PrimeOCR Job Server*), or by the developer through the PrimeOCR API.

Text Orientation

Text must be in an upright orientation to be recognized correctly. The engine will not process text that is in a landscape orientation ("landscape" in this context only refers to the orientation of the text, not whether the page is wider than tall). PrimeOCR offers two "auto-rotation" features to automatically rotate the page until the text is orientated correctly.

PrimeOCR also offers string options to find text is rotated in 90 or 270 degree rotations.

Language

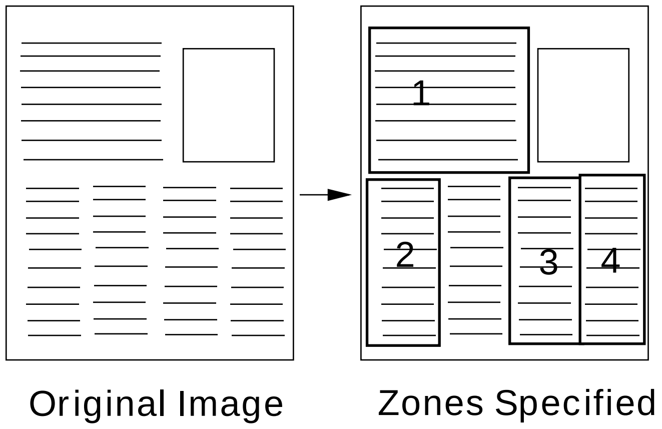
PrimeOCR will recognize text in the following languages:

-Danish
-Dutch
-French
-German
-Italian
-Norwegian
-Portuguese
-Spanish
-Swedish
-U.K. English
-U.S. English
-Chinese (simple)
-Chinese (traditional)
-Japanese
-Korean
-Russian

PrimeOCR will recognize one dominant language per page. A secondary language, usually English, can also be recognized. Languages do not have to be identified in advance (although processing is significantly faster if you can specify the language), PrimeOCR has functionality that can identify the language for you.

Zones

Zones are rectangles of area on the original image which, ideally, do not overlap. These zones must be defined by the user through the PrimeView application *(See PrimeView User's Guide)* or the PrimeOCR Job Server template file (See *Chapter 4 – PrimeOCR Job Server*) or by the developer through the PrimeOCR API. Alternatively PrimeOCR can try to sense these zones though its automatic zoning feature.



At least one zone must be defined for each image (e.g., the whole page in a full text application). Within each zone text will be recognized as a single column of text. Therefore, if your image has multiple columns of text (e.g., a newspaper) then zones should be defined for each column of text (you will probably want to order the zones by the reading order of the text).

Notes

If your application must have only one zone, and yet lines of text across the page do not line up vertically, then we recommend you use the "objects_single_zone" string option (see Chapter 5).

Zones may overlap, however, text that is in two or more zones will usually generate a higher error rate. Therefore, for example, if a skewed image is forcing zones to overlap, we recommend the following:

-solve the problem by deskewing the image before zoning and OCR

-if deskew is not practical, try to define zone overlap so that it only includes white space (no text).

Automatic Zoning

PrimeOCR can segment the image into zones automatically. This feature has three modes of operation. The first is segmentation only. In this mode the image is segmented into text (and optionally, image) zones and the location of these zones is reported back to the application for its review in order from top to bottom. The second mode zones the image for text (and optionally, image) zones and automatically orders the OCR output into the expected reading order, without any review, so that, for example, text in columns flows in the natural reading order.

The third mode is "clump" zoning, in which stand alone groups of words (e.g. a short column) exists on the image (for example, engineering drawings).

Automatic zoning, in particular reading order, is not always accurate, however, PrimeOCR uses technology that has been noted by industry tests as one of the leading zoning technologies.

Notes

Please discuss your autozoning needs with Prime Recognition. We can custom configure our autozoning technology to fit your application and get substantially better autozoning results.

You can force autozoning to ignore the edges of a page when doing autozoning. See the file …\BIN\“autozone_margins.ini.example” for more information.

Each zone will have the following unique properties:

- **Zone number**
- **Content restrictions**
  - -No restrictions. Characters recognized are listed in Appendix A.
  - -Alpha. Characters recognized are a-z, A-Z, comma, period and international alpha characters which are given strong preference (however, other characters may appear if they are extremely confident characters). See Appendix A for a full list.
  - -Numeric. Characters recognized are 0-9 and other characters typically found in numeric applications are given strong preference (however, other characters may appear if they are extremely confident characters). See Appendix A for a full list.
  - -Alpha and No restrictions can be further restricted to UPPERCASE and lowercase.
  - -OMR. Optical Marks, for example, "check boxes". PrimeOCR reports back percent of zone that is black (filled in.)
  - -Image. These zones are saved as independent image files.
  - -Barcode. Selected 1D and 2D barcode types (see prbarcode.ini for details).
- **Lexical check**
  - -Lexical check - Standard. A series of lexical checks are performed on the output. In "Alpha" and "Numeric" zones the checks will convert any characters outside the definition of the zone to a "?" with confidence equal to 1.
  - -Lexical check - Plus. A strong lexical check is performed on "No restrictions" zones (currently only works with English language).
  - -No Lexical check.
- **Accuracy level**
  - -Or in other words number of engines voting. More engines equal greater accuracy but slower speed. On average you will get the following results:

# Engines	Error Reduction	Speed
1	0%	1.0
2	15%	2.1
3	64%	3.8
4	74%	5.8
5	76%	6.1
6	80%	8.0

The **zone number** has no meaning to the PrimeOCR engine except that PrimeOCR's output is ordered by the zone number. This means that the developer can order the zones in an arbitrary order as required by his application.

Content restriction is useful, particularly in forms applications, to reduce the scope of the recognition task. This allows for faster speeds and higher accuracy.

Accuracy level configuration allows the developer to trade off throughput with accuracy. For example, very high accuracy may not be required on one or two fields on a form (e.g., a comments field), this field is configured as one zone and recognized with one engine accuracy (conventional OCR speed and accuracy), while the other fields are configured as zones and recognized with three engine accuracy, or the best accuracy available.

Lexical check slows down recognition speed considerably but has a very significant positive effect on accuracy of text if the text is lexical in nature. Data that is not lexically sensitive would include, for example, proper names, or alphanumeric part numbers.

Lexical check Plus
Compares low confidence words against a lexicon database. Can provide three basic functions:

(1) Increases the confidence of words that it finds within its database (if, for example, you are manually verifying OCR output this option can significantly reduce the number of words to be verified). This function is relatively reliable and safe.

(2) Can "fix" word and improve confidence. This is a very powerful function but be careful to configure this function carefully, settings that are too aggressive relative to your typical word patterns can cause changes that are not correct.

(3) If can not "fix" word then it lowers confidence of characters further.

Configuration of this feature for the PrimeOCR Job Server is handled through ..\BIN\PRLEXICA.INI file. Specific configuration documentation is also in this file.

User Dictionaries
The user may create his own user dictionary. This dictionary is used by Lexical check and Lexical Check Plus to improve character recognition accuracy and confidence reporting. The user dictionary file is merely a ASCII text file, with one word per line (a word must be 2-32 characters in length). If using the PrimeOCR Job Server then enter the path to the user dictionary in ..\BIN\PRLEXICA.INI file. (The use of a user dictionary does not require the use of Lexical Check Plus).

Zone limits

2000 zones per image* (automatic zoning feature is limited to 240 zones per image)
500 lines per zone*
500 characters per line*

*These items can be increased by Prime Recognition on a custom basis. Please call for details.

Engine Training

The PrimeOCR engine offers several levels of training:

- The user/developer may notify the engine that an image is very similar to the last image processed (e.g., the next page in a multi page document). The PrimeOCR engine will attempt to use its experience with the last document to improve its accuracy and speed on this image.

- One of the internal engines supported by PrimeOCR can be "trained" on specific fonts and characters. This can have a small impact on accuracy and speed, however its utility is limited to applications in which only one font used across a lot of pages. Please contact Prime Recognition for further information.

- Prime Recognition also offers its PRTRAIN engine (as an option). This engine is very font specific but it can recognize any arbitrary shape and is less susceptible to noise than conventional engines. The PRTRAIN engine must be trained by Prime Recognition and its application is best suited for custom projects.

- For large opportunities Prime Recognition can modify the engine for the specific application. The value of this effort depends greatly on the nature of the images being processed. Please contact Prime Recognition for further information.

Engine Tuning

The user/developer may also tune the PrimeOCR engine, on a zone by zone basis, by deciding which engines to run and how much weight to give to each engine. However, Prime Recognition has predefined accuracy settings of LEVEL_1, LEVEL_2, etc. These settings run engine 1 with full weight, engines 1 and 2 with full weight, etc. For most applications these settings are the best choice. However, if a zone is always of a specific type, e.g., always unconnected dot matrix, then it may be worth experimenting with engine weights for that zone.

Outputs From PrimeOCR

File Based Output Formats

PrimeOCR can generate output in the following formats:

-Prime Recognition format (PRO)
-ASCII text
-Formatted ASCII
-RRI3
-PDA
-ZyIndex
-RTF
-PDF – Image Only
-PDF – Normal
-PDF – Image plus hidden text (including PDF/A format)
-Comma delimited
-HTML
-XML
-Custom formats

For more details on each output format please read *Chapter 6 - Output Formats*.

The PRO format includes the following information:

-Page data: width, height, OCR configuration settings, average confidence

-Zone data: location and OCR configuration settings. If an OMR zone then the percentage of zone that is black. If an image zone then a path to the captured image zone as a TIF file.

-Line data: baseline based bounding box

-Character data: recognized characters, confidence level, bounding box, character attributes, point size.

Some of this data is also included in other output formats.

RAM Based Output Formats (Developers Only)

The OCR output is available as a pointer to a RAM based PrimeOCR data structure. The content of this data structure is highly analogous to the file based PRO output. This approach is best suited for sophisticated C/C++ based developers.

Alternatively the output can be retrieved "one feature at a time" through simple API calls. This alternative is best suited for Visual Basic developers or less sophisticated C/C++ developers.

Developer Features

Memory Management

Once the PrimeOCR output is no longer needed, one simple call will free up all RAM consumed by the PrimeOCR output.

Progress Feedback (Callback)

The PrimeOCR engine can generate messages periodically that indicate the ongoing progress of its processing. The developer must write a callback function (an example is provided in the sample application) and register the function through the PrimeOCR API. The PrimeOCR engine will call this function during processing and send it a message which indicates the current state of processing.

Ease of Programming

The PrimeOCR API and output format were designed to make it easy for developers to understand and program to the PrimeOCR engine. For example:

- The interface to the PrimeOCR engine is a relatively small number of simple, orthogonal, C style function calls. Other OCR engines utilize a much more complex event driven architecture or support a huge variety of function calls, at multiple architectural levels, with overlap in functionality between many calls.

- PrimeOCR output does not embed control, escape, and delimiter sequences into the recognized text output to identify attributes of the text. Instead each line of text is output as plain text with separate arrays of attributes for character attributes, such as confidence and bounding box coordinates. The output data is intuitively tied to each other via their position in the array and does not have to go through a sophisticated state machine parser for human or programmatic access. PrimeOCR output can be accessed randomly whereas other OCR engine output must be parsed in a sequential manner, then interpreted.

- PrimeOCR maintains configuration information in memory between images so variables that do not change between images, or change infrequently, such as resolution, can be set initially and then used for all following documents.

Chapter 2 System Requirements

The PrimeOCR Engine runs on Intel or compatible personal computers with a modern Windows operating system.

For PrimeOCR to work properly and efficiently, it needs the following hardware and software:

Personal Computer

- Intel PC or 100% compatible computer. See notes at end of this chapter on CPUS, and CPU utilization.

  We strongly recommend dedicating the PC to OCR in high volume usage.

- A hard disk with 150 megabytes of available disk space for software installation.

- If a hardware key license is used then a USB port is required.

- RAM (free after loading all other software)

  "Workstation" operating systems:

  Minimum: 128 MB
  Recommended: 256 MB

  " Server" operating systems:

  Minimum: 256 MB
  Recommended: 512 MB

  Items that require more memory:

  -400 dpi images: +16 MB
  -600 dpi images: +48 MB
  -Color/grey scale: +32-128 MB
  -PDF Image input (b/w 8.5x11) 32MB
  -PDF Image input (color 8.5x11) 96MB
  -Large dimension images (depends on size)

Software

Windows XP*

Windows 2003 Server, Windows 2003 R2 Server*

Windows Vista

Windows 2008 Server, Windows 2008 R2 Server

Windows 7

Windows 8/8.1

Windows 2012, Windows 2012 R2 Server

Windows 10

Windows 2016 Server

For all OS's noted above, both 32 and 64 bit supported where relevant. In general we recommend the 64 bit version over the 32 bit version.

*64 bit versions may require manual installation configuration (see *ChangeNTErrorReporting=1* in Chapter 3).

Running under VMWare, Hyper-V, and Virtual PC is supported. Other virtual environments have unique licensing issues, please contact Prime Recognition.

OS Privileges

Administrator rights are required to install the software.

Read/write rights are required for the …\(install dir)\BIN directory.

Administrator rights are generally required unless you make the changes to the Registry described in Chapter 3.

“Run as admin” (Vista and later)

Depending on your security settings, it may be important for you to run the application that uses the PrimeOCR engine (for example, the OCR Job Server, or your programmed application) with Admin rights, even if you are not logged in with Admin rights. To do this, right click on \bin\PRLICENSE.EXE (for example) and select to run as Administrator. If you are not logged in as admin, you will asked to do so (for this application only).

“Number of CPUs”

Up to four CPUs may be utilized depending on the number of CPUs licensed from Prime and by the number of “Levels” licensed from Prime (The evaluation license includes a license for four CPUs but the base configuration license for PrimeOCR, the least expensive license, only includes one CPU). (A “CPU” is Windows terminology, many users would call this a “core” in current CPU terminology).

CPU utilization

Although we may use up to four CPUs (cores), the average utilization of all CPUs can be considerably lower than 100%. The average utilization will depend on a number of factors, including accuracy levels configured, number of licensed and available CPUs, and how many “serial” processes are utilized (file reading, writing, image enhancement steps, autozoning, etc.)

To maximize the utilization of CPUs on a PC we recommend you license as many CPUs as your PC contains up to three, (we will also be utilizing a fourth CPU in this configuration at no extra cost to you).

However, considerable CPU capacity will still exist on the PC. To further utilize the CPU capacity you can:

(a) use VMWare or Hyper-V to create multiple OS instances on a single PC (each of which will require a separate PrimeOCR license), or

(b) (b) create multiple user accounts on the PC and run a copy of PrimeOCR in each user account (each of which will require a separate PrimeOCR license). However, a disadvantage is that some operating system versions allow for communications between user accounts, which can cause PrimeOCR operation problems. (If you do decide to attempt the multiple user account approach, create copies of the \bin directory and run each account from a different \bin directory. If using the Job Server, delete the ocrjob.nam file in each account. It will get regenerated automatically with a unique ID.)

Chapter 3 Installation

The installation of the PrimeOCR engine is composed of two simple steps:

- Installation of the software
- Installation of license

Software Installation

Run PrimeOCR_XXX.EXE that you downloaded.

The installation program will handle most installation issues automatically, including decompressing all files into a new or existing directory selected by the installer.

The directory will end up with the following subdirectories:

BIN	Executables required by PrimeOCR engine plus files for PrimeOCR Job Server and source code sample C program.
DOC	Manual, in PDF format (requires Acrobat [Reader])
JOB	Job file directory for the PrimeOCR Job Server application (used for sample jobs, user can use any directory)
Images	Image file directory for the PrimeOCR Job Server application (used for sample images, user can use any directory)

If you choose to install the Developer Software you will also get the following subdirectories:

LIB		Libraries required by PrimeOCR engine
SAMPLES		
	-C	Files for PrimeOCR C example application
	-VB	Files for PrimeOCR VB example application
	-C++NET	Files for PrimeOCR C++ NET based example application
	-VB NET	Files for PrimeOCR VB NET based example application
INCLUDE		*.h files for developer application development

Hardware Key vs. Software Key

PrimeOCR can utilize a hardware key or software key license.

The advantage of a hardware key is that it can be easily moved to a different machine, and with proper changes to the registry described in Chapter 3, allows PrimeOCR to run even if user does not have administrator rights. Its disadvantages include the need for a working USB (or LPT1 in some cases) port, and keeping track of the hardware key itself.

A software license cannot be moved to another machine, it is tied to the specific machine and that machine's OS/hardware configuration (see details below). It also requires that the user have administrator rights (if a page limit license is present). However, if the user does not have a working USB (or in some cases LPT1) port, or does not want to work with hardware keys, then this is another choice.

Information

A hardware key software driver must be loaded into the operating system to allow PrimeOCR to communicate with the key. Go to …\BIN\SENT and run SETUP.EXE to load hardware key driver. Reboot.

Hardware Key Installation

LPT1 based Key (for new customers we recommend instead our USB key)

If the user requests a LPT1 based hardware key, it must be installed on the LPT1 printer port for the PrimeOCR engine to initialize and run. Please use the supplied thumbscrews to securely attach the key to the port. If you have multiple hardware keys from different vendors you may have to experiment with the stacking order of the keys. A key usually performs best if it is the first key, i.e., closest to the PC.

The engine will periodically read the hardware key so the key must be present during all engine processing.

If you are receiving hardware key errors:

- Make sure the key is securely attached to the LPT1 port.
- Verify that LPT1 port is turned on in BIOS.
- Make sure that LPT1 traffic is not captured to a network printer.
- Remove the printer cable and any other hardware keys, if they are attached to the key.
- Note that only the hardware key supplied with the product will pass the engine's tests.

USB based Key

After installing the software, install the key into an active USB port on the PC. You may get a message from the operating system that it needs to load a driver for the USB device. If so choose the option that allows you to load the driver of your choice, change the directory to the BIN\SENT\Sentinel System Driver directory and choose the .INF file that is in that directory. You should reboot at this point.

The engine will periodically read the hardware key so the key must be present during all engine processing.

If you are receiving hardware key errors:

•Make sure the key is securely attached to the USB port.

•Verify that USB port is active.

•Note that only the hardware key supplied with the product will pass the engine's tests.

Software Key Installation

If a software key has never been installed on the target machine, and the user tries to run PrimeOCR (or any other Prime Recognition product), a temporary software license will automatically be created.

A permanent software license can be created (or a temporary software license extended) by running …\BIN\PRLICENSE.EXE. This will create the file …\BIN\PRLICENSE.LOG. Send this log file to your sales contact by email (or call him/her by phone and read the relevant data).

i

Warning

The file name of the PRLICENSE.LOG file can be changed. If you are updating multiple software licenses at one time, make sure to name the log file something meaningful that will allow you to associate that file name to the specific PC it came from.

Your sales contact will return instructions by which to update the license via PRLICENSE.EXE.

In some cases you may receive a program. The name may be SoftwareKeyWrite.EXE or a name that corresponds to the name of the log file you sent (particularly if you sent in multiple log files). Place this program in your …\BIN directory and run. You should get several dialog boxes indicating the progress and successful conclusion of the software license creation.

Software Key Hardware/OS Dependencies

The software license is specific to a particular machine. It cannot be moved (except via Prime Recognition). The license is also tied to three key items: the operating system installation (including Computer Name), the hard drive and drive designator in which PrimeOCR is installed, and LAN adapter IDs. Generally OS “in place” updates (including Service Packs but not including version upgrades) will not break the license. Generally if you plan on making changes to your system, we recommend you be on a Prime Recognition maintenance program. The maintenance program will include the ability to reissue/move licenses as required for any changes to your system.

Testing Installation Process

After the software and the hardware key have been installed, try running the application Prime OCR Job Server. If any errors occur then something is probably wrong with:

- The license. See *Hardware/Software Key Installation* sections.
- Your environment. Read *Chapter 2 – System Requirements* for the minimum system requirements of the PrimeOCR engine, and remove all other loaded programs.

PRIMEOCR.INI Configuration

A file called PRIMEOCR.INI is located in the \BIN directory. This file controls the configuration of selected items of the PrimeOCR engine. Most users will not need to view/modify the PRIMEOCR.INI file.

A copy of PRIMEOCR.INI file is not required for distribution. Items will default to those settings shown below if PRIMEOCR.INI is not present. Developers may also control these settings through the pr_configure_ini() call described in *Chapter 10 – Programming to the PrimeOCR API.*

To change the setting of an item merely edit the number after the "=".

Version=5.00

Indicates version of PRIMEOCR.INI file.

ShowProgressWindow=3

0=NO, 1=Independent Window, 2=Window within App window[old default], 3==Window within App window [default]
“ 0”- disable the display of the progress update window during PrimeOCR operation. This saves about 2% of CPU time.
"1"- places the progress window in a stand-alone window which can be moved by the user/developer.
"2"- places the progress window in a fixed position 330 units "Left" and 0 units "Top" relative to the parent application’s window. (See description for “3” below).
"3"- places the progress window in a fixed position 394 units "Left" and 0 units "Top" relative to the parent application’s window. If the parent window is not at least 394 units wide no part of the progress window will be visible. There is no way to change the position of the window except by Prime Recognition customization. However, you can install a callback function and receive the exact same messages, which you then can display in any way you choose.

ShowErrorsDialogBox=0

0=NO, 1=YES
Change this setting to 1 to enable more testing routines. If an error is found in these routines a dialog box will be displayed. (An error dialog box is helpful during testing but when the engine is put into production you don’t want to require that someone be available to push the “OK” button of the dialog box before your application can proceed to handle the error automatically.)

ImageDebug=0

0=NO, 1=YES - PR use only

PrintIntermediateResults=0

0=NO, 1=YES - PR use only

PrintIntermediateResults2=0

0=NO, 1=YES - PR use only

CompareDebug=0
0=NO, 1=YES - PR use only

RunOneEngine=0
0=NO, 1-X=YES - PR use only

Debug1=0
0=NO, 1=YES - PR use only

LogFile=0
0=NO, 1=YES
Change this setting to 1 to enable the generation of a text file that logs all major PrimeOCR engine activity, including calls made to PrimeOCR engine. This file is often helpful to Prime Recognition for remote technical support. The LOG file's default path and filename is "\BIN\PROCR.LOG". The default filename, path and size may be modified by OCR Job Server Setup or a “string option” (see *Chapter 5)* may be used.

ConfidenceBbox=9
0-9, 0 means none - 9 means all
Change this setting to the confidence level (proper range is between 0-9) to control which characters report a non-zero bounding box in the PrimeOCR output. For example, if your error correction application does not look at characters with confidence levels above 6, then you will save a small amount of CPU time, and file based output will be smaller, if you change this setting to 6.

WhiteSpaceIs0InImage=1
0=NO, 1=YES [Most common]
In most image types "0" means white (and black is "1"). If instead white is "1" in your image types then change this item to 0.

MostSignificantBit=0
0=PC, 2=UNIX
"0" is the correct setting for PC generated files. If your images came from a UNIX system you may need to change this setting to "2".

Engine1OnPC=1
Engine2OnPC=1
Engine3OnPC=1
Engine4OnPC=1
Engine5OnPC=1
Engine6OnPC=1
0=NO, 1=YES - PR use only

ChangeNTErrorReporting=1

0=NO, 1=YES

"1" is very strongly recommended. If set to "0" a fatal error in one of the conventional engines will cause a dialog box to pop up detailing the error. Only if someone manually clears the dialog box will the memory of the failed engine be cleared. If not cleared 5 to 10 engine failures will consume all of the memory of the PC and cause the PrimeOCR engine to fail. A setting of "1" causes the error to be reported to the Event Viewer and the memory of failed engine is reclaimed automatically and immediately. Many internal engine failures can occur without causing problems for PrimeOCR. **You must be logged in with Administrator privileges for this feature to work! (or see notes below)**

If the setting value is "1" then the PrimeOCR engine will read the "HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Windows\ErrorMode" setting in the Registry. If it is not "2" it will save the original setting and modify the registry setting to "2". On exit, the PrimeOCR engine will reset the registry entry to its original value.

This setting will also read the value for your default debugger program (often set to Dr. Watson) in “HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\AeDebug\Debugger" and reset it to blank for the duration of PrimeOCR processing. On exit PrimeOCR will reset this value.

If the OS is XP/Windows2003 Server then this setting will also read the values in “HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\PCHealth\ErrorReporting\DoReport” and “...ShowUI” and reset them to 0 for the duration of PrimeOCR processing. On exit PrimeOCR will reset these values.

If the OS is Vista, Win8, Windows 2012 Server, then this setting will also read the values in “HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\ Windows Error Reporting\Disabled” and “DontShowUI” and reset them to 1 for the duration of PrimeOCR processing. On exit PrimeOCR will reset these values.

If the OS is Windows 2008 Server then this setting will also read the values in “HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\ Windows Error Reporting\Disabled” and “DontShowUI” and reset it to 1 for the duration of PrimeOCR processing. On exit PrimeOCR will reset this value.

If the OS is Win7, Win8, Vista, Windows 20XX Server, XP SP2, Windows 2003 Server SP1 or later then this setting will also create\edit values in “HKEY_LOCAL_MACHINE,"SOFTWARE\Microsoft\Windows NT\CurrentVersion\AppCompatFlags\Layers”. A value name of “C:\PRDEV\BIN\ICRSRV32.EXE” (except with actual install path) with Data Type REG_SZ, and value of DisableNXShowUI is created. A second value is created except with an EXE name of …\XOCR32B.EXE. A third value is also created with the name of \PROCR8.EXE. If you need to make these last changes manually (see below), then we recommend you use an application in the Control Panel to make the same changes. The sequence to get to the appropriate screen is:

Control Panel\System\Advanced\Performance\Data Execution Prevention

If “Turn on DEP for essential Windows programs and services only” is selected no additional changes need to be made. However, if “Turn on DEP for all programs and services except for those I select:” is selected, then use the Add… button to select ICRSRV32.EXE, PROCR8.EXE, and XOCR32B.EXE (they will be in the install path\BIN, for example, C:\PRDEV\BIN).

Warning

Depending on your security settings, x64 versions of Vista, Win7, Win8, and Windows 20XX Server may require that changes noted above for DEP be performed manually by user.

IF YOU CAN NOT GIVE THE USER ADMINISTRATOR PRIVILEGES

Login as the administrator and make the changes to the Registry manually that have been described in this section. When the user, who does not have administrative rights, logs in and uses PrimeOCR, the proper Registry settings will already be in place. Warnings may appear in the LOG file that PrimeOCR was unable to change the Registry, but these warnings can be ignored since the Registry changes were already made elsewhere.

Warning

This means that if the original setting was "0" or "1", programs that happen to run during the same time as PrimeOCR will now fail in a slightly different way than before. Instead of an error message being sent to the Event Viewer and an error dialog box being generated, now, only the error message is sent to Event Viewer. A symptom of this behavior is an application that just "disappears" without the usual dialog box that indicates the cause of the fatal error.

Warning

If the engine is abnormally terminated during processing, for example, via GPF, or using the task manager to terminate PrimeOCR, then the registry settings are not reset.

PrimeOCR must have read/write permissions to the \BIN directory. If your user does not have admin rights then you may need to manually give the user read/write permissions to this directory.

TimeOut=2

# of seconds to add to internal formula which determines when an engine has ceased to operate correctly. The internal formula takes into account image size and complexity. Most users should leave at 2. If your images are particularly poor quality, your machine is slow, and/or you are running with a high number of CPUs (e.g. 4), you may experiment with a larger number, if you see a lot of "Engine bypassed" messages in the log.

PRIMAGE.INI Configuration

The PrimeOCR engine can perform many different image-preprocessing steps. A file called PRIMAGE.INI is located in the /BIN directory. This file controls the configuration of the image conversion/enhancement options of PrimeOCR.

A copy of PRIMAGE.INI file is not required for distribution. Items will default to the settings present in the PRIMAGE.INI file noted below.

To change the setting of an item merely edit the number after the "=".

[Color/Gray Image Binarization]

The following settings apply only to images that are sensed to be color, grey scale, or a non-standard format. These types of images must be converted to black and white (binarized) in the engine in order to perform OCR. These settings below will be applied during the binarization process (any part of the image that will be output from OCR is covered in the next section).

FixedThreshold=0

0-1. If set to 0 then image will be converted to black and white using dynamic thresholding (default - more sophisticated and often more accurate way of distinguishing text from background). If set to 1 then a fixed threshold will be used to distinguish text from background (a combination of Brightness and Contrast settings). This setting is only relevant in PrimeOCR, it is not present or implemented in other products).

Brightness=80

0-255 (If blank or "0" then value of 128 is used). This setting is used to threshold image in its conversion to a binary image for OCR purposes. If FixedThreshold=0 then 80 is a good value for OCR documents. If FixedThreshold=1 then130 is a good starting point. If your pages are always of a specific type, then you can experiment with different values of this variable to see if binarization is improved.

Contrast=230

0-255 (If blank or "0" then value of 128 is used). This setting is used to threshold image in its conversion to a binary image for OCR purposes. If FixedThreshold=0 then 230 is a good value for OCR documents. If FixedThreshold=1 then 80 is a good starting point. If your pages are always of a specific type, then you can experiment with different values of this variable to see if binarization is improved.

DesampleDPI=0

0-600, dpi to convert image to. If blank or "0" then leave dpi of image equal to original.

[Color/Gray Image Output]

The following settings apply only to images that are sensed to be color, grey scale, or a non-standard format. These settings will be applied to the image that is placed in the output file (e.g., RTF, PDF, etc.), or the .FIX output file, for example.

Binarize=0

0-1. If blank or "0" then output image (including any .FIX generated by the Job Server) will stay in its original color/grayscale format. If set to 1, then the output image will be in a black and white format (the same format used by the engine internally for OCR).

Warning

If left at 0 some image enhancement changes will not flow through to the output color image. For example:

Deskew, registration, and sub image actions will not be reflected in the original color image, leading to possible coordinate errors in PDF, RTF, HTML, or PRO output files.

Autorotation (strong and weak) will be reflected in the output color image (and coordinates in output files will be correct).

Despeckle, line removal, etc. do not change coordinates but these changes will not be reflected in the output image.

DesampleDPI=0

0-600, dpi of images that will be saved. If blank or "0" then leave dpi of image equal to original. This setting is used to control dpi of any images created by OCR engine, for example, image zones or full page images saved by engine. (Note that this setting does not impact image in PDF files.) Desampling the image can result in a much smaller output file (at the expense of image quality). (Only relevant if Binarize=0)

Compression=0

-100 to 100 (only valid for JPEG compression). If blank or "0" then average compression is used on image.
-100=Low compression. 100=High compression. Higher compression value decreases quality of image. This setting is used to control quality of any sub images created by OCR engine, for example, image zones. (Only relevant if Binarize=0)

Contrast=230

0-255 (If blank or "0" then value of 128 is used). Generally leave this setting at 0 unless some specific changes need to be made to image to make it more aesthetically pleasing to a viewer. (Only relevant if Binarize=0)

Brightness=80

0-255 (If blank or "0" then value of 128 is used). Generally leave this setting at 0 unless some specific changes need to be made to image to make it more aesthetically pleasing to a viewer. (Only relevant if Binarize=0)

[PDF2TIFF]

The following settings apply only to images that are input to the engine as PDF files.

Version=1

0,1,2. “1” is the default. “2” and “1” are the same technology but with slightly different error logic. This technology is faster in all black and white image scenarios than “0”. If the “1” version fails for any reason (for example, color or grayscale input image) then “0” version is automatically used. If the value of “2” is used, then if we sense the incoming PDF is corrupt we will report an error, as opposed to continuing to “0”. If you find a number of your images are strongly corrupt (“1” can handle small amounts of corruption), then the “0” technology will waste a significant amount of time trying to read these files, and you should choose “2” as your setting.)

ReadDPI=300

150, 200, 240, 300, 400, 600. PrimeOCR will automatically detect the resolution of the main scanned image in a PDF file and will use that resolution for conversion. If the software cannot detect the resolution, then it will use the ReadDPI value as the resolution.

AllowColor=1

0,1. “1” is the default. If you have no color or grayscale images then “0” is a faster setting.

DrawAnnot=0

0,1 “0” is the default. If set to “1”, and Version=0 above, and annotations are present in the incoming PDF file, then the annotations will be drawn into (i.e. included) in the image sent to OCR. Most customers should set this to 0.

SuperImpose=0

0, 2 “2” is the default.

If set to 0, PrimeOCR will create a new PDF output file.

If set to a number (not 0) and output is PDF, then PrimeOCR will create an output PDF by making a copy of the input PDF and inserting the PrimeOCR text into the copy. This allows you to preserve almost all functionality of the existing PDF (for example, document properties, hyperlinks, bookmarks, image compression, etc. But note that in some cases small changes may occur. For example, in some cases the PDF version number may change.)

If set to “2” and output is PDF, then PrimeOCR will look at each incoming PDF page. If a page contains text, this text will be removed from the image that is submitted for OCR but the remainder of the page will be OCR’d. So OCR’d text will be added to the PDF file in output, meaning that existing text plus OCR text will be available. This setting is useful if parts of the page were electronically produced, or parts of the page were already OCR’d , but other parts of the page still need to be OCR’d.

Note that image enhancements will not impact the image used in the output PDF, so autorotate results will not impact the final image, for example.

Also all the PDF configuration settings will be ignored since Prime is not creating the PDF.

Password=

If you are reading in a PDF file, and the PDF file is protected via password, you can supply the Password in this setting.

Alternatively, you can place the password in a simple ASCII file with the same name as the incoming image (and in the same directory), except with a PSW file extension. Or the password can be supplied by the PDF_SECURITY string option (see chapter 5).

[PDFOptimize]

The following settings apply only to PDF files that are output from the engine.

Version=1

0,1. “1” is the default. “1” is a PrimeOCR internal processes that perform optimization. If it fails it will try the “0” process. “0” represents using a local copy of Adobe Acrobat to perform optimization. If Acrobat is not installed on the local PC do not choose “0”, and, for example, if “1” fails it will obviously not be able to use “0” as the back up process.

There are some limitations of each approach. “1” will not optimize PDF/A or PDF files that contain bookmarks. “0” will only produce the native PDF file version of the Adobe Acrobat installed. For example, Acrobat v7.0 will only be able to produce PDF files that are version 1.6.

In many cases the following preprocessing steps can significantly increase OCR accuracy. This portion of the file controls the configuration of the image enhancement options of PrimeOCR. The settings for these features are exactly those of the ScanFix (TM) image-processing engine, which is embedded within the PrimeOCR engine.

The PRIMAGE.INI file controls the configuration of each image preprocessing step <u>BUT IT DOES NOT TURN ON THE STEP</u>. To turn on the step:

(A) If you are using the OCRJOB Server, you must set the proper parameters in the template file (using Wizard, PrimeView, or editing the template file directly).

(B) If you are programming to the API, you must make a call to pr_preprocess_image().

----PR_DESKEW

Automatically straightens skewed (crooked) images on the page. Seeks out either text or horizontal lines to establish the amount of skew and then corrects by rotating image.

mindetectlength=600

Minimum length in pixels of a run of text or a line used to detect skew. Longer is typically better.

maxacceptableskew=250

A value of 150 means 150 horizontal pixels for each vertical pixel of skew. 100 corresponds to 1% skew, 200 to 0.5% skew. Set higher for more precision. NOTE: Set to no more than 50% of the minimum detect length parameter. 150-250 works well with OCR.

deskewprotect=1

“0” turns off. If “1”, this feature will attempt to adjust rotational distortion into white space between letters. Deskew takes longer with this option but we recommend you use this setting for increased OCR accuracy.

----PR_HORIZONTAL_REGISTER

Aligns the image with a consistent left margin. Accurate to within 3 pixels on average (1/100"). Zoning and forms OCR require registration because page scan locations may vary up to 1/2".

resultantleftmargin=10

The amount of left margin, in pixels, remaining in document after registration. 150 pixels corresponds to 1/2 inch of margin at 300 dpi.

horzcentralfocus=0

“0” turns off. If “1”, do central focus analysis. This will ignore letterheads, footnotes, etc. in margin analysis.

horzaddonly=0

“0” turns off. If “1”, restrict margin adjustment to add margin only. This will assure that no portion of your image will ever be inadvertently lost.

horzignoreholes=0

“0” turns off. If “1”, ignore any punch holes on the left edge of the document.

horzlineregister=0

Set to the minimum length of a vertical line which is expected near the left of the image. Set to 0 for register detection when there is no line at the left of the image. This option is particularly useful with forms.

----PR_VERTICAL_REGISTER

Aligns the image with a consistent top margin. Accurate to within 3 pixels on average (1/100"). Zoning and forms OCR require registration because page scan locations may vary up to 1/2".

resultantuppermargin=10

The amount of upper margin, in pixels, remaining in document after registration. 300 pixels corresponds to 1 inch of margin at 300 dpi.

vertcentralfocus=0
"0" turns off. If "1", do central focus analysis. This will ignore left or right justified logos or page numbers, etc. in margin analysis.

vertaddonly=0
"0" turns off. If "1", restrict margin adjustment to add margin only. This will insure that no portion of your image will ever be inadvertently lost.

vertlineregister=0
Set to the minimum length of a horizontal line which is expected near the top of the image. Set to 0 for register detection when there is no line at the top of the image. This option is particularly useful with forms.

----PR_HORIZONTAL_LINE_REMOVAL
Removes horizontal lines from an image and can report their location. Greatly reduces OCR errors and false translations. Repairs intersected characters.

horzminlinelength=300
Minimum length in pixels of a line to locate and (optionally) remove. Set small enough to detect the shortest lines in the image, but not so short as to remove large text as well. See Maximum Line Thickness parameter.

horzmaxlinewidth=10
Maximum thickness of a line to be detected. Set smaller (thinner) to differentiate between large text and thinner lines of the same length.

horzmaxlinegap=0
Maximum allowed gap in any line in pixels. Insures complete removal of degraded lines. Set higher to remove lines in poor-quality images.

horzcleanwidth=2
Amount of cleaning of stray pixels to be done near a removed line. Set higher if line remnants remain in poor-quality images. Reduce if characters near lines are affected.

horzreconstructwidth=20
The maximum pixel width of characters to be repaired after line removal. Set higher if text is not being fully repaired. Set lower if you find erroneous reconstruction. Set to 0 to disable character repair. In that case, set Edge cleaning factor lower than the default.

----PR_VERTICAL_LINE_REMOVAL
Removes vertical lines from an image. Greatly reduces OCR errors and false translations such as I's, L's, and 1's. Repairs intersected characters.

vertminlinelength=300
Minimum length in pixels of a line to locate and optionally remove. Set small enough to detect the shortest lines in the image, but not so short as to remove large text as well. See Maximum Line Thickness parameter.

vertmaxlinewidth=10

Maximum thickness of a line to be detected. Set smaller (thinner) to differentiate between large text and thinner lines of the same length.

vertmaxlinegap=0

Maximum allowed gap in any line in pixels. Assures complete removal of degraded lines. Set higher to remove lines in poor-quality images.

vertcleanwidth=2

Amount of cleaning of stray pixels to be done near a removed line. Set higher if line remnants remain in poor-quality images. Reduce if characters near lines are affected.

vertreconstructwidth=20

The maximum pixel width of characters to be repaired after line removal. Set higher if text is not being fully repaired. Set lower if you find erroneous reconstruction. Set to 0 to disable character repair. In that case, set Edge Cleaning factor lower than the default.

----PR_INVERSE_TEXT

Inverse Text Correction automatically detects areas of inverse (white-on-black) text and converts it into normal (black-on-white) text. It will handle multiple zones of inverse text on the page and inverse zones of various shapes, such as rectangles, circles, ovals, etc.

invheight=50

Smallest vertical thickness of any inverse text area. Set higher to reduce false detects, lower to catch thinner zones.

invwidth=300

Smallest horizontal width of any inverse text area. Set higher to reduce false detect, lower to catch thinner zones.

invedge=10

The smallest horizontal distance between the edges of an inverse text zone and the inverse text itself. Decrease if inverse zones are missed. Increase if normal text is being treated as inverse.

----PR_DESPECK

The settings before “despeckhorizontal” control a special version of despeckle, i.e., Dot Shading Removal, which removes dot shading from text. THIS IS THE SAME DOT SHADING THAT IS IN THE PRIMEOCR JOB SERVER WIZARD.

despeckheight=300

Smallest expected vertical thickness of any dot shaded area. Set higher to reduce false detects. Set lower to catch thinner zones of shading.

despeckwidth=50

Smallest expected horizontal width of any dot shaded area. Set higher to reduce false detects. Set lower to catch thinner zones of shading.

maxspecksize=5

Maximum thickness in pixels of any dots in a shaded area. Increase to find larger dots. Decrease to prevent removal of small text.

horzadjust=0

Tweaks the horizontal component of the automated dot sizing function. Set higher if some dots survive dot shading removal. For example, a value of 2 will remove dots 2 pixels wider than usual. Set to -1 or -2 if text is being degraded.

vertadjust=0

Tweaks the vertical component of the automated dot sizing function. Set higher if some dots survive dot shading removal. For example, a value of 1 will remove dots 1 pixel larger than usual. Set to -1 or -2 if text is being degraded.

protect=3

"0" turns off. If "1", protects characters from removal damage in horizontal direction, "2" protects in the vertical direction, and "3" protects in both directions. We always recommend protection set to maximum level.

The next two settings control one of two different implementations of despeckle. Use despeckhorizontal and despeckvertical, or despeckisolated. Do not use both at the same time.

despeckhorizontal=0

Removes noise horizontally. Set to the width of larger specks. A negative number tries to protect characters from damage.

despeckvertical=0

Removes noise vertically. Only use if Horizontal De-Speck does not work .Set to the height of larger specks. A negative number tries to protect characters from damage.

This is the recommended implementation of despeckle (as opposed to despeckhorizontal & despeckvertical). Do not use both implementations at the same time.

despeckisolated=-2

Removes isolated noise. This is powerful and can be used in conjunction with normal dot shading removal. A negative number tries to protect characters from damage (a negative number is recommended). If this value is too large it can remove the "i" dots and/or periods.

----PR_SUBIMAGE

Use these settings to perform manual crop. Manual crop can be used to remove pixels from the left, right, top, or bottom of an image by the number of pixels you specify.

subimagetopedge=0

Number of pixels to crop from top of image. Set to zero (0) to leave edge as is.

subimagebottomedge=0

Number of pixels to crop from bottom of image. Set to zero (0) to leave edge as is.

subimageleftedge=0
Number of pixels to crop from left of image. Set to zero (0) to leave edge as is.

subimagerightedge=0
Number of pixels to crop from right of image. Set to zero (0) to leave edge as is.

subimagepad=0
Number of pixels to add to each edge of image. Set to zero (0) to leave edge as is.

----PR_ROTATE
1=90 degrees, 2=180 degrees, 3=270 degrees.

turnbefore=3
Rotate image before other processing.

turnafter=0
Rotate image after other processing.

----PR_PERIOD_REMOVAL - (Obsolete in PrimeOCR – Only supported in PrimeZone)
Removes “periods” (small black circles) that appear in a sequence. (Some times called dot leaders.)

maxperiodheight=10
Maximum height (in pixels) of “periods” (small black circles) to remove.

expectedfrequency=20
Average number of pixels between the centers of periods.

----PR_SMOOTH

smooth=1
Does 'Sand and Fill' smoothing of your image. The value indicates the length in pixels of nicks or bumps that will be smoothed. Too large a value will produce a squaring effect on characters. We recommend a value of 1 for most images. 0 disables this feature.

----PR_AUTOROTATE
Use these settings to perform automatic image rotation. PrimeOCR will attempt to recognize the orientation of the image and adjust to the proper orientation.

autoportrait=1
If “1”, this feature will automatically detect if print is portrait oriented. If it is not, the image will be rotated 90° so that it becomes portrait.

autoupright=1
If “1”, this feature will detect if the image is upside down. If it is it will Rotate the image 180°. It works well in conjunction with AutoRotate - Portrait.

autorevert=0

If “1”, any automatic rotation will be undone after all image enhancement is complete.

----PR_CROP

IntelligentCrop can be used to automatically remove thick black or white borders from an image.

cropblack=1

If “1”, this feature will remove black noise from the edge of the image no matter how large the black noise is.

cropwhite=0

This feature removes excess white from around your entire image. The value you supply is the number of pixels of white edge left around the entire image. Note that this happens BEFORE registration. Set to 0 to disable.

----PR_GROWTH_EROSION (or PR_DILATION_EROSION)

This feature allow you to adjust blocks of characters (pixels, actually). Using these functions, you can bring out faint text, de-emphasize bold text, join dot matrix text into something better readable by PrimeOCR, and smooth out the edges of jagged text. Settings that are too large will connect characters, or character features incorrectly, causing OCR errors.

Some users prefer the terminology of “growth” to “dilation”.

dilation=1

Grow image by this amount in the vertical and horizontal directions. Try 4 to join dots in dot-matrix print.

erosion=1

Erode the image in the vertical and horizontal directions (that order). If you are using a value of 4 in dilation, try an erosion of 2 or 3. This will remove excess thickness.

options=

Allows the use of ScanFix string options. NOTE: Not all string options are supported, please contact Prime Recognition for more information.

OCRJOB.INI Configuration

The OCRJOB.INI file, located in the \bin directory, is used by the OCR Job Server. This file can generally be ignored by most users. But there are some settings that users can modify for specific functionality.

To change the setting of an item merely edit the number after the "=".

Check4Text=0

0,1,3. “0” is the default. If set to “1”, this checks the box for “Copy PDF file to output directory” in Setup. “0” and “1” are set automatically. You can manually change this entry to “3”. In this case, files that have a specific PDF structure will be copied to the output directory. The specific structure is one in which more than one image file is present on any page in the PDF file. If you go into Setup and change the “Copy PDF file to output directory” setting, then the value will revert back to “0” or “1”. (If you have any special needs in this area please contact Prime and we might be able to develop a value for your application.)

StrongBinarization=0

0-900 If this setting is 0 then a single pass dynamic thresholding will take place with the settings noted above. If this setting is not 0 then PrimeOCR will automatically iterate around the dynamic thresholding settings above, searching for the best settings. A good starting value would be 830. If the initial confidence result of an OCR pass does not reach that confidence level (830 for example) then PrimeOCR will continue to process through a number of iterations, using different DynamicBrightness settings until it can maximize the confidence result. The resulting settings will be saved in the PRIMAGE.INI file (to speed up processing of later pages that have the same characteristics). Enabling this feature will significantly increase processing time if image characteristics are continually changing.

MaxConsecutiveErrors=0

0-2,00,000 If this setting is not 0, then if this many consecutive errors occur in the Job Server it will stop processing. If set to 0 then the limit is automatically set to 2,000,000 (effectively no limit). This feature prevents the Job Server from generating errors for a large set of images, if it stuck in a condition in which it will always fail.

SortOrder=1

1 or 2 or 3. A value of 1 (default) sorts incoming image files to be processed in alphabetical order. A value of 2 will sort those files by the modification time of the image file (earliest files are processed first). A value of 3 will sort the files by the creation time of the file. If user has selected to process a directory PLUS its subdirectories (e.g. *.tif+ in the job file) then the order in which the subdirectories is also processed by time. (Note that all directories are sorted by time, so the order of directories processed may jump back and forth between different subdirectories or upper level directories).

Testing the Development Environment (Developers Only)

Prime Recognition has supplied a simple application for use in development, called PREXC32.EXE. It is available as source code and in a compiled version. Run the PREXC32.EXE from the \BIN directory. Once the supplied example application runs correctly, try to compile it from the supplied source code and make files. Some compilation issues are covered in *Chapter 10.* If you are not using Visual C++, you will need to consult the documentation for your programming tools. Errors at this point will most likely be a mismatch between the supplied PrimeOCR source code and your development environment.

Again, we very strongly recommend that you do not proceed any further until you are able to get the PrimeOCR example code working in your environment. Once a working example of the code is available then problems with your application can be much more easily isolated to the differences between your code and the example application.

We highly recommend that you use our code as a starting point for your development, if possible, and incrementally modify the code, testing at each significant modification. So long as the PrimeOCR example code is used in conjunction with our engine, you can modify it as much or as little as you like with no royalties or any other legal hindrance.

PATH

If you locate your application in the \BIN directory no PATH modifications are required. If you wish to move your application to another directory then:

-The \BIN directory must be added to the PATH statement. Call Prime Recognition if you need help in changing the PATH operating system settings.

Warning

During the use of a development tool such as Visual C++, set the output file name (for the application) to the \BIN directory. Otherwise, if you let the output executable default to \WINDEBUG, for example, then the engine will fail to initialize since the executable is not in the \BIN directory.

Distributing the PrimeOCR Engine (Developers Only)

Once you have finished developing the application that interfaces to and controls the PrimeOCR engine you will want to distribute the PrimeOCR engine and your program to your production environment. A license is required for each PC in your production environment.

Please contact Prime Recognition to receive a package of installation files. An installation of a run time PrimeOCR engine requires the following setup:

-A \BIN directory with all files that are in the development \BIN directory (except for PRIMAGE.INI, PRIMEOCR.INI, PRBACKUP.*, PRCONFIG.*, OCRJOB*.*, PREXC32.EXE)

- All files from …OCR\OCRSYS32 directory put into …\WINDOWS\SYSTEM32 directory.

-If you will be processing color/gray scale input files :

- o A …\WINDOWS\PIXTRAN directory with all files that are in the …OCR\PIX\PIXTRAN directory.
- o All files from …OCR\PIX\SYSDIR directory put into …\WINDOWS\SYSTEM32 directory.
- o All files from …OCR\PIX\SYSTEMNT directory put into …\WINDOWS\SYSTEM32 directory.

-If application is not in the \BIN directory then the PATH must point to \BIN directory.

-Installation of hardware key software drivers (unless you are using Prime's software license system. Note that the software license system requires that Prime generate the license file):

> -Run the hardware key software drivers setup program. The program, SETUP.EXE, is located in the "SENT" directory on the installation CD.
>
> -The setup program will auto-detect the operating system and install the correct hardware key software drivers.
>
> -Re-boot the computer after the drivers have been installed.

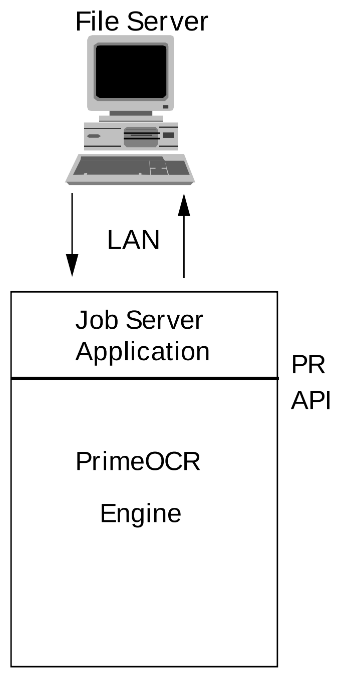
You may use the Prime Recognition installation program to install a run time license. It may generate subdirectories and files that are not required for your run time installation. You may erase these extra files and directories at your option.

Chapter 4

PrimeOCR Job Server

Overview

The PrimeOCR Job Server is an application, written by Prime Recognition, that controls the PrimeOCR engine. The PrimeOCR Job Server is designed to read “jobs” from a user specified directory, configure and start the PrimeOCR engine processing, and then place the PrimeOCR results in a user specified output directory. If it encounters a recoverable error it writes the error to an error file and continues processing.



A “job” is a simple ASCII text file that is created automatically by the PrimeView tool, by a user application or manually. At the end of this section is a detailed description of the "job" file format.

Because "jobs" are files, and the output from the PrimeOCR Job Server are files, the PrimeOCR Job Server can be located on the same PC as the application generating the job files, or anywhere on LAN/WAN network where it has file access. Since the job server's architecture is file based it is not dependent on any specific network protocols, or even the operating system of the computer generating the job files. For example, a UNIX machine could be generating the "job" files and submitting them to a PrimeOCR Job Server across a WAN in another state.

The Job Server queue can contain multiple job files, waiting for processing, and new jobs can be added at any time. This means that many PrimeView stations, or user applications, can be sending jobs to the Job Server. The Job Server's simple architecture also means that you can set up multiple Job Servers, so that OCR output can be increased simply by adding more Job Servers.

A typical, simple, test installation will have one PC on the network creating jobs with the PrimeView tool. The jobs will be automatically saved to a user specified directory on a file server. The PrimeOCR Job Server, on a separate dedicated PC on the network, will be polling this directory for jobs. Once it senses a new job the Job Server reads it in and processes it. The results from the PrimeOCR engine are saved to another user-specified directory on the file server.

All of these same steps may take place on a single PC, as might be common in very small applications, or the initial evaluation and testing of the PrimeOCR engine.

Note

OCR is very CPU and memory intensive. If you will be processing a significant amount of documents we recommend that a PC be dedicated to the PrimeOCR engine.

The PrimeOCR Job Server reads the job file to identify which images to process and how to process those images. The "how to" information is described in a "template" file, a simple ASCII based text file. The format and settings of the template file are described later in this chapter.

Key Features

The flexibility of the job and templates files means that a wide variety of processing methods are available including some very powerful techniques, for example:

-Process all images in a directory by specifying "*.tif" in the path
-Process all images in a directory AND subdirectories by specifying "*.tif+"
-Process some images in a directory AND subdirectories by specifying "*text*.tif+"
-Use one template file for all images or specify a unique template file for each image
-Multiple Job Servers can work on one job at the same time.

Jobs can be prioritized. Two job input directories exist, one of them is “low priority”, any job submitted to this directory only is performed after jobs in the regular directory have been completed.

A report on the average confidence level of each image is created called "CONFID.TXT". This report allows you to, for example, only verify images that fall below a confidence threshold. The image path, page number, average OCR confidence level (100-900), number of characters, and the time required to perform OCR (seconds), is reported on each line in the file.

Multipage TIFF files can be processed. Output for each image is automatically appended into one file so that one multipage TIFF file generates one output file.

Fault tolerance is built in at several levels. The PrimeOCR engine has several fault tolerant features plus the Job Server has several additional features, including automatically handling of “exceptions” (normally would cause a “GPF”, Job Server captures exception and keeps on going). For those rare occasions where something gets past all the other safeguards the Job Server has an "Automatic Restart" feature that will relaunch the Job Server automatically.

Email notifications can be sent based on certain events (or lack of events) in the Job Server. These events include:

-Job is completed
-A completed Job has errors
-Predicted Job completion date/time (updated after 1000 pages have been processed)
-“Heartbeat”, i.e. hourly updates as to how many pages have been processed
-No Jobs are available to process
-Job Server is not running

Configuration of the email notifications is in the …\BIN\PREOUT.INI file, along with detailed instructions at the bottom of this file.

Simple OCR Job Server Tutorial

1. Double click on the PrimeOCR Job Server icon.
2. Click on "Setup" menu item/button.
3. Configure the Job Server by clicking on each “Setup” menu choice and making choices as noted in the “help” window, in particular point the "Job Directory" to the directory to which you will be placing your job files. (We suggest you leave the default "\JOB" in place, there is an example job file, "EXAMPLE.JOB" already in that directory.)
4. Click on the "Wizard" button and follow directions to create a new template and/or job. Be sure to save job to Job Directory.
6. Click on the "Start" button.

Starting Job Server

Clicking on the PrimeOCR Job Server icon brings up the main screen. Select the "Start" button to begin processing. To start the engine programmatically (no manual intervention), execute the OCRJOB32.EXE with "START" in the command line. For example,

```
        WinExec("ocrjob32.exe START", SW_SHOW);
```

Stopping Job Server

Press "Stop" button during processing. The server will not stop until it has completed the current page. If the server is processing a multipage TIFF, and not all pages have been completed, then a message box will warn the user that if the Stop action is confirmed, the partial output file will be deleted. In other words, all pages processed to date in this file will need to be reprocessed when the job is started up again.

Error Reporting

If any errors occur during processing an “Errors: X” entry will show up in the user interface. The X indicates the number of errors that occurred but were captured, handled, and logged as processing continued.

Errors are logged to a file called "PROCR.LOG". If you are trying to understand any unusual behavior or problems with the Job Server we strongly recommend you review this file.

This file holds the date, time, image file, page number, and explanatory message(s) for a single error on each line in ASCII format. The file is limited to 1MB in size. Once the file reaches this size it is saved to "PROCR.001" and another PROCR.LOG file is started.

The PROCR.LOG, PRIMEOCR.INI (configuration file for PrimeOCR), and CONFID.TXT file are available from the user interface menus.

Note

An error during the processing of a multipage image file will cause the erasure of the output file. This is done to preserve the integrity of the multiple page output file. This means that the OCR results of all pages processed up to that point within that multiple image file are lost.

Note

During processing the Job Server will generate a “XXX.BLK” file in the output directory, where XXX is the file name of the target image. This file is used for several purposes. If the image is successfully processed this file is removed. However, an error in Job Server processing will cause the BLK file to remain. If the Job Server is restarted on this “JOB”, it will look at any existing BLK files, and try to reprocess the corresponding image files. If it fails again on a file the BLK file is modified so that the Job Server will bypass the image file on any further processing. This allows the Job Server to continue onto other jobs, leaving behind flags for the operator that signal which files could not be successfully processed.

Job Status

The Job Server displays the job status of the job being processed and displays a list of jobs that have completed processing. Once a job is done processing the Job Server displays the total of image files processed, if there were any errors associated with the job, and if the Job Server processed all the files described in the job. If the Job Server processed all of the files within a job the job is considered complete.

For users that require job completion information across a network the same tabulated information can be found in the “JOB_RESULTS.LOG” file found in the /BIN directory. This file includes the date and time the job finished processing.

Configuration

Select "Setup" menu item/button from the main screen. Help text is available within the Setup screens.

Creating Jobs & Templates

There are several ways to create a template and/or job files:

1. Click on "Wizard" button and follow directions. This method is fast but does not cover all options nor does it allow you to setup individual zones.

2. Use PrimeView tool. This tool covers almost all options and allows you to draw individual zones with the mouse.

3. Create your own job and template files directly, perhaps manually using a text editor, or automatically through your own program. The following sections will describe the job and template file formats. The job and template file formats are ASCII based and are open formats. You may use these formats without restriction so long as they are used with a Prime Recognition product.

Running as a Service

Some users prefer to run OCR as a Windows Service for security reasons. This allows the product to operate without logging into the PC. See Chapter 12 for more information on running OCR Job Server as a Service.

Job File Format

A job file is, in essence, a five line text file that can be created by the user using a text editor. Prime Recognition's PrimeView tool automatically creates job files, as does the OCR Job Server Wizard, or the developer may create these files. An example job file is included in the \JOB directory as "EXAMPLE.JOB".

The first non header line is the number of image/template pairs in the job file that will be processed. The second line is a path to the first image(s) that must be OCR'd. The third line is a path to the "template" file (zoning information and OCR engine configuration information.) The image path may point to one image, a whole directory, e.g., "C:\IMAGES\*.TIF", or a directory and its subdirectories, e.g., “C:\IMAGES\*.TIF+”. The image file name can also be “*Text*” which will only process images that fit this wildcard criteria. Here are some valid examples: *001.tif, *001*.tif, 001*.tif, etc.

Job files must have a ".JOB" extension.

Example Job File:

```
Prime Recognition Job File      (Header 1)
Version 3.90                    (Header 2)
2                               (Number of image/templates pairs to follow)
c:\images\4931.tif                       (full path to first image)
c:\templates\test3.ptm          (full path to first template)
c:\images\nov2.tif                       (full path to second image)
c:\templates\fullpage.ptm       (full path to second template)
```

The key concept is an image/template pair that is repeated for as many images that need to be processed. You can process a number of images in one job or put each image into a separate job, there is no appreciable difference from an OCR standpoint.

Special Cases

1. If you specify "C:\IMAGES\*.XXX" the OCR engine will process all images in the directory with the ".XXX" extension (“XXX” may be “*”, as in “*.*”). This job must be limited to one image/template pair. All images will be OCR'd with the one supplied template. If you append a "+" at the end of the image path then all subdirectories will also be processed (subdirectories found will be processed in alphabetical order, with directory names ordered with case sensitivity). You can specify the template path with a "*.PTM". In this case, template files with the same name as the image file (but with a ".PTM" extension) and in the same directory as the image, will be used for processing.

2. If you leave the template entry blank (there must be a blank line to indicate this) then the OCR engine will OCR the image with the last known template supplied in this job. For example, you can submit a list of images, and just one template, and all images will be processed with this template.

3. Special commands may be used within the job file.

Image Path Special Command Examples are below. Note that multiple commands can be used at the same time. In most cases (but there are exceptions noted below) the commands only apply to the image(s) in that image path.

A. FASCIITAG If the symbol “|FASCIITAG” is added after the image path, any string placed after this phrase will be reported as a user tag in the first page of FASCIITAG format output.

B. APPEND/ APPEND_DIRNAME If the string “|APPEND” is added after a "*.image_extension" image path (including "*.tif+" for example), all output in a directory will be saved to one collated file in that directory. The name of the output file will be the name of the first file in the directory. Here is an example of the image path line:

```
c:\prdev\images\*.tif |APPEND
```

Special case: If you have selected the output to go to a fixed directory, and have not chosen to preserve the directory structure, then the file name in each input directory must be different, otherwise output files with the same name will overwrite each other.

Do not use this feature when pages might be skipped or processed out of order, for example, High and Low priority job directories are being used, or Skip files with existing output is selected.

If instead of APPEND you use APPEND_DIRNAME, the output file name will be the name of the directory in which the files are located (instead of the first file name).

C. OUTPUTPATH If the string “| OUTPUTPATH c:\output” is after the image path, all output will be placed in this directory (preservation of directory structure does not occur). (c:\output is just an example, you can specify the output directory). If you have specified an output path in “Setup\Save output to a different directory”, this OUTPUTPATH directive overrides the Setup value.

You can use use both APPEND (or APPEND_DIRNAME) and OUTPUTPATH in the same job line, for example:

```
c:\prdev\images\*.tif |APPEND |OUTPUTPATH c:\output
```

D. OUTPUTSUBPATH If the string "| OUTPUTSUBPATH c:\output" is after the image path, all output will be placed in this directory (partial preservation of directory structure does occur, the hard coded directory structure before "*" in the image path is not preserved, only any sub directory structure that is discovered in the "*" area of image path). (c:\output is just an example, you can specify the output directory). If you have specified an output path in "Setup\Save output to a different directory", this OUTPUTPATH directive overrides the Setup value.

You can use use both APPEND (or APPEND_DIRNAME) and OUTPUTSUBPATH in the same job line, for example:

```
c:\prdev\images\*.tif |APPEND |OUTPUTSUBPATH c:\output
```

E: IMAGE+OUTPUTEXT If the string "|IMAGE+OUTPUTEXT is added after image path, all output will in the format of IMAGEFILENAME.OUTPUT_EXTENSION (the most common/default way of naming output). This setting, once used, will not reset on the next image or job. Only stopping/restarting the Job Server will cause it to read the settings from Setup and potentially changing the output naming back to those settings.

F: CONTROL If the string "CONTROL" is the only text on the template line, then the Job Server will expect to find a template file, called "control.ptm" in the same directory as any image found (including any subdirectories).

G. CHANGE_SETTINGS If the string "| CHANGE_SETTINGS c:\test" is added after image path, all files in c:\test (as an example) will be copied from c:\test to ..\bin directory. Job Server will reinitialize internally and close/open PrimeOCR engine. If the c:\test path holds all files used to configure Job Server and PrimeOCR engine (e.g. all INI files and USER_DICT.TXT), then this allows you to reconfigure for each JOB.

Here is an example of the image path line:

```
c:\prdev\images\*.tif | CHANGE_SETTINGS d:\job1settings
```

For example, if you wished to use some specific string options for job1, you would manually setup the Job Server as usual for that job1 (using Setup button). Then save all INI files from …\bin into d:\job1settings. When you create the JOB file for job1, use the Wizard as usual. Then open the job file in Notepad (or equivalent editor) and add:

```
| CHANGE_SETTINGS d:\job1settings
```

to the end of image line in the job file.

When you run that job, the INI files from d:\job1settings (which hold the string option settings along with all other configuration data) will be copied to your …\bin directory and the Job Server will run with these settings.

Note that these settings will then be used for any later jobs as well (unless you manually use Setup or other methods to change the settings) or unless you use a different CHANGE_SETTINGS value to change the values.

Template File Format

A template file is a multi line text file that can be created by the user. Prime Recognition's PrimeView tool automatically creates template files as does the OCR Job Server Wizard. An example template file "FULLPAGE.PTM" is included in the \JOB directory.

The first non header line of text sets the OCR configuration items that are relevant across the whole document, the second line describes configuration data for the first image/page within a document, the third line describes the number of zones within the page, the fourth line (and other lines if any) describe the relevant OCR configuration settings for each zone.

If multiple pages exist within a document then the page configuration data line is repeated, followed by the number of zones on this page, zone configuration lines, etc.

Template files can have any extension but the standard extension is ".PTM". (.ACC is a special template format for use in creating PDF files that conform to Section 508 accessibility requirements. See Chapter 5, PDF_DEFAULTS for more information).

Example Template File:

```
Prime Recognition Document Template      (Header 1)
                                         (Header 2 - not currently used)
Version 3.90                             (Header 3)
3,2                                      (Document Configuration Settings)
1,0,0,0,10,1,12,0,0,0                    (Page 1 Configuration Settings)
2                                        (Number of zones on Page)
0,0,1,090099,100,200,6700,5000, R95T     (zone 0 description)
1,0,1,090099,100,5000,6700,9000          (zone 1 description)
2,0,0,0,10,0,3,0,0,0                              (Page 2 Configuration Settings)
1                                        (Number of zones on Page)
0,0,1,999999,100,200,500,5000            (zone 0 description)
```

Document Configuration Settings

Based on 2 numbers separated by commas.

Label	Example	Description	
Output Format	"3"	"0"	ASCII
		"1"	Formatted ASCII (add left edge space and blank lines to mimic original image).
		"2"	PDA
		"3"	Prime OCR format (".pro") format
		"4"	ASCII but no lines separate zones
		"5"	RRI3 (RRI Version 3)
		"6"	FASCII with user tag at top of page
		"7"	ZyIndex Version 3.0 format
		"8"	PRSTAR format
		"9"	RTF format
		“10”	ASCIITAG format
		“11”	PDF - Normal
		“12”	PDF - Image Only
		“13”	PDF – Image plus hidden text
		“15”	Comma Delimited
		“16”	HTML
		“17”	FASCII with average confidence of document on first line of file
		“18”	FASCII without white space improvement logic
		“19”	FASCII with logic to remove hard line feeds at end of each line and put text into paragraphs
		“20”	Tab delimited – tabs inserted between output of each zone
		“21”	XML/Word – Words reported with associated coordinates (in pixels), UTF-8 characters
		“22”	XML/PRO – PRO format except in XML style, UTF-8 characters
		“23”	PRO UNICODE – PRO format except recognized characters are in Unicode hex format (each character becomes a 4 character hex sequence).

Select PrimeOCR format if you want confidence levels, character data, and other data included in the output. See *Chapter 6 – PrimeOCR Output Formats* for more information.

PDF

If PDF is the output format we recommend you select autozoning (see Autozone section below).

Label	Example	Description
# Pages	"1"	Enter number of pages that will be OCR’d. Note that not all pages in a multipage TIFF file must be OCR’d.
		"-1" Means process all pages within document with following settings. Relevant if you want to process all pages in a multipage TIFF file with same settings.

Page Configuration Settings

Based on 10 numbers separated by commas.

Label	Example	Description
Page Number	"1"	Page number of image that appears in original TIFF file. If a multipage TIFF file then this number may be between 1 and # of images in multipage TIFF file. It does not have to be consecutive.
Document Source	"0"	"0" This page is not from the same document as the last page processed by the engine. "1" This image is from the same document, it has exactly the same fonts as the previous image processed by the engine. Most users will set to "0".
Image Quality	"0"	"0" Default quality setting. "1" Poor quality setting. For the vast majority of documents "0" is the correct choice.
Print Type	"0"	"0" Machine Print "1" Dot Matrix Print "2" Machine Print Fixed Pitch Do not select dot matrix unless the text is a series of unconnected dots, i.e. 9 pin Dot matrix, or badly broken characters.
Language	"10"	"0" Danish "1" Dutch "2" French "3" German "4" Italian "5" Norwegian "6" Portuguese "7" Spanish "8" Swedish "9" U.K. English "10" U.S. English “12” Chinese (Simple) “13” Chinese (Traditional) “14” Japanese “15” Korean “16” Russian

Special Cases:

“-1” Automatically identify and set the main language based on each page in a document. If Asian Languages are installed it will check all languages (rather slow). This value is created by the Wizard when Automatic ID is selected.

“-2” Same as –1 above except no Asian languages are checked, even if they are installed (significantly faster than –1).

-16 If this number is added to above numbers, Russian Language will be included in the ID (again decreases speed further). For example, -17 (-1 + -16) will check European languages, Asian languages, and Russian.

-100 If this number is added to the above numbers, only the first page in a multiple document will be checked. All later pages will use the language identified on page 1. For example, -117 (-100 + -1 + -16) will check all languages, including Asian and Russian on the first page only. All later pages will be recognized with the language identified on page 1.

Asian Languages

If you select an Asian language, we recommend you also select some type of autozoning.

Deskew	"1"	"0"	Do not perform Deskew
		"1"	Perform Deskew if skew is > 1%.
		"2"	Perform Deskew but do not adjust any zone coordinates supplied in the template for the amount of skew. This setting is appropriate if you are sending a “static” template to the engine that is good on deskewed images.
		"3"	Perform Deskew but do not adjust any output coordinates supplied in the PRO file for the amount of skew. This means that the data in the PRO file will match the deskewed image, not the original image supplied to engine.
		"4"	A combination of “2” and “3”.
Image PreProcess	"12"		Add together the values of each desired image preprocessing steps noted below.
		“1”	PR_HORIZONTAL_REGISTER
		“2”	PR_VERTICAL_REGISTER
		“4”	PR_HORIZONTAL_LINE_REMOVAL
		“8”	PR_VERTICAL_LINE_REMOVAL
		“16”	PR_INVERSE_TEXT
		“32”	PR_DESHADE
		“64”	PR_DESPECK
		“128”	PR_SUBIMAGE
		“256”	PR_ROTATE
		“1024”	PR_SMOOTH
		“2048”	PR_AUTOROTATE
		“4096”	PR_CROP
		“8192”	PR_GROWTH_EROSION

For example, “12” is PR_HORIZONTAL_LINE_REMOVAL(4) + PR_VERTICAL_LINE_REMOVAL(8).

This setting will turn on the feature(s). To configure a feature you must edit the \BIN\PRIMAGE.INI file. The settings of the PRIMAGE.INI file are exactly those of the ScanFix product and are documented in *Chapter 3*.

Warning!

Be conservative in selecting image enhancement steps. Only select steps that you know are beneficial. Many image enhancement steps can harm image if target “defect” is not actually present. A common misconception is that image enhancement steps are automatic and “safe”. This is not the case.

We do not recommend selecting PR_AUTOROTATE if the recognition language is one of the asian languages.

AutoZone	"0"	"0"	No Autozone
		"1"	PR_SEGMENT Find only text zones and report in order of top to bottom.
		"2"	PR_ZONE Find only text zones and report in “reading order”.
		"3"	PR_CGS Custom zoning version. Call Prime for more information.
		"4"	PR_SEGMENT_IMAGE_TEXT Find text and image zones. Report in order from top to bottom. (See *Image Zone Numbering* section later in this Chapter).
		"5"	PR_ZONE_IMAGE_TEXT Find text and image zones. Report in reading order. Image zones are saved in same directory as original image with the same name as the image plus an extension that denotes the number of the image in this document (See *Image Zone Numbering* section later in this Chapter).
		"10"	PR_OBJECTS Find text zones. Report in order from top to bottom. This is best used when text is not in columns but is in “clump”, e.g. small paragraphs or phrases of text. Examples, would include invoices.
		"11"	PR_OBJECTS_ENGINEERING PR_OBJECTS with small enhancements designed for engineering drawings.
Auto Rotation	"0"	"0"	Do not Auto Rotate
		"100-900"	OCR confidence value below which auto rotation sensing is performed. "700"

is a good setting.
This auto rotate feature is much more accurate but a lot slower than PR_AUTOROTATE feature described in ImagePreProcess above. If only a small percentage of images are rotated then use this feature, as Auto rotation will only be attempted on a small number of images and therefore speed will not be a problem. If you have a lot of images that are rotated use both PR_AUTOROTATE (for speed) and Auto Rotation (to catch and correct PR_AUTOROTATE mistakes).

Save Image	"0"	"0"	Do not save image
		"1"	Save image that is in memory after image processing and after recognition. This will save the image to the output path (note that this may be or may not be same path as original image) with the same file name as the original image except with a ".FIX" extension.
		"2"	Saves image with same name as original file including extension. Note that if output is going back to directory in which original image file was present, this setting will cause the original image to be overwritten by new file.

Number of Zones on Page

A single number.

"2" The number of fields or zones on this page of image. The configuration data of these zones is in "Zone Description" below.

Zone Description

Based on 8 numbers separated by commas. An optional ninth string can be added to this description.

Label	Example	Description	
Zone Number	"0"	Zone numbers must be consecutive from 0 to number of zones -1.	
Zone Restrictions	"0"	"0"	No restrictions
		"1"	Alpha only
		"2"	Numeric only
		"3"	No restrictions - upper case
		"4"	No restrictions - lower case
		"5"	Alpha only - upper case
		"6"	Alpha only - lower case
		"7"	OMR
		"8"	Image

See *Appendix A* for a listing of characters that fall within each restriction.

Other Settings

"9"	Anchor Region – Used by PrimeZone
"10"	Anchor Region – Used by PrimeZone
"11"	Barcode. See prbarcode.ini for configuration information.

Lexical Check	"1"	"0" No lexical check, however, extra weight is given to characters that fall within each restriction. "1" Perform lexical check on output. Any character that is not within restriction group is changed to a "?" and given a confidence value of "1". Lexical check is not valid for OMR, or Image zones. "1X" Perform Lexical Check PLUS on output where X can range from 1-9 and represents the confidence level of a character in a word that will trigger a Lexical Check PLUS of the word. Lexical check PLUS configuration is controlled by the PRLEXICA.INI file in the INSTALLATION\BIN directory. This file also documents what functions the Lexical Check Plus performs. (See *Lexical Check* section in Chapter 1). Finally, special features of Lexical Check PLUS (or Lexical Plus) are implemented in LEXPLUSPRO.INI in the INSTALLATION\BIN directory.
Accuracy Level	"990099"	Range from "1" (i.e. "000001") to "999999" Determines which engines run and what weight they are given in processing. For example, "699077" would mean: -run sixth engine, give it a 6 weight -run fifth engine, give it a 9 weight -run fourth engine, give it a 9 weight -do not run third engine ("0") -run the second engine, give it a 7 weight -run the first engine, give it a 7 weight HOWEVER, we strongly recommend most users should give each engine licensed a value of "9" and stay with standard configurations as follows: Level 1 9 Level 2 99 Level 3 90099 Level 4 99099 Level 5 99999 Level 6 999999
Left Dimension	"0"	"0" Automatically sense the left edge of the image (useful when you just want to OCR the whole document as one zone. You cannot enter "0" if there is more than one zone.) Otherwise you should enter the left edge of the zone on the image in units of 1/1200 of an inch. For example, if the zone starts one inch in from the left edge the value would be "1200". A negative number means move in from the left edge of the page by this amount. Proper values must be >-196200 and <196200.
Top Dimension	"0"	See left dimension description.
Right Dimension	"0"	See left dimension description.

Bottom Dimension	"0"	See left dimension description.
Zone Text	"R95T"	Optional string. This string can be up to 100 characters in length. If this string is part of an ACC style PTM file (see PDF_DEFAULTS in Chapter 5), then this alternative text for a zone in a PDF file. Otherwise this text is ignored by PrimeOCR.

We can easily extend the job, template, or zone definitions to include other configuration issues. Please contact Prime Recognition to discuss your specific needs.

Image Zone Numbering

Image zones are saved as G4 TIFF files (if the original image was color/grey scale/or non TIFF format, then image zone will be a JPEG file) in the output directory with the same file name as the image plus an eight character extension that denotes the page number and image zone on that page. The first four characters of the extension refer to the page number. The last four characters refer to the zone number on that page. (Zone numbers start at 0). For example, an image zone on the 12th page of the document called “TEST.TIF”, that has a zone number of 2, will be named “TEST.00120002”. The “0012” refers to the 12th page in the document, and “0002” refers to the 3rd zone on that page. (The first zone is 0, the second zone is 1, the third zone is 2, etc.) An image zone on page 37 with a zone number of 15 would have an extension of “.00370015”.

WARNING!

Several advanced features of the Job Server can be confusing and cause apparently mysterious failures:

1. Erasing of files. Job, image, and template files can be erased by the Job Server (if so configured by user).

2. You must coordinate directories carefully. For example, the Job Server will only look for jobs in the Job Directory, and will place output only in the selected OCR Output directory(s).

Customization Features

If you are interested in the following features please contact Prime Recognition. These capabilities exist within the product but are only available on a custom basis.

-System vendors may change labeling of Job Server to their own product names, company names, and contact information.
-Custom scripts of image preprocessing steps can be created which allow any arbitrary sequence of image preprocessing steps (including multiple calls to the same process) to be performed. (For example, in some applications the order of preprocessing steps is important and the best order may be different than the native order.)

Chapter 5 String Options

Overview

PrimeOCR includes a feature called “String Options”. This feature allows Prime Recognition to quickly and easily add functionality (often times custom functionality for a particular customer’s needs) to the PrimeOCR engine without changing the API or other important design parameters of the engine.

For end users, string options can be implemented in one of two ways:

1. Entered in the OCR Job Server Setup menu\button item, look for the String Options tab.

Note!

Many key string options are now configuration items in the PrimeOCR Job Server Setup item. For ease of use we recommend you use the Setup to configure the required functionality instead of directly calling the string option.

2. Entered at the end of the PTM file. Use this approach when you want to be able to vary the configuration between jobs/PTM files.   In general we would recommend using one of the two approaches described here: (1) or (2), not both, for reasons of clarity, but if you do have both (1) and (2) implemented, (2) will have priority (i.e. (1) will be ignored where they overlap).

   Each string option should be on its own line in the PTM. Multiple string options can be added to the PTM. The Job Server will automatically run the string options in the correct area of the code (pre OCR, post OCR, etc.), so the order of the string options is not important in this regard.

   All major configuration items are available as a string option, but if you need to change an minor item that is not currently supported as a string option, please contact your representative at Prime.

The following example PTM was created by PrimeOCR Job Server Wizard, then the PTM file was modified in Notepad by adding a string option ("objects_single_zone") to the bottom of the file:

```
Prime Recognition Document Template
Generated by Prime Recognition Template Wizard
Version=3.90
3,-1
1,0,0,0,10,4,0,0,0,0
1
0,0,1,999999,0,0,0,0
objects_single_zone,100
```

For developers, string options are entered via the pr_string_options() call.

The remainder of this chapter details the public string options that are available. Note that the functionality and timing of each call is highly variable.

If you need functionality not described in this Guide please contact Prime Recognition. We may be able to customize the engine to your application's needs. These will be private string options.

Note

String Options are very sensitive to case and format. Review carefully the examples given for each string option and make sure to mimic these formats precisely.

Change Characters in Output

Function:

Changes the characters in PrimeOCR output before writing output to file (i.e. while it is still RAM based). Can be used to change one character, or repetitive single characters, in one zone or across the whole page, to a user/developer specified character. This function cannot convert a character to more than one character.

Timing:

Users: This functionality is configurable in Setup.

Developers: Can be made any time after a pr_recognize_image() call and before the corresponding pr_del_results() call. Most developers will want to call this before writing the output to file, or converting it to PDA format, etc.

This call is not "sticky", as are many PrimeOCR configuration calls. In other words, you must explicitly call it for every page you want processed.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be "change_chars")
-Target character to be replaced
-Number of consecutive target characters that must be found before qualifying for replacement
-Replacement character
-Zone number in which to perform replacement (-1 causes whole page to be processed)

Return Value:

No return values.

Example Usage:

Developers:
```
status=pr_string_options("change_chars,.,2, ,-1", NULL);
```

In this example two or more consecutive periods will be replaced with spaces in all zones in a document. If you wanted to replace all "R" characters with "B" only in zone 3 you would change the period, ".", in the example string to "R", change the "2" in the string to "1", change the " " to "B", and change the "-1" to "3".

Notes:

Only the character is replaced, no changes are made to confidence level, character attributes, or any other output.

A ",," entry for the Replacement character, that is, no entry, causes the Target Character sequence to be cut out.

Change Strings in Output

Function:

Changes any string in PrimeOCR output before writing output to file (i.e. while it is still RAM based). Can be used to change a single character string or a multicharacter string, in one zone or across the whole page, to a user/developer specified string.

Timing:

Developers: Can be made any time after a pr_recognize_image() call and before the corresponding pr_del_results() call. Most developers will want to call this before writing the output to file, or converting it to PDA format, etc.

This call is not “sticky”, as are many PrimeOCR configuration calls. In other words, you must explicitly call it for every page you want processed.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “change_string”)
-Target string to be replaced
-Replacement string
-Zone number in which to perform replacement (-1 causes whole page to be processed)

Return Value:

No return values.

Example Usage:

Users:
```
change_string,south,south west,-1
```

Developers:
```
status=pr_string_options("change_chars,south,south west,-1",
NULL);
```

In this example the sequence of characters “south” (which happens to be a word but could instead be a phrase if needed), is replaced by “south west”.

Notes:

Only the character is replaced, no changes are made to confidence level, character attributes, or any other output.

A ",," entry for the Replacement string, that is, no entry, causes the Target String sequence to be cut out.

Cut Repetitive Characters in Output

Function:

Removes repetitive characters in PrimeOCR RAM based output. Can be used to remove repetitive characters, in one zone or across the whole page. After processing, one character is left. This is most commonly used to remove extra spaces in output. (The "change_chars" string option can cut characters but it cuts all characters, it does not leave one character behind.)

Timing:

Users: This functionality is configurable in Setup.

Developers: Can be made any time after a pr_recognize_image() call and before the corresponding pr_del_results() call. Most developers will want to call this before writing the output to file or using results in RAM.

This call is not “sticky”, as are many PrimeOCR configuration calls. In other words, you must explicitly call it for every page you want processed.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “cut_repetitive_chars”)
-Target character
-Number of consecutive target characters that must be found before qualifying for cut
-Zone number in which to perform replacement (-1 causes whole page to be processed)

Return Value:

No return values.

Example Usage:

Users:

```
cut_repetitive_chars,.,2,-1
```

Developers:

```
status=pr_string_options("cut_repetitive_chars,.,2,-1", NULL);
```

In this example two or more consecutive periods will be cut to one period.

Notes:

Various Statistical Measures

Function:

Separate calls that can calculate:

-average confidence level of all non space characters in a zone or page.
-total number of recognized characters in a zone or page.
-total number of characters in a zone or a page with confidence less than "x".
-total number of words in a zone or a page with one or more characters with confidence less than "x".

Most of these results are already reported to a user of the PrimeOCR Job Server via the CONFID.TXT file. In any case there is no means by which the user can get return data from this function so it is irrelevant to a user.

Timing:

Developer: Can be made any time after a pr_recognize_image() call and before the corresponding pr_del_results() call.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command
-Zone number in which to perform calculation (-1 causes whole page to be processed)
-Confidence level (on some calls, see below)

Return Value:

The function returns the calculated value. Negative numbers indicate an error.

Example Usage:

AVERAGE CONFIDENCE
```
status=pr_string_options("average_confidence,-1", NULL);
```
(In this example the average confidence will be reported for the whole page.)
A return value of 0 means that no non-space characters were found in the output. The range of values is 100-900, with 900 indicating extremely high confidence.

NUMBER OF CHARACTERS RECOGNIZED
```
status=pr_string_options("number_of_characters,-1", NULL);
```
Includes space characters. (To measure the total number of non space characters use the "character_markers" option noted below and use a confidence of 9. All characters have a confidence of 9 or less.)

NUMBER OF CHARACTERS WITH CONFIDENCE EQUAL TO OR LESS THAN TARGET

```
status=pr_string_options("character_markers,-1,6", NULL);
```

This example measures the number of characters with confidence equal to or less than 6 in the whole page. The proper range of confidence levels is 1-9, with 9 meaning very high confidence. Space characters are not included in this measure.

NUMBER OF WORDS WITH 1 OR MORE CHARACTERS BELOW TARGET CONFIDENCE LEVEL

```
status=pr_string_options("word_markers,-1,6", NULL);
```

This example measures the number of words with one or more characters with confidence equal to or less than 6 in the whole page. The proper range of confidence levels is 1-9, with 9 meaning very high confidence.

Variable Processing of Engines based on Image Quality

Function:

Allows user/developer to control which engines run based on the automatically sensed quality of the image. This function has several applications, for example:

-Engines after the first engine do not run on very bad quality images. PrimeOCR does not waste a lot of time on an image that will be key entered or otherwise processed because of its poor quality.

-As image quality increases the number of engines running decreases until at extremely high quality images only one engine is running. This is good for "fuzzy search" applications that do not employ human OCR error verification. The user/developer is happy with the OCR quality of one engine on extremely high quality text (and wants the speed of one engine) but wants voting OCR to help out on lower quality images.

Timing:

Users: This functionality is configurable in Setup.

Developer: The call must be made before the pr_recognize_image() call for each image. This call must be made for each relevant image, i.e., the setting is not "sticky" between images.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “cut_process_short”)
-Zone number in which to perform calculation (-1 causes whole page to be processed)
-For each of six engines:
  -Average lowest confidence that causes each engine to run expressed in units from 100-900.
  -","
  -Average highest confidence that causes each engine to run expressed in units from 100-900.
  -","

(There must be six of these number pairs, even if your PrimeOCR engine is only licensed for three or four engines. These numbers are sequenced to control engines in the following order: Engine 1, Engine 2, etc.)

Return Value:

No return values.

Example Usage:

```
Developer:  status=pr_string_options("cut_process_short, -1, 600, 900, 600, 800, 600,
750, 800, 900, 700, 900,750,900", NULL);
```

In a five engine configuration this string causes the following actions: The first engine runs. (Its settings of 600,900 are ignored.) The average confidence for the whole page is calculated. If the average confidence for the whole page is 600 or above (equal to "6" on the character based scale of 1-9) and 800 or below then Engine 2 will run (settings 600,800). If it is equal to or above 600 and 750 or below then Engine 3 will run (settings 600,750), and so on.

Assume a three engine scenario: Engine 2, Engine 3, and Engine 5. In this scenario the settings for Engine 1 and Engine 4 are ignored (but they must be present.). Engine 2 is the first engine to run. So its settings are ignored (settings 600,800). (The first engine always runs regardless of its setting.) If Engine 2 senses the average confidence to be between 600-750 then Engine 3 runs, if the confidence is between 700-900 then Engine 5 will run.

Special Case Usage:

```
User: cut_process_short, -1,5
Developer:  status=pr_string_options("cut_process_short, -1,5", NULL);
```

This string is equivalent to entering "600,900" for each engine. This special case is supported for ease of use. This version's basic effect is to prevent engines from running on poor quality images.

Notes:

-The settings for the first engine to actually run will be ignored. The first engine must always run in order to sense the quality.

-For most users an average confidence of 600 or below is a good description of a bad document that does not merit further OCR processing. For most users a setting of -1 to read the whole page, instead of a specific zone, is most appropriate.

-Remember that you have to enter six pairs of numbers, even if you have only licensed three engines. Numbers for the engines that are not licensed/used will be ignored.

-You cannot change the running order of engines in our standard product. If you wish to do this contact Prime Recognition for a custom version.

-A string that progressively cuts off processing on very high quality images might be:

```
"cut_process_short, -1,600,900,600,890,600,800,600,825,600,875,600,850"
```

-As of version 4.4, PrimeOCR, by default is set internally for:

```
"cut_process_short, -1,500,900,500,900,500,900,500,900,500,900,500,900"
```

Change LOG File Settings

Function:

Changes the path/file name of log file and maximum size. The log file writes all major activities of the engine to a text file (if it is turned on in the PRIMEOCR.INI file).

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made any time after the pr_open(). Any output to the log file before this call, including the output made during the pr_open() call, will be made to the default log file name and location.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “log_settings”)
-Path/file name of log file
-Maximum size of log file (in K bytes)

Return Value:

No return values.

Example Usage:

Developers:

```
status=pr_string_options("log_settings,c:\newlog.txt,1300", NULL);
```

In this example the new log file path/name is "c:\newlog.txt" and the maximum size is 1300K , i.e., 1.3MBytes.

Notes:

-Default log file name is "\BIN\PROCR.LOG".
-Default log size is 10MB (10,000K). Once maximum log size is reached the existing log file is renamed to "xxx.yearmoda.log" where "xxx" is the old log file name (without extension) and yearmoda is 20180101 (year, month, day). Then a new log file is started with the appropriate name. THIS MEANS THAT RELEVANT LOG FILE ENTRIES MAY BE IN THE SAVED FILE. For example, if the engine is stopped immediately after the log file was renamed to " XXX.yearmoda.log" then all relevant log file entries will be in that saved file, not the new, and blank, log file.
-Turning on the log file slows down the operation of the engine. We recommend you only turn on the log file for diagnostic purposes. Only 10 old copies of the log file are kept. Older copies will be automatically deleted.

Phone Books

Function:

Automatically corrects many errors that occur in the OCR of Phone Books.

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime after the pr_recognize() and before pr_del_results().

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “phone_book”)
-Zone number in which to perform calculation (-1 causes the entire page to be processed)

Return Value:

No return values.

Example Usage:

Developers:

```
status=pr_string_options("phone_book,-1", NULL);
```

In this example all defined zones will be processed.

Notes:

The dashed lines common in phone books between the address and phone number hurt OCR accuracy considerably. If possible, remove these lines with PrimeZone, or some other image utility before submitting image to PrimeOCR.

ASCII Defaults

Function:

Changes some of the settings used to report ASCII, FASCII and derivative file output types.

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is “sticky”, it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “ASCII_DEFAULTS”)
-Wrapped paragraphs

Optional:

-Page end string to replace existing page end character (\f in C language). Can be up to 100 characters long or as short as one character. If you wish to hide the page break then we would recommend one space character.

Return Value:

No return values.

Example Usage:

Developer:

```
status=pr_string_options("ASCII_DEFAULTS,1,page break", NULL);
```

In this example the Wrapped Paragraphs setting of 1 will result in soft carriage returns in text so that text will flow into paragraphs. Hyphens will be removed in words that are hyphenated between lines. At the end of each page "page break" will appear.

Notes:

HTML Defaults

Function:

Changes some of the settings used to report HTML file output.

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is “sticky”, it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “HTML_DEFAULTS”)
-Wrapped paragraphs
-No Font reporting

Return Value:

No return values.

Example Usage:

Developer:

```
status=pr_string_options("HTML_DEFAULTS,1,1", NULL);
```

In this example the Wrapped Paragraphs setting of 1 will result in soft carriage returns in text so that text will flow into paragraphs. Hyphens will be removed in words that are hyphenated between lines. The value of "1" in No Font reporting means that font information will NOT be included in HTML file (default font will be used to display text). A value of "0" does include font information (this is default setting).

Notes:

RTF Defaults

Function:

Changes some of the settings used to report RTF files output.

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is “sticky”, it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “RTF_DEFAULTS”)
-Page Width
-Page Height
-Left Margin
-Top Margin
-Right Margin
-Bottom Margin
-Proportional Font (report proportional font output as this font)
-Proportional Font – sans serif (report sans serif proportional font output as this font)
-Fixed Pitch Font (report fixed pitch font output as this font)
-Wrapped paragraphs

Return Value:

No return values.

Example Usage:

Developer:

```
status=pr_string_options("RTF_DEFAULTS,9600,12000,600,660,8400,11400,Times
New Roman,Arial,Courier New,1", NULL);
```

In this example the page width will be reported as 8 inches (9600 BMUs), no matter what the real width of the page was. (If the real width of the page was greater than 8 inches then you may get potentially confusing word wraps and extension of page into 2 pages). The page height will be reported as 10 inches, the left margin as .5 inch, top margin as .55 inch, right margin as 7 inches (or one inch from right edge as sometimes expressed by word processors), bottom margin as 9.5 inches. The proportional font used in the RTF file will be Arial, and the fixed pitch font will be Courier New.

The Wrapped Paragraphs setting of 1 will result in soft carriage returns in text so that text will flow into paragraphs. The default setting of 0 causes text to be reported only on the line as seen on the original document (this is accomplished through the use of hard carriage returns at the end of each line of text). Hyphens will be removed in words that are hyphenated between lines.

Notes:

-All coordinates are expressed in BMUs and are relative to the top left hand corner of the page.
-Any coordinate can be listed as “-1”. In this case the real value is reported.
-Any coordinate can be “–99”, in which case ALL coordinates will NOT be reported in the RTF output.
-If a coordinate is listed this fixed coordinate will be reported for all pages of OCR output in the RTF output.
-Make sure to use the exact spelling of the fonts used in your target application (such as a word processor).
-Most users will also want to use the “point_size_change” string option to reduce the font size reported in the RTF file.

PDF Defaults

Function:

Configures several settings used for outputting PDF files.

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is “sticky”, it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “PDF_DEFAULTS”)
-Suspect Confidence Level (0-9)
-DeSample DPI (-1 if want to leave as is, otherwise 100-600 recommended)

The command string can (optional) include the following parameters separated by a comma:

-Optimize (0=no optimization, 1=Optimize)
-Thumbnails (0=do not include, 1=generate and include Thumbnails)
-Zip Compression (0=do not use Zip Compression, 1=Use Zip Compression)
-Accessibility (0=do not add Accessibility features, 1= Add/use Accessibility features).
-PDF/A (0=standard format, 1= PDF/A 1b format, 2=PDF/A 1a format)
-JBIG2 compression
-PDF version (14=version 1.4, 15=version 1.5, 16=version 1.6, 17=version 1.7)
-JPEG2000 compression

Return Value:

No return values.

Example Usage:

Developer:

```
status=pr_string_options("PDF_DEFAULTS,6,200", NULL);
status=pr_string_options("PDF_DEFAULTS,6,200,1,1,1,0,1,14,1", NULL);
```

In this example any word with one or more characters with a confidence level of 6 or less will generate a snippet of the word in the PDF Normal output. (Suspect Confidence Level is irrelevant in PDF Image Only or PDF Image plus hidden text). Any images that are present in the PDF output will be reduced in resolution to 200 dpi. For example, if the original image was at 300 dpi and the user selects PDF Image Only then the resulting image in the PDF file will be at 200 dpi, significantly smaller in file size than the original image. The file will be optimized (“byte served” or “linearized”) for quicker viewing of file across the Internet. Thumbnails will be inserted into the file. Zip compression will be used to compress the image (if it is a color or gray scale image). The file will not be generated to conform to Accessibility guidelines, but it will conform to PDF/A (class 1b) standards. The file will be compressed with JBIG2 (assuming it is black and white). The PDF version will be set to 1.4. If the image is color JPEG2000 will be used to perform the compression.

NOTES:

OPTIMIZATION Adobe Acrobat is required to perform optimization only if PDF/A output is required. (However, at your option you may choose to use Acrobat for optimization for other scenarios if you wish.)

There are three methods to perform optimization. They are controlled in PRIMAGE.INI\[PDFOptimize]\ Version. See Chapter 3, PRIMAGE.INI Configuration for more information.

THUMBNAILS: While viewing a PDF file, Acrobat Reader 5.0 and later will automatically generate thumbnails. Acrobat Reader 6.0 and later will automatically generate thumbnails when viewing a PDF file within a browser. In general, you do not need to turn on thumbnail support unless you want to embed thumbnails into the PDF file for faster thumbnail viewing. Thumbnails will only be embedded into the PDF file for image plus hidden text PDF output.

ZIP COMPRESSION Only use Zip compression if lossless compression is required for color and grayscale PDF output. Using Zip compression will increase PDF file size by 40-100% and processing time will also increase by the same percentage due to Zip compression taking longer than the default, lossy, faster JPEG compression.

JBIG2 COMPRESSION JBIG2 compression can produce file sizes that are 2-10 times smaller than standard compression PDF files. JBIG2 by definition only applies to black and white images/pages. This option significantly slows down processing, particularly on poor quality documents, the delay will be noticeable on the last page of a document and selected pages within the document (i.e. speed is “lumpy”). Note that jbig2 is a “lossy” compression method and hence will most likely not be acceptable for documents that have a legal status. Specifically jbig2 may make substitution errors (for example, a poor quality “e” may be interpreted and rendered as a “o”). PrimeOCR’s implementation of JBIG2 has a low error rate, very competitive with the best industry JBIG2 implementations, however, errors are possible. NOTE: DeSample DPI setting is ignored when JBIG2 is turned on. File sizes do not improve significantly (and can get larger) if DeSample is turned on (and processing time is increased and displayed image quality is lower, so there is no benefit to Desample when JBIG2 is used).

PDF/A: PDF/A is not supported for PDF Normal (PDF Text Only format). PDF Normal is almost never used in an OCR environment (PDF Image + Text is by far the most commonly used format) so this lack of support is should not be of great concern. If you would like us to support PDF Normal as well please contact us. PDF Image Only is supported.

PDF Version: By default PrimeOCR will produce version 1.4 PDF files. You can select version 1.4 explicitly if you wish, or you can explicitly specify that PrimeOCR output PDF formatted files with higher value version numbers.

There is an exception to this logic. If Acrobat is used to perform the optimization (instead of PrimeOCR's internal algorithms), then the PDF version will be that version supported natively by that version of Acrobat, for example, v1.7 in Acrobat 9. If PDF version 1.4 or 1.5 is selected in the PDF_DEFAULTS call, and optimization through Acrobat is selected (in PRIMAGE.INI), Prime will generate an error to avoid generating a PDF file with a higher version number. But no other version checks are performed, so if you specify a PDF version of 1.6, for example, and are using Acrobat 9, which will generate a version of 1.7, Prime will not generate an error in this situation.

JPEG2000 compression: If the image in the PDF file is color, then JPEG2000 can be selected instead of the default JPEG method. The compressed image will be in general higher quality and in most (but not all) cases will be smaller.

PDF_RETAIN: PDF/A and PDF_RETAIN settings cannot be used at the same time. If the PDF/A setting in PDF_DEFAULTS is not zero , and any of the PDF_RETAIN settings are set to 1, the engine will not implement the PDF_RETAIN functionality.

ACCESSIBILITY: PrimeOCR PDF output offers a number of features that increase the accessibility of the contents of the PDF file for people with disabilities. These features also help government agencies and businesses comply with US government regulations as outlined in Section 508 of the Rehabilitation Act.

508 requirements:	PrimeOCR PDF output:
A text equivalent for every non text element shall be provided	Alternate text provided for each significant graphic on the page Alternate text can be provided by the user for each zoned graphic on the scanned image (using PrimeView or other method - See "Manual" below). If alternate text is not provided by the operator from manual zoning then PrimeOCR automatically inserts a default string "This is a graphic from a scanned page". the alternate text can be modified later with a PDF tag editor.

Documents shall be organized so they are readable without requiring an associated style sheet	Reading order is identified and tagged in the PDF file along with paragraph markers. Reading order is determined from autozoning the scanned page (or set by the user manually using PrimeView or alternative editor). The language of the document is identified and tagged for each page. (The language for the page is from the language setting in the processing template or API call.) Text retains formatting so when the OCR text is exported to RTF from a PDF viewer the output text reflows within paragraphs and character formatting is retained.
Row and column headers shall be identified for data tables	Rows and columns are defined and tagged in the PDF file. Rows and columns must be manually defined (using PrimeView or other method - see "Manual" below) within the template or autozoning will segment the table as a single text zone or as several text zones.

Another way to summarize the functionality is by the type of processing: automatic (autozoning), or manual.

<u>Autozoning</u>

If you use autozoning during OCR, PDF accessible output will include:

a. Reading order of the text that is recognized during OCR. Text will be identified and tagged in the PDF output file.
b. Paragraphs will be identified within the text for later export into another application. Formatting of the text is retained during export.
c. Graphics within the scanned page will be identified and tagged with a generic alternative text tag - "This is a graphic from a scanned page". The alternative text for the graphic can be easily modified later with PDF editing software.
d. Tables will not be recognized or tagged when using autozoning. Tables can only be identified by manually zoning the page prior to OCR taking place.

<u>Manual</u>

To provide alternate text for each graphic on a scanned page and to identify tables in the scanned document then an "accessible" template file must be provided to PrimeOCR for each page scanned. The alternate template file can be created by manually zoning the page with PrimeView then adding additional information to the zone line description or by manually creating the template file with a text editor. This file must be in the same directory as the image, and must have the file name of "imagefilename.acc" where imagefilename is the actual image file name, for example, "C:\TEST\00001.TIF" image would have an accessible template file name of "C:\TEST\00001.ACC".

Alternate text for image zones and Table rows and table columns designators are passed into PrimeOCR from the last field of each zone definition in the template file. Four accessible zone descriptions are available in that last field:

1. Text - identify the zone as text when only text is recognized in the zone.
2. Table Row - identify the zone as a table row when beginning a new row of a table. The zone will be the first column in the new row.
3. Table Column - identify the next zone as a table column for the next column in row that has been identified by a new row (Table Row).
4. Figure - identify the zone if the zone is an image zone and provide the alternate text for the scanned graphic in the image zone.

Here is an example:

```
Prime Recognition Document Template

Version=3.90
3,1
1,0,0,0,10,0,0,0,0,0,
11
0,0,1,999999,4708,1344,8268,1692,Text,
1,0,1,999999,1128,1888,1628,2248,Table Row,
2,0,1,999999,2420,1964,3980,2220,Table Column,
3,0,1,999999,4204,2016,5268,2208, Table Column,
4,8,1,999999,7200,1964,8584,2208,Figure,Graphic of Ace Inc. Company Logo
5,8,1,999999,9564,1988,11252,2208,Figure,Sales figures for 2004
6,0,1,999999,1144,2420,2032,2880, Table Row,
7,0,1,999999,2408,2456,4108,3640, Table Column,
8,0,1,999999,4176,2432,6900,6484, Table Column,
9,0,1,999999,7164,2368,9368,5460, Text,
10,0,1,999999,9552,2420,11632,3120, Text,
```

The first zone of a new row of a table should be designated with a Table Row. Every subsequent column of that row should be designated with a Table Column.

Table rows and columns can be identified if they have a single logic level (single column under row headings). Tables that have multiple logical levels of row or column headers may be identified as a single logic level or as a graphic with alternate text.

PDF Retain

Function:

Retains several fields and settings when reading PDF files and generating PDF output.

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is “sticky”, it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “PDF_RETAIN”)
-Retain bookmarks (0 or 1)
  0=do not retain bookmarks from PDF input file
  1=retain bookmarks from PDF input file and copy the bookmarks to the PDF output file
-Retain document description fields (0 or 1)
  0=do not retain document description fields from PDF input file
  1=retain document description fields from PDF input file and copy them to the PDF output file
-Retain initial view (0 or 1)
  0=do not retain initial view mode from PDF input file
  1=retain initial view mode from PDF input file and copy it to the PDF output file
-Retain hyperlinks (0 or 1)
  0=do not retain hyperlinks from PDF input file
  1=retain hyperlinks from PDF input file and copy those same links to the PDF output file

Return Value:

No return values.

Example Usage:

Developer:

```
status=pr_string_options("PDF_RETAIN,1,0,1,1", NULL);
```

In this example bookmarks will be copied from the original PDF input file over to the newly created PDF output file. The PDF document descriptions (Title, Author, Subject and Keywords) will not be copied over to the new PDF output file. The PDF output file will have the same initial view mode as the PDF input file. Any hyperlinks in the input file will be copied over to the output PDF file.

NOTES:

-Only Title, Author, Subject and Keywords are extracted and retained from the document desciptions at this time.

- Initial page view will be retained if the input PDF file initial page view is one of the following: 1) bookmarks panel and page, 2) pages panel (thumbnails view) and page, open in full screen mode.

-PDF/A and PDF_RETAIN settings cannot be used at the same time. If the PDF/A setting in PDF_DEFAULTS is not zero , and any of the PDF_RETAIN settings are set to 1, the engine will not implement the PDF_RETAIN functionality.

-If the PDF file has security set for "copying/modifying" contents, then bookmarks/hyperlinks can not be copied over to the new file.

-We can not determine if hyperlinks are set to be not visible, we set all hyperlinks to be visible.

-We can not copy hyperlinks that are "named destinations". This style of hyperlink is most often seen in PDF Normal files that have been created with authoring tools. These types of files are not normally sent for OCR so this should not be a large concern.

-If you require other attributes of the PDF input file to be retained during processing contact Prime Recognition with your requirements.

PDF Security

Function:

Allows the creation of passwords for PDF file access and/or a password to override/modify disabled features. Also allows disabling of features such as printing, editing, etc.

Timing:

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is "sticky", it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be "PDF_SECURITY")

-open password (optional)

if a string is present, then this string/password must be used by user to open/view this PDF file

-permissions password (optional)

if a string is present, then this password can be used by the user to modify or bypass the restrictions (noted below) in the PDF file

-restrictions/features to be disabled (optional)(sum of the relevant numbers below)

1	disables printing
2	disables copying text and graphics from the document
4	disables editing the document
8	disables adding annotations
16	disables filling form fields
32	disables copying for use with accessibility features
64	disables assembly of the document
128	disable high resolution printing

Return Value:

No return values.

Example Usage:

User:

```
"PDF_SECURITY,openpw,permissionspw,5"
```

Developer:

```
status=pr_string_options("PDF_SECURITY,openpw,permissionspw,5", NULL);
```

In this example “openpw” is the password that will be required to open the PDF file. “permissionpw” is the password required to bypass or modify the restrictions placed on the file, and the restrictions on the file include (5=1+4):

1	disables printing
4	disables editing the document

Some other example strings are:

```
        "PDF_SECURITY,openpw
```

In this example, only a password to open the PDF file is created.

```
        "PDF_SECURITY,,permissionpw,5
```

In this example, only a password to bypass/modify the restrictions is created. Restrictions are placed on certain actions to the file.

```
        "PDF_SECURITY,,,5
```

In this example, no passwords are created, but restrictions are created. (Note that the user will not be able to bypass or modify these restrictions because no password was supplied to do so. (Note the use of commas, with no intervening characters, to denote the lack of entry in these optional fields. Do not use any space characters in any of these entries as this will be confusing to the user.).

NOTES:

PDA Defaults

Function:

Changes some of the settings used to report PDA file output type.

Timing:

Developers: This call can be made anytime before pr_convert_output_to_file().

This call is “sticky”, it only needs to be called once. (Thus once a setting is "turned" on it must be turned off with another call.)

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “PDA_DEFAULTS”)
-Presence of Word bounding boxes in output

Return Value:

No return values.

Example Usage:

User:

```
"PDA_DEFAULTS,1"
```

Developer:

```
status=pr_string_options("PDA_DEFAULTS,1", NULL);
```

In this example bounding boxes for words will be included in output. (Bounding boxes for characters are always included).

Notes:

This string option allows PDA output to be sent to the InputAccel Indexing module, so that when the user selects a word in image display area, that word will be highlighted and the word text sent to the index field.

Word Data in PRO Output

Function:

Adds WORD based data to “in memory” and PRO file output.

Timing:

Developers: This call can be made anytime after pr_recognize_image() and before pr_convert_output_to_file(). However, we recommend that developers call pr_configure_output() directly (see Chapter 10b).

This call is not “sticky”, it needs to be called for every page.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “pr_configure_output”)
-Flag to cause addition of WORD data to output (“1”)

Return Value:

No return values.

Example Usage:

User:
```
"pr_configure_output,1"
```

Developer:
```
status=pr_string_options("pr_configure_output,1", NULL);
```

Notes:

This string option allows Word based data to be added to the in memory data structure and to PRO file based output. The “in memory” data structure changes are described in Chapter 10b. The impact on PRO file based output is as follows:
“Format” on line 1 of output will be “1” instead of “0”.
After the standard output for each line of text, 7 lines of data are added:

-# of words on line of text
-Character positions (zero based) that start each word (separated by commas)
(e.g. Word 2 starts at character position 13)
-Character positions (zero based) that end each word (separated by commas)
(e.g. Word 2 ends at character position 22)
-Left edge in BMUs of each word (separated by commas)
-Top edge in BMUs of each word (separated by commas)
-Right edge in BMUs of each word (separated by commas)
-Bottom edge in BMUs of each word (separated by commas)

Point Size Change

Function:

Changes the reported point size of the OCR output in memory (and can therefore impact file based outputs). Particularly useful when outputting to RTF format, where a 10-20% size reduction can sometimes help maintain the original look and feel of the document. (But also see Output Point Size Change).

Timing:

Developers: This call can be made anytime after pr_recognize_image() and before pr_convert_output_to_file (). This call is not “sticky”, it must be called for every image.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “point_size_change”)
-Zone number in which to perform calculation (-1 causes whole page to be processed)
-Point size change

Return Value:

No return values.

Example Usage:

User:
```
"point_size_change,-1, -20"
```

Developer:
```
status=pr_string_options("point_size_change,-1, -20", NULL);
```

In this example the point sizes reported for the all text is reduced by 20%.

Notes:

The point size reduction value can be negative or positive.

Output Point Size Change

Function:

Changes the reported point size of selected OCR output file based formats. Particularly useful when outputting to RTF format, where a 10-20% size reduction can sometimes help maintain the original look and feel of the document. (But also see Point Size Change).

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime before pr_convert_output_to_file (). This call is not “sticky”, it must be called for each image.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “output_point_size_change”)
-Point size change

Return Value:

No return values.

Example Usage:

Developer:
```
status=pr_string_options("output_point_size_change,-20", NULL);
```

In this example the point sizes reported for the all text is reduced by 20%.

Notes:

The point size reduction value can be negative or positive.

UTF Output

Function:

Changes the supported output file format to either UTF-8 or UTF-16 (or removes Unicode support).

Timing:

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is “sticky”, it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “UTF_OUTPUT”)
-Format of output: 0=turn off Unicode, 1=UTF-8, 2=UTF-16

Return Value:

No return values.

Example Usage:

User:
```
"UTF_OUTPUT,2"
```

Developer:
```
status=pr_string_options("UTF_OUTPUT,2", NULL);
```

In this example the format of any output that supports UTF will be UTF-16.

Notes:

The default is for Unicode to be set to 0.

This setting currently only affects ASCII, FASCII (and variants of each), and some custom formats.

Asian and Russian language recognition will automatically generate UTF-16 in RTF (and internally within PDF).

If you would like modifications to this functionality please contact us.

File Output (second or third file output)

Function:

Creates a second (and optionally third) file based output from pr_convert_output_to_file().

Timing:

Users: This functionality is configurable in Setup.

Developers: This call can be made anytime before pr_convert_output_to_file(). This call is “sticky”, it can be called once and then is active until reversed.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “file_output2” or file_output3)
-Value of output format, found in prstrct.h, including: 0=ASCII, 1= Formatted ASCII, 3=PRO, 9=RTF, 11=PDF Normal, 12=PDF Image Only, 13=PDF Image + Text, 16=HTML. Or -1 to turn off.

Return Value:

No return values.

Example Usage:

Developer:

```
status=pr_string_options("file_output2,13", NULL);
```

In this example the output will be PDF Image + Text.

Notes:

A second file will be output. This file will be placed in the same directory, with the same file name, as the standard file except it will have a different extension (extension is based on the output format, for example ASCII=.txt, or PDF=.pdf). Obviously the file output format should be different from the standard (or primary) file output.

Warning

If you have autozoning turned on with image zones, and PDF is one of your formats, make sure PDF is your primary output.

To get a third file output use two string option commands, one of them “file_output2,x” and the other “file_output3,y”.

To turn off this feature, enter -1 as the file format value.

Subscript/Superscript Recognition Enhancement

Function:

Improves recognition of Subscript and superscript characters.

Timing:

Developers: This call can be made anytime before pr_recognize_image(). This call is "sticky", it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be "sub_super_enhancement")
-On (1) or Off (0) value

Return Value:

No return values.

Example Usage:

User:
```
"sub_super_enhancement,1"
```

Developer:
```
status=pr_string_options("sub_super_enhancement,1", NULL);
```

In this example the setting of 1 will result in somewhat improved recognition of subscript and superscript characters.

Notes:

This functiontionality is off by default since many documents do not include subscript and superscript characters, and therefore do not require the processing time (albeit fairly small) required by this functionality.

Recognition of these very small characters is difficult, this function will only improve that recognition by 30-40%.

Subscript/Superscript Tagging

Function:

Inserts tag around Subscript and superscript characters.

Timing:

Developers: This call can be made anytime after pr_recognize_image() and pr_del_results(). This call is not "sticky", it must be called for every image.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be "sub_super_tag")
-String to place before subscript characters
-String to place after subscript characters
-String to place before superscript characters
-String to place after superscript characters
-Zone number in which to perform replacement (-1 causes whole page to be processed)

Return Value:

No return values.

Example Usage:

User:

```
"sub_super_tag,^s,^e,^S,^E,-1"
```

Developer:

```
status=pr_string_options("sub_super_tag, ,^s,^e, ^S,^E,-1", NULL);
```

In this example "^s" will be placed before the first character in a subscript sequence, and "^e" will be placed after the sequence, "^S" will be placed before the first character in a superscript sequence, and "^E" will be placed after the sequence.

Notes:

Strong Auto Rotate Accuracy Improvement

Function:

Allows user to select which and how many engines are used in “strong” autorotate. Since default is Engine 1, any addition of engines will result in higher accuracy (and slower processing).

Optionally, the valid rotation can be restricted to 180 degress only.

Timing:

Developers: This call can be made anytime before pr_recognize_image(). This call is “sticky”, it only needs to be called once.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “auto_rotate_level”)
-A valid engine string, e.g. “9” (Level 1), “99” (Level 2), “90099” (Level 3), “99099” (Level 4), “99999” (Level 5)

The command string can (optional) include the following parameter separated by a comma:

-Restrict rotation to 180 degrees only (1=Yes)

Return Value:

No return values.

Example Usage:

User:
```
"auto_rotate_level,99"
```

Developer:
```
status=pr_string_options("auto_rotate_level,99", NULL);
```

In this example the setting of 99 will result in somewhat improved recognition of rotated pages, as now two engines are used to sense the proper orientation.

User:
```
"auto_rotate_level,99,1"
```

Developer:
```
status=pr_string_options("auto_rotate_level,99,1", NULL);
```

In this example there is an added setting, “1”. This restricts valid rotations to 180 only. So an image that may be corrected by a 90 degree rotation, for example, will not be rotated (this setting is useful if you know that images are only rotated at 0 or 180 degrees).

Notes:

The default accuracy level value is “9”, so there is no reason to use this function to set a value of “9”, unless you are trying to reset the value back to “9” after changing it to another value.

The vast majority of users should use “99” to improve recognition. Each additional engine added increases processing time linearly, but recognition rates improve only slowly with each new engine added.

Bates Number Accuracy Improvement

Function:

Will improve recognition accuracy of Bates numbers (numbers often added to legal document images).

Timing:

Developers: This call can be made anytime after pr_recognize_image() and before pr_del_results(). This call can be made multiple times for one page.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “batesnumber”)

-Vertical location of Bates Number (1=top of page, 2=bottom of page)

-Horizontal location of Bates Number (1=50% of page on the left, 2=50% of the image width in the center of page, 3=50% of page width on the right)

-Format of number with A indicating Upper case alpha ASCII characters (A, B, C, etc.) and N indicating Numeric characters (0,1,through 9) Any character aside from A and N will be considered a fixed seperator (e.g. space character, period character, etc.).

Return Value:

0=successful (Note that this does not mean that the Bates number was OCR’d 100% accurately, merely that it fits the defined format)

12250=could not find the Bates number
12251=Bates number did not match the defined format

Example Usage:

User:
```
"batesnumber,2,1,AAAAA NNNNNNNN"
```

Developer:
```
status=pr_string_options("batesnumber,2,1,AAAAA NNNNNNNN ", NULL);
```

In this example the Bates number is expected to be on the bottom of the page and to the left. An example number would be “ABCDE 01234567”.

Notes:

Only a single zone is supported at this point. If the number is at the top of the page then the number must be in the OCR output of the first line. If the number is at the bottom of the page then the number must in the last line. Other data may be on these lines but the Bates number must be separated by at least 7 spaces.

In some applications two or more Bates numbers may be legal for a specific page set. If you are a user we don't support this concept yet. If you are a developer, we strongly recommend you run the page against the longest legal format first. If it fails then try the next longest format, and so on.

We recommend that you do not use more than one space as a seperator (more than one space is hard for OCR to accurately recognize). We also do not recommend using separators that are hard for OCR to recognize, for example, underscore `| * ^ # @ ! \ < >` and other unusual characters.

This string option will improve Bates Number recognition but it will not guarantee 100% accuracy.

Maximum Processing Time

Function:

Will terminate main OCR recognition if time exceeds user set limit.

Timing:

Developers: This call can be made anytime before pr_recognize_image().

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “max_time”)

-Seconds

The command string can (optional) include the following parameter separated by a comma:

-Force termination even if no OCR output yet available (1=Yes)

Return Value:

0=successful

Example Usage:

User:

```
"max_time,120,1"
```

Developer:

```
status=pr_string_options("max_time,120,1", NULL);
```

In this example the pr_recognize_image() call will terminate after 120 seconds have elapsed (any internal engine processing is interrupted and terminated, even if no OCR output yet exists).

Notes:

By default this value is set to 240 internally. So if you have images that require more than 240 seconds to process (you would know this, for example, if the total processing time reported is 240+ seconds now), you may wish to choose a number higher than 240. We choose 240 as a very large number that, very few, if any, customer’s images would require so its unlikely you will need to increase this number.

We recommend that most users do not use the optional "force termination" value. If this optional value is set, then PrimeOCR may terminate processing with no OCR output available. This will cause a –13003 error, so if you are processing a single page file, then no OCR output will be created for this file. If you are processing a multiple page file, then the existing multiple page OCR output file is deleted. The downside of not using this "force termination" value is that if the early OCR processing takes a very long time to produce output, PrimeOCR will take a very long time, regardless of any max_time setting. (But PrimeOCR would have taken even more time to process without any max_time setting.)

Convert complex columns into single zone

Function:

If your images have columns of text, you would normally select autozoning to identify columns. If for some reason you cannot use autozoning, then you would configure PrimeOCR to OCR the page as a single zone. This will work OK so long as the lines in each column are vertically aligned. If not, then OCR gets confused and accuracy goes down significantly in the lines that are misaligned. This string option will solve that problem by performing a very low level autozoning in which many zones are created in which lines are contiguous. We OCR these zones, and then recompile the data back into a single zone.

Timing:

Developers: This call can be made any time after pr_configure_zone() and before pr_recognize_image().

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “objects_single_zone”)

-join partial lines together parameter (100 is recommended)

Return Value:

0=successful

Example Usage:

User:
```
"objects_single_zone,100"
```

Developer:
```
status=pr_string_options("objects_single_zone,100", NULL);
```

In this example lines that are slightly misaligned across a page will be joined together if they are located within one average character height. If you see lines that are not being joined together, you could adjust this parameter to, say 150, which would now join lines together that were within 1.5 times the average character height.

Notes:

We strongly recommend you configure PrimeOCR for a single zone if you plan to use this string option. You could instead configure autozoning, for example, but this is wasted effort, this extra processing effort will be thrown away, as this string option does its own form of autozoning.

Add zones in which text is rotated 270 degrees clockwise

Function:

If your images have areas of text in which some secondary text is rotated from the normal/primary orientation by 270 degrees (clockwise), making this call will add this text during the pr_recognize() call.

Timing:

Developers: This call can be made anytime before pr_recognize_image().

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “some_rotated_text_270”)

-turn on/off parameter (0 or 1)

-left edge in which to look for rotated text (% of image width from left edge of image)

-right edge in which to look for rotated text (% of image width from right edge of image)

Return Value:

0=successful

Example Usage:

User:
```
"some_rotated_text_270,1,4,9"
```

Developer:
```
status=pr_string_options("some_rotated_text_270,1,4,9", NULL);
```

In this example the functionality is turned on, and the left 4% of the image, and the right 9% of the image will be searched for text that is rotated 270 degrees (clockwise), if found, it will be OCR’d and added to the PrimeOCR output.

Notes:

One example use would include many engineering drawings.

You can search the whole page by setting the left edge to 100, and the right edge to 0.

Turning on this feature will increase the time spent in the pr_recognize_image call() significantly. The more area searched (by increasing the left and right margins), the larger the increase in time. If the whole image is searched, then the recognition time will increase roughly a factor of 1.2-1.5.

All rotated text zones will be at the end of “in memory zonestructure” and the PRO file output format. Rotated text zones are identified in the “in memory zonestructure” with a “zone_order” value of “3”. In the PRO file, on the Zone Settings line, rotated zones will have a value “3” for zone rotation. The location data in the rotated zone is reported relative to the rotated image. See Note near end of Chapter “PrimeOCR Output Formats” in manual for formulas to convert these locations relative to the original orientation of the image.

The number of zones will almost certainly change during the pr_recognize_image() call. If you are programming to the API, and you make use of the “number of zones” quantity before the pr_recognize_image() call (which you most likely do), then you should make a call to the pr_get_number_of_zones() right after pr_recognize_image() call to update to the correct value.

In almost all cases, if you are doing autozoning, the best type of autozoning to use when using this string option, is “clump” autozoning.

Selected other string options will cause an error if used with this call. For example, “strikethrough_underline_enhancement”.

Add zones in which text is rotated 90 degrees clockwise

Function:

If your images have areas of text in which some secondary text is rotated from the normal/primary orientation by 90 degrees (clockwise), making this call will add this text during the pr_recognize() call.

Timing:

Developers: This call can be made anytime before pr_recognize_image().

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “some_rotated_text_90”)

-turn on/off parameter (0 or 1)

-left edge in which to look for rotated text (% of image width from left edge of image)

-right edge in which to look for rotated text (% of image width from right edge of image)

Return Value:

0=successful

Example Usage:

User:
```
"some_rotated_text_90,1,4,9"
```

Developer:
```
status=pr_string_options("some_rotated_text_90,1,4,9", NULL);
```

In this example the functionality is turned on, and the left 4% of the image, and the right 9% of the image will be searched for text that is rotated 90 degrees (clockwise), if found, it will be OCR’d and added to the PrimeOCR output.

Notes:

Please review all the notes in “some_rotated_text_270” string option.

Strikethrough recognition and underline enhancement

Function:

Will report “strikethrough” as a character attribute and will improve recognition of underline characters.

Timing:

Developers: This call can be made anytime before pr_recognize_image(). This call must be made for every page, otherwise it will automatically be turned off.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “strikethrough_underline_enhancement”)
-mininum line size (in pixels)
-allowed gaps in line (in pixels)

Return Value:

No return values.

Example Usage:

User:
```
"strikethrough_underline_enhancement,50,1"
```

Developer:
```
status=pr_string_options("strikethrough_underline_enhancement,50,1", NULL);
```

In this example any strikehrough characters will be reported as a character attribute and any underline character attribute reporting will be improved. The minimum line length will be 50 pixels (usually about 2 characters), and maximum allowed gap in a underline or strikethrough will be 1 pixel.

Notes:

This functiontionality is off by default since many documents do not include strikethrough characters and reporting underline accurately is not important and therefore do not require the extra processing time required by this functionality.

The strikethrough character attribute is defined as PR_CHAR_SUPERSCRIPT+PR_CHAR_SUBSCRIPT. So use of this feature will remove the ability to distinguish superscript and subscript characters.

Use a line length of less than 50 pixels will likely create many false strikethrough/underline lines. However the 50 pixel limit means that one or two character strikethroughs/underlines will not be captured by this string option. Fortunately, in most applications, there are not many of these.

We do not recommend allowing for large gaps in lines (values in excess of three pixels, for example). This will find extraneous “lines” that are actually just character features near each other. This will slow down processing and might lead to spurious reporting of strikethrough or underline.

Skew in the image will greately degrade the accuracy of this string option, so if your image has skew, we strongly recommend deskewing the image.

This string option, as it is currently implemented, will modify the image just prior to OCR. If you are saving the image after OCR, then the saved image will be this modified image. (If this is a problem for you please contact Prime, we can modify our implementation to your needs.)

As with OCR, low quality images will lead to lower accuracy of strikethrough and underline attributes.

In general characters that are strikethrough, or have underline, will OCR at lower accuracy than regular characters.

In its current implementation, this string option generates output in the “in memory” data structures of PrimeOCR output, PRO file based output, and RTF file based output. If you need it in other file based outputs, please contact Prime. Note that RTF is a fairly approximate formatting format, oriented towards words. For precise, character by character formatting, the in memory or PRO format is recommended.

This string option has been tested with English language documents. If you are interested in support for other languages please contact Prime.

Report lines in image

Function:

Will report vertical and horizontal lines found in the input image to a file with input image filename and “pr_lines” extension. The file will be placed in the same directory as input image (unless optional path is provided).

Timing:

Developers: This call can be made anytime before or after pr_recognize_image(). This call must be made for every page, otherwise it will automatically be turned off.

The action will occur on the image in memory at the time.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be “report_lines_in_image”)
-(optional)mininum line size (in pixels) (default is 100 if not provided)
-(optional)allowed gaps in line (in pixels) (max value is 3) (default is 0 if not provided)

The command string can (optional) include the following parameter separated by a comma:

-Full path (including file name and extension) of file to hold results

Special Case for Job Server

Job server users can use “JSOutput” (without quotes) as a special string, which will create file in: output directory\imagefilename.prlines.

Return Value:

No return values.

Example Usage:

User:

```
"report_lines_in_image,300,1"
```

Developer:

```
status=pr_string_options("report_lines_in_image,300,1", NULL);
```

In this example any vertical or horizontal lines that are longer than 300 pixels (including lines that have a gap of 1 pixel) will be reported.

Notes:

At the end of each page in the pr_lines output file, a page seperator character will be inserted. (On a page with no lines to report, this will be the only output).

The numbers in the pr_lines file are in pixels. A line with “HORZ” as the 3rd element represents a horizontal line. A vertical line includes “VERT”. “DOWN” represents vertical displacement (top of image is 0). “OVER” represents horizontal displacement (left edge of image is 0). “THICK” represents thickness of line. As an example:

“DOWN:266, OVER:694, HORZ: 9820, THICK:18”

This data represents a horizontal line that starts 266 pixels down from top edge, and 694 pixels from left edge of image. The line is 9820 pixels long (came from an engineering drawing) and 18 pixels thick.

There is no concept of skew in the reporting of lines, so we strongly recommend deskewing the image before calling this function.

The coordinates in the file represent the image in PrimeOCR memory. So if deskew, autorotate, etc. have been applied to the image, the coordinates will be on this modified image.

A slightly different version of this call is also available “`report_lines_in_image2`”. This version will recognize lines that are greater than 22,000 pixels in length. It currently is less intelligent at combining partial line segments that have image defects (such as gaps). You might try this different version if the primary version is causing problems. If “`report_lines_in_image`” is called, and image is greater than 22,000 pixels then the functionality of “`report_lines_in_image2`” is automatically used.

You should not use both versions at same time, if both “`report_lines_in_image`” and “`report_lines_in_image2`” are called, then “`report_lines_in_image2`” will automatically be deleted.

If you supply a path as the last parameter, and that path includes a comma anywhere, this will confuse the string option handler, which relies on commas between string parameters. If you convert the comma to a question mark character, it will automatically be converted back to a comma when we produce the output file.

Report text already in input PDF

Function:

Will add any existing text found in input PDF to Prime file output. (see Notes below for supported formats.)

Timing:

Developers: This call can be made anytime before pr_recognize_image(). This call is "sticky". Once called with a value it will retain that value until changed.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be "report_pdf_text")
-Value (0=off, 1=on)

Return Value:

No return values.

Example Usage:

User:
```
"report_pdf_text, 1"
```

Developer:
```
status=pr_string_options("report_pdf_text,1", NULL);
```

In this example any text found in the input PDF will be added to Prime's file output (if that output format is supported.)

Notes:

To date, only PRO and XML PRO will show this extra output. (If you want other formats supported please contact Prime Recognition.)

Any text found will be reported as 4 zones at the end of output (one zone for each rotation, i.e. upright, rotated 90 degress, rotated 180 degrees, rotated 270 degrees, with any text at intermediate rotation mapped onto upright or 180 degrees). On the "Zone Settings" line in the PRO file, the last number on this line will reflect its source as the incoming PDF file (value=10) plus the rotation of the zone(0,1,2,3). For example: 11= text came from PDF (10) plus it is rotated 90 degrees (1).

Words that have the same point size and are near each other horizontally will be reported as a line. Lines will be reported in vertical order, top to bottom (so concepts such as columns of text are not retained).

Confidence is set to 9 for each character. Character attributes are set to “1” for all characters.

The original text in a PDF can be reported in unusual ways:

-Spaces can be added in the middle of words, or a word may be reported as individual characters.

-PDF bounding boxes are not usually tight to a character, they are often higher and lower than normal and constant across a line of text.

-Words that are not visible to a human reader may be reported.

-Certain character combinations are often reported as ligatures (2 or 3 character combinations). We try to separate ligatures into individual characters for searchability.

-Characters are sometimes reported as unusual Unicode characters. We try to change these characters into more common characters for searchability.

Remove text from image in input PDF

Function:

Some incoming PDF files may already have parts of the page/document as text (e.g. electronic text or OCR text). This function will remove the text from the image so it does not get OCR'd (possibly duplicating text already in the file if SuperImpose=2 setting is used – see Notes).

Timing:

Users: This call will be made automatically when …\bin\PRIMEAGE.INI\ PDF2TIFF\ SuperImpose=2 (and incoming image is a PDF).

Developers: This call can be made anytime before pr_recognize_image(), but most likely you would want to do it after any image enhancement steps and before any automatic zoning. This call must be called for every page.

Input Variables:

The command string must include the following parameters separated by commas:

-Name of the command (must be "`erase_incoming_text_from_pdf`")

Return Value:

No return values.

Example Usage:

User:

```
"erase_incoming_text_from_pdf"
```

(but note Job Server does this automatically if SuperImpose=2 and input is PDF)

Developer:

```
status=pr_string_options("erase_incoming_text_from_pdf", NULL);
```

Notes:

If …\bin\PRIMEAGE.INI\ PDF2TIFF\ SuperImpose=2 then the output PDF will include all the text from the original input PDF. In this case using this string option is appropriate, as only portions of the file that do not already have text will OCR'd and added to the output PDF. Processing will be faster and text will not be duplicated in the output file.

Removing text from the image may affect nearby image features, including lines, so if you are using `"report_lines_in_image"` string option then we recommend performing `"report_lines_in_image"` first. (Only developers need to worry about this timing, for Users, this is taken care of automatically.)

Chapter 6 PrimeOCR Output Formats

The PrimeOCR engine can generate output in a variety of file based output formats. For developers the output can also be accessed in RAM. This chapter will first discuss which file based output formats are supported, it will then go into detail on the PRO format (PrimeOCR's native output format). The last portion of the chapter will discuss issues relevant to developers including access to the output in RAM.

File Based Output Formats

PrimeOCR can generate the following file based output formats:

ASCII

Just lines of characters recognized.

Conversion Rules:

-All lines are flush left, no blank lines are reported in output. Two blank lines are inserted between output of different zones.

-Word wrapping can be controlled via Setup\Output\AdvancedSettings\ChangeASCIIDefaults (see help text for more information) or ASCII_DEFAULTS string option (described in *Chapter 5*).

ASCII_NOZONEBUFFER,

ASCII but with no lines separating zones.

FASCII (Formatted ASCII)

Includes lines of characters recognized plus blank lines between lines of text and white space on left hand margin of text, as appropriate.

Conversion Rules:

-This file output tries to mirror the look of the zone of the page. If the whole page was defined as one zone then the output will look like the original page.

-If zones were defined on the page then each zone is reported linearly down the page, separated from the next zone by two inserted blank lines.

-There is no ability in ASCII files to define columns, or zones that appear next to each other in the output so the zones must be reported linearly down the page.

-Word wrapping can be controlled via Setup\Output\AdvancedSettings\ChangeASCIIDefaults (see help text for more information) or ASCII_DEFAULTS string option (described in *Chapter 5*).

FASCIITAG (Developer's Only)

FASCII but with "user tag" placed at top of document.

PDA

A file format that is a defined in the WordScan 5.2 Development Kit. PrimeOCR's PDA format is a Level 2 style. The output includes escape sequences compatible with the following WordScan engine settings:

c_s_attributes(CDP_A_XYLOCS|CDP_A_CBBS|CDP_A_POINTS)
c_s_marklevel2(CDP_MARK2,CDP_NONE)

PrimeOCR does not support image zones in PDA output.
This function should only be of interest to developers who have already interfaced to the WordScan product and want to use their existing output parsing code for PrimeOCR output.

PRO (Prime Recognition Output)

This output is described in detail later in this chapter.

PRSTAR

Custom version of PRO format. Contact Prime Recognition for more information.

RRI3

Format defined by Recognition Research, Version 3.

ZY3

Formatted ASCII plus tag at bottom of page which includes image file name, date, time as defined by ZyIndex, version 3.

RTF

Complies with version 1.1 format defined by Microsoft and used by many word processing programs. Supports multiple pages per file and linked image zones.
Conversion Rules:

-If zones have been defined each zone is created as a RTF frame. Text found within zone is placed within the frame.
-If image zones have been created, the path to the image file is inserted into the field. Note that the image file is not embedded into the RTF file, it is only a link to the image file created by PrimeOCR. Also note that image zones will only display correctly in Word 7.0+. Image zones are TIFF format if original image was bitonal, and JPEG if original image was color, grey scale, some other non TIFF bitonal format.
-Text is placed on the page (no zones defined) or within the frames with the margins and vertical spacing preserved.
-Three or more consecutive spaces in the output are converted to a tab.
-Text can be reported in two basic ways: (1) "As Is", no attempts are made to analyze and convert individual lines into paragraphs, or to remove hyphenation, or (2) "Wrap" text by removing carriage returns at end of lines (and hyphenation) to create paragraphs.
-A number of RTF parameters can be controlled via Setup\Output\AdvancedSettings\ChangeRTFDefaults (see help text

for more information) or RTF_DEFAULTS string option (described in *Chapter 5*).

PDFTO

PDF – Text (“PDF Normal”). Includes text with image zones, if any defined. As an option, images of low confidence words may be included.

PDFIO

PDF – Image Only. Includes only a copy of image. This format will probably not be used with the PrimeOCR engine, as the OCR output has no place in PDFIO format (use PrimeZone to generate PDF – Image Only format).

PDFIT

PDF – Image plus Text. Includes a copy of image with OCR text behind it. Text can be searched with common third party utilities.

Features that are supported in PrimeOCR’s PDF output are described in more detail later in this chapter.

COMMA

Comma delimited output. The output of each zone is separated by a comma. This format is useful for zoned images when the output must be imported into a database, or spreadsheet. Please contact us if you require a different delimiter.

HTML

Generate pages to display output on the web.
Conversion Rules:

-If the whole page was defined as one zone then the output will look like the original page.

-If zones were defined on the page then each zone is reported linearly down the page, separated from the next zone by two inserted blank lines. With this version of HTML output, there is no ability to define columns, or zones that appear next to each other in the output so the zones must be reported linearly down the page.

-Image zones are TIFF format if original image was bitonal, and JPEG if original image was color, grey scale, some other non TIFF bitonal format.

-A number of HTML parameters can be controlled via HTML_DEFAULTS string option (described in *Chapter 5*).

XML_WORDCOORD

Fairly simple XML output which only includes OCR’d words and their location coordinates. Units are in pixels. The character encoding is UTF-8.

XML_PRO

XML output which includes the same data that is the PRO format. The character encoding is UTF-8. The XML schema for this format, titled PRIMEOCR.XSD, is located in the \Include installation subdirectory.

(Prime Recognition has developed many custom XML formats for its customers, if you need a different type of XML format or with different contents please contact us.)

PDF Output

PrimeOCR allows the control of many PDF output features.

Feature	Control/Documentation
Optimize (byte serve) Desample image Generate Thumbnails Accessibility (508 compliance) PDF/A (1a or 1b) JBIG2 compression Zip compression Snippets in PDF Normal PDF version	Job Server: Setup/Output/Output Settings/PDF/Details String Option: PDF_DEFAULTS
Retain Input PDF information -Bookmarks -Document descriptions -Initial view -Hyperlinks	Job Server: Setup/Output/Output Settings/PDF/Details String Option: PDF_RETAIN
Bookmarks added manually or automatically	…\(install directory)\bin\bookmark.ini (see file bookmark.ini.example for documentation)
Add document descriptions (including Creator, Producer, Title, Subject, Author, Keywords)	…\(install directory)\bin\docprop_pdf.ini (see file docprop_pdf.ini.example for documentation)
Security/restrictions/passwords	String Option: PDF_SECURITY
Retain everything from incoming PDF, just add OCR text	…\(install directory) \bin\primage.ini\[PDF2TIFF]\SuperImpose=2 (see for Chapter 3)

PRO Output

PrimeOCR's native format is called "PRO". It reports all output that is available from the PrimeOCR in an "easy to read" format. We will first start the description of this format by defining the key concepts and variables used in the PRO format.

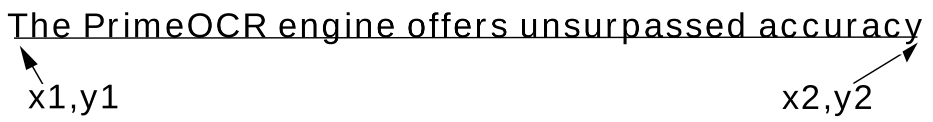
Definitions

Coordinate Units

PRO output coordinate measurements are always in units of 1/1200th of an inch, measured from point 0,0 which is the top left hand corner of the image.

Line Baseline Coordinates

A "baseline" is a line that extends through the bottom edge of all characters of a line (ignoring descenders on characters such as "p").



There are four coordinates to a baseline. The first two coordinates represent the x,y point of the left edge of the line on the original image. The second two coordinates represent the x,y point of the right edge of the line. (Note that y2 will often not match y1 because of skew in the image).

PrimeOCR extends the definition of a "baseline" to also include the height of the line via a fifth value.

Note

If a page is run in LEVEL_1 accuracy mode on all zones then y1=y2=y coordinate of midpoint of line. Therefore, on documents with large skew y1 and y2 will be relatively inaccurate.

Recognized Characters

See Appendix A for a listing of characters that may be recognized by the PrimeOCR engine.

Confidence Levels

Confidence levels range from 1-9, with 1 being very low confidence. As confidence levels increase the percentage of recognition errors decrease.

Character Format Data

This single byte (i.e. char in C language) is a bit field for character attributes.

PR_CHAR_NORMAL	0x01 (proportional width, serif font)
PR_CHAR_BOLD	0x02
PR_CHAR_UNDERLINE	0x04
PR_CHAR_ITALIC	0x08
PR_CHAR_SUPERSCRIPT	0x10
PR_CHAR_SUBSCRIPT	0x20
PR_CHAR_FIXED	0x40 (Fixed width as opposed to proportional width)
PR_CHAR_SANS_SERIF	0x80 (sans serif as opposed to serif)

The NORMAL attribute is included in every character. (A NORMAL character by default is proportional width and a SERIF font.) Therefore a character that is bold and underline would be value 7. That is, 7= 1+2+4.

Note that character attributes are not very accurate as reported by conventional OCR engines. The most common mistake is to not report an attribute. PrimeOCR does improve on conventional OCR performance in this area, however, be warned that even PrimeOCR's output will not be 100% accurate.

Note

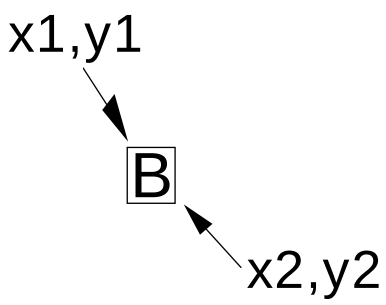
When this character attribute data is reported in the PRO file, a value of 48 is added to the actual value. This way PR_CHAR_NORMAL shows up as human readable “1” in the PRO file (which is actually ASCII value 49). So subtract 48 from the value read in the PRO file to get the machine readable value. See the example later in this chapter for more information.

Character Size

The size of the character is reported in points (1/72 of an inch). Again conventional OCR engines do not excel at reporting precise character sizes. It is best to think of these values as relative to each other vs. an absolute measure of the size of the character. The most common conventional OCR mistake is to report too large a size on characters larger than 20 points in size.

Character Bounding Box

A bounding box is a rectangle on the original image that encloses the character. The first two entries (0 and 1) in the bounding box array represent x1,y1, the top left corner of the rectangle. The second two entries (2 and 3) represent x2,y2, the bottom right hand corner of the rectangle.



Note

First, the good news. PrimeOCR's bounding boxes are more accurate than conventional OCR character bounding boxes, indeed many OCR engines do not give character bounding boxes because it is difficult to generate them accurately.

The bad news is that PrimeOCR's bounding boxes may not always totally enclose the character. For human error correction we recommend that you display an image that is centered on the PrimeOCR coordinates but is 1.5 times the average line height, and at least 2-3 times the reported width of the character. PrimeOCR does include bounding boxes for space characters although most applications have no need for this information. Bounding boxes for space characters in low quality documents will usually be in the correct general location but the width (difference between x1 and x2) is often incorrect.

PRO Output Hierarchy/Content

There is a five level hierarchy in PrimeOCR output. The first level is the document, the second level is the page, the third level is the zone, the fourth level is the line, and the fifth level is the character.

Document Level

If multiple pages exist in a document defined by the user/programmer then multiple pages will be appended together into one output document. Note that the number of pages in the document is not reported in the PRO output, you can only get this number by reading in, maintaining a count, of all the pages in the PRO output.

Page Level

The image height, width, resolution, color/binary type, and page based OCR configuration items are reported at this level including the number of zones defined.

Zone Level

The zone OCR configuration data is reported along with the number of lines in this zone.

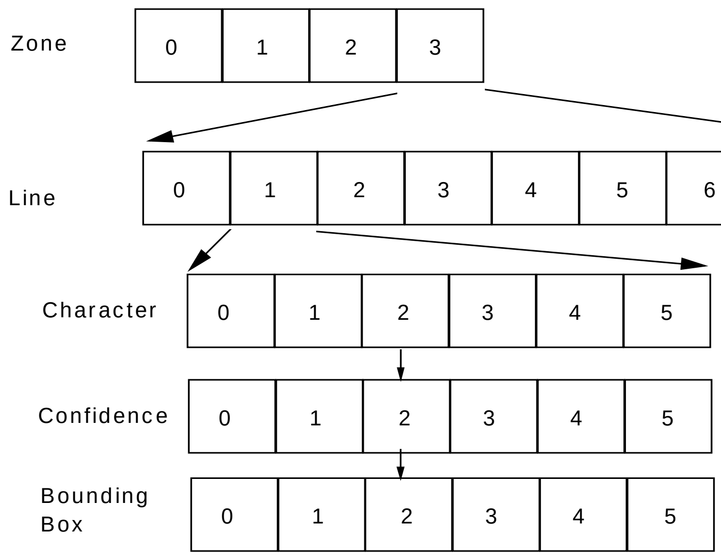
Line Level

Each line is described by a baseline plus average height for the line.

Character Level

Recognized text in this line. Each recognized character has a confidence level, character attribute data, point size, and a bounding box.

Text, Confidence, and Bounding Box of 3rd character of 2nd line of 4th Zone



File Based Output

Typically a PRO format output file will have a ".PRO" extension, especially if it has been output from the PrimeOCR Job Server, however, this is not a requirement.

The first 5 lines in a PRO file are used to describe the configuration settings for the first image or page within the document. The last line of this group describes the number of zones on the image.

The next line in the output indicates the beginning of zone descriptions. Then each zone's configuration data and output is fully described.

Within a zone description the first line is the configuration data. The next line is the number of lines recognized in this zone. Each recognized line is then described using 9 lines of text:

The baseline coordinates of the line plus average height
The recognized text
Confidence levels for each character of recognized text
Character attributes for each character of recognized text
Point size for each character of recognized text (entries separated by a comma)
x1 of the bounding box for each character (entries separated by a comma)
y1 of the bounding box for each character (entries separated by a comma)
x2 of the bounding box for each character (entries separated by a comma)
y2 of the bounding box for each character (entries separated by a comma)

There are no delimiters to note a transition from one line of recognized text to the next or one zone to the next, however there is no need because the format described above is fixed, e.g., each line always is described by 9 lines.

The maximum memory requirements of each line are noted below.

30 characters (5 coordinates *(5 characters/coordinate + 1 character delimiter))
500 characters (up to 500 characters recognized per line)
500 characters
500 characters
2000 characters (up to 500 entries * (3 characters/coordinate + 1 character delimiter))
3000 characters (up to 500 entries * (5 characters/coordinate + 1 character delimiter))
3000 characters (up to 500 entries * (5 characters/coordinate + 1 character delimiter))
3000 characters (up to 500 entries * (5 characters/coordinate + 1 character delimiter))
3000 characters (up to 500 entries * (5 characters/coordinate + 1 character delimiter))

OMR and Image zone output differ from text zones and are described below via examples.
At the end of each page description there is a "\f" character (end of page).

Example

The first several lines in a PrimeOCR output file could look like this:

```
450,0,850,22908        Version, Format, Confidence
User Tag info goes on this line.
c:\images\4931.tif     2      0
0,1,1,10,0,200,0,0,0,9984,13428,0,0   Page settings
3      # of Zones
0,0,1,999909,3716,2564,5012,2760,0    Zone Settings
18     # of Lines
6368,1127,8376,1115,124
Escrow #   7 0 3 -2
9999999199941215149
1111111111133333333
12,12,12,12,12,12,12,12,12,12,12,10,10,10,10,10,10,10,10
0,0,0,0,0,0,0,7311,0,0,0,7811,7925,7925,8039,8039,8153,8153,0
0,0,0,0,0,0,0,1552,0,0,0,1665,1665,1596,1665,1665,1665,1644,0
0,0,0,0,0,0,0,7410,0,0,0,7925,8039,8039,8153,8153,8267,8284,0
0,0,0,0,0,0,0,1694,0,0,0,1803,1803,1803,1803,1803,1803,1803,0
```

Line by Line Explanation

```
"300,0,850,22908       Version, Format, Confidence”
```

Version of software, flag ("1") if custom word output is included, and average confidence of all characters on this page * 100 (therefore range is from 100-900). The last number in string is for Prime Recognition’s internal use only.

```
"User Tag info goes on this line.”
```

Data, if provided by user_tag string, in call to pr_convert_output_to_file() by a developer.

```
“c:\images\4931.tif           2      0”
```

String provided by "image_name" string in call to pr_convert_output_to_file(). Typically this the image name but it could be any arbitrary string. Prime Recognition's OCRJOB Server places the original image name, tab, the page number (e.g., "2" as in second page of a multipage tiff file), tab, indicator if image is black/white (0) or color/greyscale/or other non standard format (1).

```
“0,1,1,10,0,200,0,0,0,9984,13428,0,0 Page Settings
```

Page Configuration data. (New Document, Page Quality, Print Type, Language, Deskew, DPI, Image Process, Autozone, Training, ImageWidth, ImageHeight, Auto Rotation, Save Image)
The numbers represent the integer value of the enums defined in PRSTRCT.H where appropriate. For example, in this image the Document Source is SAME_DOCUMENT (0), Page Quality is LOW_QUALITY (1), Print Type is DOT_MATRIX(1), Language is US (10), Deskew is not performed (0), DPI is 200 dpi, no image processing, autozoning, or training took place (0,0,0), the image width was 9984 BMUs, the image height was 13428 BMUs, no auto rotation took place, nor was image processed image saved.

```
“3     # of Zones”
```

Number of zones on this page.

```
“0,0,1,999909,3716,2564,5012,2760,0   Zone Settings
```

Zone Configuration data. (Zone #, Restrictions, Lexical Check, Acc Level, Zone bbox, Rotation of zone)
First line in a repeating structure for each zone. The numbers represent the integer value of the enums defined in PRSTRCT.H where appropriate. For example, in zone 0 (0), the Restrictions is NO_RESTRICTIONS (0), Lexical check is NO_LEXICAL(0), Accuracy Level is 999909 (run all engines except TextBridge with weight "9"), and the zone bounding box coordinates in 1/1200ths of an inch are:

- top right hand corner:
  - x - 3716
  - y - 2564
- bottom left hand corner:
  - x- 5012
  - y - 2760

The last number is the rotation of the zone.

- -“0” indicates normal rotation (i.e. text is upright).
- -“1” indicates 90 degrees (clockwise) rotation
- -“2” 180 degrees rotation
- -“3” 270 degrees rotation

(if 10 is added to these numbers it indicates text came from incoming PDF file, for example, 11 would indicate that text is rotated 90 degrees and was text already present in incoming PDF file).

```
“18    # of Lines”
```
Number of lines in zone. Second line in a repeating structure for each zone.

```
“6368,1127,8376,1115,124”
```
Line baseline coordinates plus the average height of the line. First line in a repeating structure for each line.

```
“Escrow #   7 0 3 -2”
```
RECOGNIZED TEXT OF LINE. Second line in a repeating structure for each line.
All whitespace has been converted to spaces. There are no tabs, or other special spacing characters in PrimeOCR ASCII text output.

```
 “9999999199941215149”
```
Confidence level of each character recognized. Third line in a repeating structure for each line. The confidence level range is from 1-9. 1 is very low confidence, 9 is very high confidence. (Prime Recognition's testing has shown a sharp break in error rates at the confidence level 6, i.e., for most applications confidence levels 7-9 should be treated as accurate.)). The actual binary value in the PRO file is 48 higher than the value in RAM based PRO output. For example, “1” in RAM output is printed as “49” in file based output. This is because “49” is displayed as “1” when reading the file in NotePad, WordPad, or other editors.

```
"1111111111133333333"
```
Character attribute of each character recognized. Fourth line in a repeating structure for each line. This example shows normal characters (1), going to bold characters (3=1+2). The actual binary value in the PRO file is 48 higher than the value in RAM based PRO output. For example, “1” in RAM output is printed as “49” in file based output. This is because “49” is displayed as “1” when reading the file in NotePad, WordPad, or other editors. This can be a little confusing once the attribute value is greater than 9, so the key to remember is to take the binary value of the attribute printed in the file and subtract 48 to get the real value.

```
"12,12,12,12,12,12,12,12,12,12,12,10,10,10,10,10,10,10,10"
```
Size of each character recognized expressed in points (1/72 of an inch). Fifth line in a repeating structure for each line. This example shows point size 12 characters, going to point size 10 characters.

```
“0,0,0,0,0,0,0,7311,0,0,0,7811,7925,7925,8039,8039,8153,8153,0”
“0,0,0,0,0,0,0,1552,0,0,0,1665,1665,1596,1665,1665,1665,1644,0”
“0,0,0,0,0,0,0,7410,0,0,0,7925,8039,8039,8153,8153,8267,8284,0”
“0,0,0,0,0,0,0,1694,0,0,0,1803,1803,1803,1803,1803,1803,1803,0”
```
The bounding box of each character. 6th-9th lines in a repeating structure for each line.
Only "suspicious" (all characters is the initial default) characters generate a real bounding box, all other characters have a bounding box of 0,0,0,0. For example, the "#" character has a confidence level of 1, so the following bounding box is reported:

x1	7311
y1	1552
x2	7410
y2	1694

Bounding boxes are in units of 1/1200 of an inch, measured from the top, left corner (0,0) of the image supplied to PrimeOCR. x1,y1 defines the top left corner of the bounding box, and x2, y2 defines the bottom, right corner of the box. Each number in a row is separated from its neighbor by a comma.

The nine "line description" lines are repeated for the number of lines in this zone (18 in this example). Then the description of zone 1 begins, etc. until all zone descriptions are complete.

OMR Zones

An OMR zone reports a single line of zone configuration data and one line of zone output, for example:

```
“0,7,1,3,3716,2564,5012,2760,    Zone #, Restrictions, Lexical Check,  Acc Level, Zone bbox”
```

(Note the restriction level "7". The lexical check and Accuracy Level data is irrelevant to an OMR zone and should be ignored.)

```
“75”
```

(Percentage of OMR zone that was black (number between 0-100).)

Image Zones

An image zone reports a single line of zone configuration data and one line that includes the image zone file name, for example:

```
“0,8,1,3,3716,2564,5012,2760,    Zone #, Restrictions, Lexical Check,  Acc Level, Zone bbox”
“test1.00010003"
```

Note the restriction level "8". The lexical check and Accuracy Level data is irrelevant to an image zone and should be ignored.

No other data is reported for an image zone. However, a Group 4 TIFF file (JPEG if original images was color/greyscale/nonstandard format) is created in the output directory with the name "XXXXXXXX.YYYYZZZZ" where "XXXXXXXX" is the name of the original image file and "YYYY" is the page number and ZZZZ is the zone number on that page (Zone numbers start at 0). In base 36 each character can vary from 0-9 and then from A-Z (note that due to Windows’ file system, letters are not case sensitive, therefore “a” is equivalent to “A”). For example, an image zone on the 12th page of the document called “TEST.TIF”, that has a zone number of 2, will be named “TEST.00120002”. The “0012” refers to the 12th page in the document, and “0002” refers to the 3rd zone on that page. (The first zone is 0, the second zone is 1, the third zone is 2, etc.) An image zone on page 37 with a zone number of 15 would have an extension of “.00370015”.

Note that if you move the PRO file, you must move the image zones to the same new directory (unless you plan on ignoring the image zones).

(**Developers:** refer to the documentation for the pr_configure_image_zone() call and pr_convert_output_to_file() call for more details on the creation of the image files.)

RAM based PRO Output (Developers Only)

The pr_recognize_image() call returns a pointer to an array of a PrimeOCR defined datastructure, "zonestructure". The number of zonestructures in the array is equal to the number of zones defined by the developer's control program. This number must be remembered by the developer's control program, it is not reported by the PrimeOCR RAM output.

Note that the Document and Page level output data is not present in RAM based output. This data is already supplied to the developer or by the developer. RAM based output is based on one image, not a document or multiple page construct.

zonestructure Data Structure

The zonestructure data structure includes the following elements:

short source	This is used by PrimeOCR internally. There is no significance to this attribute for the end user.
short numlines	Number of lines in the zone.
short confcount	% of zone that is black for OMR zones.
short zone_order	If PrimeOCR is looking for rotated text, and found it, this value will be non 0 for this zone. For example, “3” means text that is rotated 270 degrees clockwise to normal upright orientation. (“1” is 90 degrees, “2” is 180 degrees)
Linestruct * lines	A pointer to an array of pointers to line descriptions. There are numlines number of elements in this array.

linestruct Data Structure

The linestruct data structure includes the following elements:

short source	This is used by PrimeOCR internally. There is no significance to this attribute for the end user.
long linecoord[5]	x1,y1, x2,y2, height of line. This is not a bounding box. It is the coordinates of the baseline of the line. The last coordinate is the average height of the line.
short num_chars	Number of characters in this line.
char * character	Pointer to a string of characters that represent the reported line including conversion of any

	reported whitespace to spaces.
char * confidence	Pointer to a string of confidence values. Confidence values correlate precisely to character array by position, i.e. confidence[33] is the confidence level of character[33]. Confidence is reported on a 1-9 scale. 1 - very low confidence 9 - very high confidence The distribution of characters by confidence level depends, of course, on the quality and other factors of any specific document.
char * char_data	Pointer to a string of character attribute information. These values correlate precisely to character array by position, i.e. char_data[33] is the attribute data of character[33]. The value is a sum of Normal =1, Bold=2, Underline=4, Italic=8, Superscript=16, Subscript=32, Fixed=64, Proportional Sans Serif=128. Normal is included in every character. (Normal is defined as a Proportional font with Serif style.) For example, a normal character would be value 1. A bold, underline character would be value 7 (1+2+4). Note that if Proportional Sans Serif attribute is turned on the resultant value is >128. This means that RAM based values of char_data will be interpreted as negative by a debugger, or other tools. This is not an error, the underlying bit pattern is accurate.
char * point_size	Pointer to a string of character size information. These values correlate precisely to character array by position, i.e. point_size[33] is the size of character[33] in points (1/72 of an inch).
Bbox * box	Pointer to array of bbox datastructures which represent a bounding box for a character. Only characters that have a confidence level of equal to or below ConfidenceBbox level set in PRIMEOCR.INI will have a non zero bbox. 99% of the time at least a portion of the target character is in the x & y dimensions of the bbox. 99% of the time the character is

	fully enclosed by adding 50% of the bbox width and height to either side. For editing purposes the relevant image location should be centered on the bbox location, use the bbox y dimensions + 50% on top and bottom, but show at least 200% of the bbox width, and preferably > 1000% of the bbox width.

bbox Data Structure

The bbox data structure includes the following elements:

long xy[4]	Typically used to describe a bounding box, a rectangle that encloses an area on the original image (e.g. zones or characters) Array elements defined as: 0,1 - the upper left hand corner 2,3 - the lower right hand corner

Example

A simple example will illustrate the ease of accessing PrimeOCR output in RAM.

After a series of initialization and configuration calls the developer will recognize the image with the call shown below:

```
short status;
zonestructure * pr_output;
pr_output=pr_recognize_image(&status);
```

The following variables will access all relevant PrimeOCR output:

pr_output[i]	The [i]th zone datastructure defined on this image. i can range from 0 to the number of zones-1 defined on this image. The number of zones defined by the developer for this image must be remembered by the developer's control program, it is not reported by PrimeOCR output.
pr_output[i].numlines	The number of lines in zone[i].
pr_output[i].lines[x1]	The [x1] line datastructure in zone[i]. x1 can

	range from 0 to pr_output[i].numlines-1.
pr_output[i].lines[x1].linecoord[x2]	The baseline coordinate[x2] of line[x1] in zone[i]. linecoord[4] is the average height of line. x2 can range from 0 to 4.
pr_output[i].lines[x1].character[x3]	The [x3] character of line[x1] in zone[i]. x3 can range from 0 to the number of recognized characters (see below) on this line-1.
pr_output[i].lines[x1].num_chars	The number of characters recognized in this line of text.
pr_output[i].lines[x1].confidence[x3]	The confidence value for the [x3] character.
pr_output[i].lines[x1].char_data[x3]	The character format bit field value for the [x3] character.
pr_output[i].lines[x1].point_size[x3]	The size in points for the [x3] character.
pr_output[i].lines[x1].box[x3].xy[x4]	The [x4] bounding box coordinate of the [x3] character of the [x1] line in zone[i]. x4 can range from 0 to 3.

Note

The elements in a C style array start numbering at 0 instead of 1. For example, if pr_output[i].numlines reports 18 lines, then x1 in pr_output[i].lines[x1] can range from 0 (the first line) to 17(the last line). It is a common, and potentially damaging, mistake to try to access the 18th line using pr_output[i].lines[18].

Note – Rotated zones

The image location data in a rotated zone is relative to the rotated image.

If you need the coordinates expressed in the original image coordinates you will need to convert the numbers. Here is an example of how to convert coordinates that are expressed in an image that was rotated 270 degrees clockwise back to original image location.

Orginal image location=270 degree rotated image location

X1=Y1
Y1=Image height-X2
X2=Y2
Y2=Image height-X1

Asian Language Output in PRO file

When the recognized language is an Asian Language, each recognized character is identified by 4 number/letters from the Unicode Standard 5.0, for example, “2E80” would represent 1 character. So if num_chars is 10, there will be a total of 40 number/letter characters in the character line. All other lines (confidence, point_size, etc.) will still have 10 corresponding entries.

Other RAM based Output (Developers Only)

Chapter 10 – Programming to the PrimeOCR API describes other calls (pr_output_xxx()) which can access individual elements of the RAM based output. These calls are highly recommend for developers using Visual Basic, or developers not comfortable with the multi-dimensional data structures noted above.

Chapter 7

Troubleshooting

This chapter describes strategies and tools to help you identify problems with PrimeOCR (including the PrimeOCR Job Server). Developer issues are covered at the end of the chapter.

Troubleshooting Suggestions

Check the PROCR.LOG file for any messages. This file is available under Logs\Job Server Log menu item, or Errors button, or look in the PRDEV\BIN directory.

A common problem is more than copy of software on the machine. Search your PC's full set of local hard drives for PROCRB.DLL. If multiple copies exist make sure you are using the correct version or delete all but one copy of software.

If you have installed imaging products from other OCR vendors, or other imaging vendors:

> Temporarily remove the software from these other vendors to see if any problems persist.

If the program appears to run correctly but does not write an output file, or the output file is 0 bytes size:

> Make sure that enough disk space exists to write PrimeOCR results (if file output is being used). A PrimeOCR output file can easily require 60-70KB of disk space. The PROCR.LOG file will warn you when disk space in the output drive or the log drive is below 5 MB in free space.

If the program runs much of the time but once in a while does not run correctly:

> Restart the operating system and in some cases, reboot the system. The majority of these problems are caused by a lack of RAM. A dialog box may also appear describing the error. Please note both the error number and the text in the error dialog box.

If the program has problems on the very first image (depending on your configuration it may continue on to the next image), try the following:

> Select “Stop Processing” in the \SETUP\OCR Engine\Error Handling area of the PrimeOCR Job Server.
>
> Select the “Log PrimeOCR engine entries” setting in the \SETUP\OCR ENGINE\LOGGING area. Look at resulting PROCR.LOG file.
>
> If these actions still do not solve the problem please call technical support at Prime Recognition. We may ask you to send us the files necessary to replicate and/or diagnose your problem. These files would include:

-Image file
-Template file (.ptm)
-Job file (.job)
-PRIMEOCR.INI, OCRJOB.INI, PRIMAGE.INI
-PROCR.LOG

You would send these files as email attachments to Prime Recognition’s technical support (mail to: support@primerecognition.com).

“Run as admin” (Vista, Windows 2008, Win7)

Depending on your security settings, it may be important for you to run the application that uses the PrimeOCR engine (for example, the OCR Job Server, or your programmed application) with Admin rights, even if you are not logged in with Admin rights. To do this, right click on \bin\PRLICENSE.EXE and select to run as Administrator. If you are not logged in as admin, you will asked to do so (for this application only).

PrimeOCR Job Server Error Reporting

Any serious errors will be reported to a file called PROCR.LOG in the \BIN directory. Warnings and log entries (if you turned on the Job Server log setting in the Setup\OCR Engine box) will also appear here.

Intermediate Error Reporting

PrimeOCR can automatically handle almost any error from the intermediate processes. Errors handled this way will be logged to a file called "PROCR.LOG". For example, if one intermediate engine fails on an image then PrimeOCR will terminate the engine for that image and continue processing. (The engine will be brought back up for the next image.). The error will be logged in the PROCR.LOG file as a warning to inform the user that this image did not receive processing by all engines. The warning listing includes the engine which reported the trouble, a message, the image which caused the problem, and the date and time. It can be a fairly common occurrence to have an internal engine fail so most users should not worry about these warnings (unless they occur on each image for a specific engine, or, at the other extreme, more often than every 20 images for any specific engine). However, more serious errors are also reported to this file so we encourage you to review its contents.

Activity Log

A text file log of all major activities of the engine can be generated for debugging purposes. Select the “Log PrimeOCR engine entries” setting in the \SETUP\OCR ENGINE\LOGGING area. Look at resulting PROCR.LOG file.

The default name of the log file is PROCR.LOG, and the default size is 1000K bytes. You may change both of these settings with the \SETUP\OCR ENGINE\ADVANCED SETTINGS\LOGGING\Change PrimeOCR Log Attributes or with string option API call "log_settings" (see *Chapter 5 – String Options* for more information).

The log file includes a description of all API calls made, along with the supplied variable values. It also includes major internal activities. We recommend you call Prime Recognition for assistance in reading the log file.

Other Debug Facilities

Several debugging tools are embedded within the PrimeOCR engine and can be activated by making some changes in the PRIMEOCR.INI file. However, these tools are intended for the use of Prime Recognition for remote technical support and are not documented here.

Error Numbers/Messages

PrimeOCR returns an error number, always negative, to indicate what type of error has occurred. The latest list of errors and an explanation of those errors is kept in the PROCRERR.TXT file in the \BIN directory.

The Job Server will translate this error number into a text message that provides an English based explanation of the error and in some cases suggestions as how to fix the error. Developers might note that the Job Server uses the pr_report_error() call to perform this task.

Trouble Shooting (Developers Only)

If your program does not work at all:

> Try to compile and run the C source code sample program as is. If the sample program does not compile or run correctly with the included example images then there is a problem with your environment.

If the program works but fails after a limited number of images:

> Make sure you are calling pr_del_results() after you are done with the RAM based output, otherwise the operating system will eventually run out of memory which will cause PrimeOCR operating errors.
>
> Are you getting dialog boxes that warn you of GPFs? If so you should change the “ChangeNTErrorReporting” setting in the PRIMEOCR.INI file to the value of “1”. (**Remember you must be logged in with Adminstrator privileges**).

API Error Reporting (Developers Only)

The best way to determine the cause of errors is to always check the value of the "status" variable returned by each PrimeOCR API call. A value of 0 indicates success, any other value indicates an error except for the pr_open() call which returns the version number as a positive number..

All API calls perform as much input validation as possible, such as receiving a NULL pointer, or input data out of range. Bad inputs will cause immediate function termination (no intended processing occurs) and reporting of bad input.

An API call, pr_report_error() is available that will translate the error number into a text based message. This text comes from the PROCRERR.TXT file. If so desired a developer may modify the text in this file to better fit their needs (for example, an international developer may wish to translate text to another language.) If an error is reported that is not listed in PROCRERR.TXT please call Prime Recognition technical support.

Chapter 8

Contacting Prime Recognition & Warranty/Support

We encourage you to call Prime Recognition with any technical or sales questions or comments. We are very interested in feedback on our products. If you need any functionality which is not in the existing product please let us know.

If you have a significant problem with our product or support, please contact technical support directly at the phone number below. We will do our best to set it right.

Prime Recognition can be contacted by phone, FAX, Email, Web, or FTP as noted below.

Phone:	425-895-0550
Email Address:	support@primerecognition.com
FTP Address:	ftp.primerecognition.com
Web Address:	www.primerecognition.com

Warranty/Support

PrimeOCR offers an annual warranty and support program. The program offers free unlimited technical support via phone, FAX, FTP, mail, or Email at the above numbers, plus free maintenance upgrades and 50% discount on major upgrades. A Premimum maintenance program is also available that includes free major upgrades.

In order to be covered by our warranty program all licensed products, even those not the subject of the current technical support question or issue, must be under an active warranty program.

On-site Technical support is available for a daily charge plus travel expenses. Please call to verify the current daily rate and availability.

Chapter 9 Captiva/InputAccel Module

PrimeOCR can be run as an Captiva/InputAccel module. Captiva/InputAccel is a document capture system developed and marketed by EMC).

PrimeOCR and other Prime Recognition products have been certified by EMC to work reliably within InputAccel.

Versions

PrimeOCRIA is available for IA versions 5.3, 6.X, and 7.X.   Please contact Prime Recognition to get this software or for more details on its functionality.

Chapter 10 Programming to PrimeOCR API

The PrimeOCR interface is a DLL (Dynamic Link Library) with an API. The PrimeOCR DLL, in turn, manages calls to other DLLs to execute its functionality. The DLLs were developed in Microsoft Visual C++ , however, the master DLL which implements the API to the developer was implemented with a "C" style interface which can be accessed by C, C++, Visual Basic, Delphi, and other tools/languages. Source code for four sample applications are included which use C and Visual Basic and CNET/VBNET as the development language. Please refer to these examples for an illustration of how to implement the items noted below.

Include Files

Any call from a C/C++ program to the PrimeOCR API requires these include files:

```
#include <prstrctb.h>
#include <prapib.h>
```

The PRSTRCTB.H file details the PrimeOCR enumerated constants and data structures and the PRAPI.H file contains the API call formats.

Libraries

The PROCRB.LIB library must be linked into the controlling application. This library is in the \LIB subdirectory. The PROCRB.LIB file automatically links your program into PROCRB.DLL, the main DLL for PrimeOCR.

Old applications written to v5.X PrimeOCR API

Applications written to PrimeOCR v5.X (and earlier releases), should run “as is”, no need to recompile or relink (they will continue to use PROCR32.DLL, which in v6 is a new DLL that links the old style API into the new v6 PROCRB.DLL). Note that the old style API does not support large images, all the image limits in v5.X still apply.

Programming Languages

Developers using other languages should refer to their language documentation for instructions on how to call a DLL with a C style function call interface. Visual Basic users are encouraged to read *Chapter 11 – Example Applications* for a discussion of the PRVBEX32.EXE example program which was written in Visual Basic.

API Call Functionality Groups

The API calls can be grouped by functionality. These groups are:

Open/Manage/Close Engine
- pr_open()
- pr_configure_ini()
- pr_license_get_value()
- pr_report_error()
- pr_close()

Input/Process Image
- pr_read_image_RAM()
- pr_read_image_file()
- pr_image_information()
- pr_blank_image_area()
- pr_deskew_image()
- pr_preprocess_image()
- pr_auto_rotate()
- pr_save_image()
- pr_save_image_mpage()

Configure Page
- pr_set_new_document()
- pr_set_low_quality()
- pr_set_language()
- pr_set_printer_type()• pr_load_page_template()
- pr_set_user_dictionary()
- pr_configure_lexical_plus()
- pr_lexical_plus ()

Configure Zone
- pr_autozone()
- pr_get_autozone()
- pr_set_number_of_zones()
- pr_get_number_of_zones()
- pr_configure_zone()
- pr_configure_OMR_zone()
- pr_configure_image_zone()

Recognize Page
- pr_recognize_image()
- pr_language_id()

Get Output
- pr_output_xxx()

Convert RAM based Output to ...
- pr_convert_output_to_file()

Delete Output Memory
- pr_del_results()

Custom Functionality
- pr_string_options()
- pr_configure_output()
- pr_pre_process_PDF() (independent of the rest of the engine) ()

API Call Scope

API calls also differ in their scope. There are three levels of API call scope:

1. Engine - calls apply to the whole engine
2. Image or page - calls apply to one full image/page
3. Zone or multi-zone - calls apply to one or multiple zones

The API calls are organized below by their scope:

Engine Calls

- pr_open()
- pr_configure_ini()
- pr_license_get_value()
- pr_report_error()
- pr_close()

Image Calls

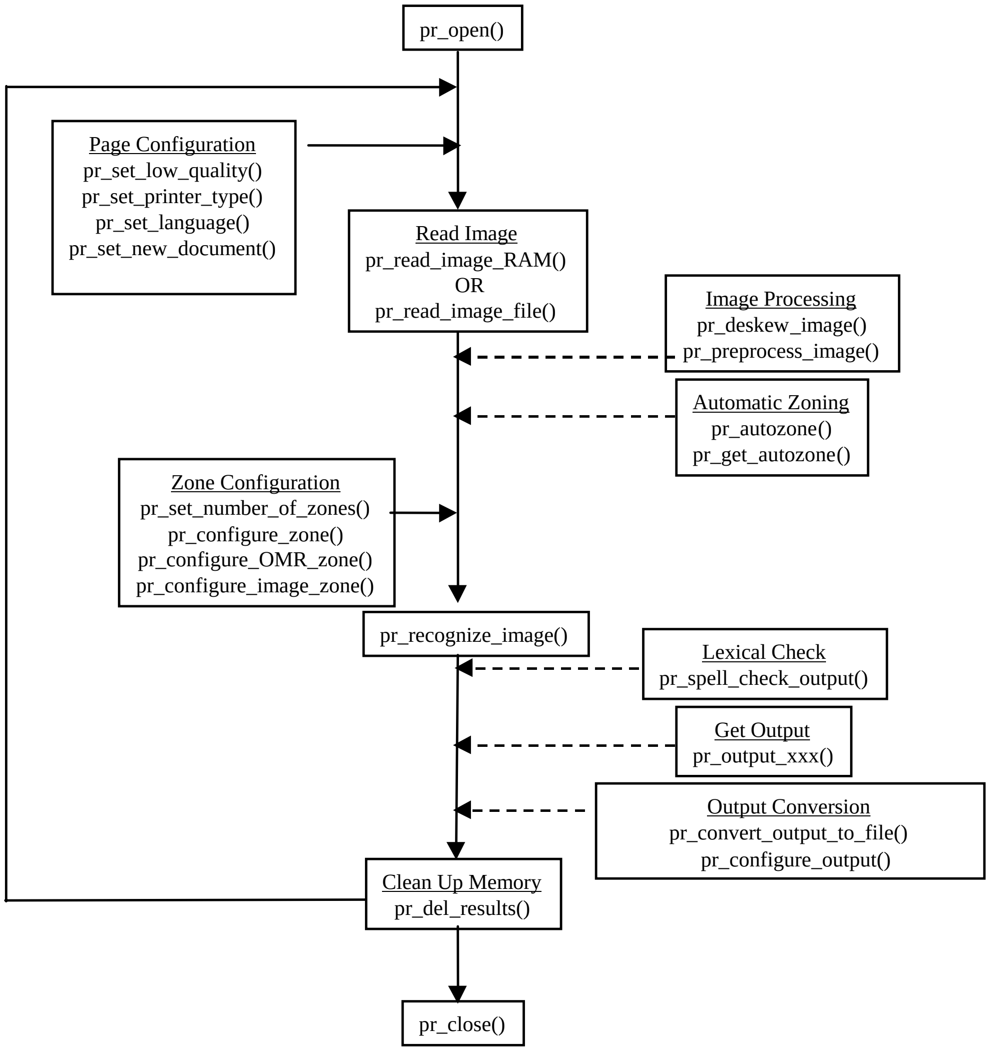
- pr_read_image_RAM()
- pr_read_image_file()
- pr_image_information()
- pr_blank_image_area()
- pr_deskew_image()
- pr_preprocess_image()
- pr_auto_rotate()
- pr_save_image()
- pr_save_image_mpage()
- pr_autozone()
- pr_set_new_document()
- pr_set_number_of_zones()
- pr_set_language()
- pr_set_low_quality()
- pr_set_printer_type()
- pr_recognize_image()
- pr_convert_output_to_file()
- pr_del_results()
- pr_load_page_template()
- pr_set_user_dictionary()
- pr_configure_lexical()
- pr_lexical_plus ()
- pr_configure_output ()
- pr_language_id ()

Zone Calls

- pr_get_auto_zone()
- pr_configure_zone()
- pr_configure_OMR_zone()
- pr_configure_image_zone()
- pr_output_xxx()
- pr_set_number_of_zones()
- pr_get_number_of_zones()

API Call Sequence

Each API call described later in this chapter includes a discussion of when it can be called in relation to other calls. A figure below gives a rough description of the flow for the more popular calls, however, please refer to the actual API descriptions for a more precise description. The line going down the middle of the diagram represents the minimum process for one page. Solid horizontal lines indicate mandatory calls, although the calls may only need to be made once at engine startup. Dotted horizontal lines indicate optional calls.



API Call Functionality

Configuration Memory

Many of the PrimeOCR API calls perform configuration. PrimeOCR retains configuration data between API calls. Any processing is based on all configuration data that is loaded at the time of process initiation. This means that most configuration need not be reentered for each page, e.g., the pr_set_low_quality() call can be made once, with all subsequent pages processed against this setting. Because PrimeOCR does not reset configuration data between pages any settings that need to change between pages must be set explicitly by the developer.

Changing one configuration value never causes other configuration settings to change, although it may make other settings incomplete or irrelevant. For example, assume that 5 zones were defined and processed on page one. On page two there are 7 zones so the number of zones is changed to 7. All the zone configuration data for zones 0-4 are still in memory and will be used for page two unless it is changed. Obviously zones 5 - 6 must be configured for page two. (Zone numbering starts with 0, for example, the fifth zone is zone number 4.)

If, instead, 7 zones were defined on page 1 and then 5 zones on page 2, zone data for zones 5 and 6 would remain in memory for page 2 but would be ignored since only zones numbered from 0 to number of zones-1 are processed.

Error reporting

Each function returns an integer or "status" variable indicating 0 for success and -X for errors.

Refer to *Chapter 7 - Troubleshooting* for more information on trouble shooting. The file PROCRERR.TXT includes error numbers and corresponding textual explanations.

Yielding

API calls which consume a significant amount of CPU time have been designed to periodically yield a small amount of time to other applications during processing. Developers may also design their OCR engine control applications to yield between PrimeOCR API calls and during PrimeOCR callbacks, if processing time is required by other applications. However, we do not recommend running CPU intensive, RAM intensive, or timing sensitive, applications concurrently with PrimeOCR.

If you implement the callback function then you may also add your own yield process in this call back function. This allows the developer to add more yields during recognition.

Call Return Timing

Each API call will return only when processing is complete. For all calls, except the pr_recognize_image(), processing will complete quickly. On large, bad quality images, with high accuracy settings, the pr_recognize_image() call can take up to several minutes to return.

Progress Reporting (Callback function)

A callback function may be registered through the pr_open() call. This function will receive messages from the PrimeOCR engine during its processing which indicates the progress of the engine.

API Calls

Programming to PrimeOCR API

pr_open()

short pr_open(HINSTANCE hInstance, HWND hWnd, short speed, FARPROC pr_callback);

Function:

Initializes PrimeOCR Engine.

Required?:

Required.

Timing:

Should be called only once and before any other PrimeOCR call.

Input Variables:

HINSTANCE hInstance

The instance of the user program. (This can be a positive dummy number if not available).

HWND hWnd

The handle to the user program window. Can be 0 if not available. If 0 then the update window will not be created (progress still available through callback).

short speed

The speed rating controls the number of processes that are run concurrently. Set the speed rating equal to the number of processors that are free for PrimeOCR processing. For example, if you have a dual processor machine, and only PrimeOCR is run on this machine, then you can set this to 2 (or 1 if you don't want to take advantage of the second CPU). Do not choose a number higher than the number of processors on your machine, higher than you are licensed for, or higher than the number of processors that are actually free for PrimeOCR processing. A setting of "0" loads each engine as required and unloads it immediately after processing. This method uses much less memory, but is quite slow, slowly consumes resources, and is only recommended for "demos" or other special situations.

A setting of –1 will allow PrimeOCR to sense how many processors exist on the machine, and to use all the processors (subject to any licensing restriction).

Memory Consumption

All engines required for an image are loaded and do not get removed until the PrimeOCR engine is terminated (unless "speed" is "0"). The memory requirements are: 5MB plus 10MB times the number of engines. For example, a three engine version would require 35MB of free RAM.

FARPROC pr_callback

The address of the callback function written by the developer. PrimeOCR will send a message to this function that indicates the current step in its processing. If a callback is not requested then enter NULL for the address. Typical messages are shown below:

Message	PrimeOCR Step
“Opening PrimeOCR Engine”	During pr_open()
“Reading d:\images\test.tif”	During pr_read_image_file() Includes name of image to be read by engine.
“Image size 990,890 RES=300”	At the end of pr_read_image_file() Includes pixel width, height, and resolution in dpi of image.
"Intermediate Results(% Complete)"	During pr_recognize_image() Indicates that the intermediate algorithms are being processed.
“XX”	During pr_recognize_image() Indicates percentage of processing that is complete. The percentage may momentarily decrease, or even start over at 0 again during processing. This is not a bug, it indicates that processing is looping back for a 2nd, 3rd, etc. pass.
“Processing Results”	During pr_recognize_image() Indicates that processing is almost complete.

Note: If you do not have significant experience with callback functions please use the callback function and code provided in the example application provided with this toolkit. Also review your compiler’s instructions regarding compile and make as they relate to callback functions.

The callback must use _cdecl calling convention. C# and VB, for example, require special coding in your application to enable this convention (C/C++ typically do not).

Typical Return Values:

A negative return value indicates an error. A positive return value indicates the version number of the software expressed as an integer. For example, "380" indicates release 3.80.

-100	Invalid hInstance
-101	Invalid hWnd
-111	Incompatible API version, license does not match software version. You may have updated the software without updating the license.
-112	Speed rating exceeded speed rating contained in license, in other words you tried to set a speed that was higher than speed rating licensed.
-113	Could not find a file called "PRIMEOCR.INI" in PRDEV\BIN directory.
-887	Could not find the hardware key, or hardware key contents were not read correctly, and no software license was found.
-4599	(1) Calling application was not in same directory as PROCRB.DLL, OR,

(2) FF20M32.DLL, FFWIN32.LOK, and PROCRB.DLL was not in PATH.

Application Location

If you locate your application in the \BIN directory no PATH modifications are required. If you wish to move your application to another directory then the \BIN directory must be added to the PATH statement. Call Prime Recognition if you need help in changing the PATH operating system settings.

pr_configure_ini()

short pr_configure_ini(char * string);

Function:

Allows configuration items that are typically found in the PRIMEOCR.INI file to be set via API calls. This means that configuration items can be configured without including the PRIMEOCR.INI file in the software distribution, and/or configuration items can be changed while the engine is running.

Required?:

Optional. If this call is not made, and if the PRIMEOCR.INI file does not exist then default settings are used. The default settings are those present in the PRIMEOCR.INI file when it was originally shipped by Prime Recognition.

Timing:

Can be made at any time, including BEFORE the pr_open() call. (This is the only call which can be made before the pr_open() call.)

Input Variables:

char * string

A string that exactly matches the line of text found in the PRIMEOCR.INI file. For example, "ConfidenceBbox=8", would set the ConfidenceBbox configuration value to 8.

Typical Return Values:

-1 or -2 if string was unrecognized.

Notes:

pr_license_get_value()

short pr_license_get_value(short value);

Function:

Will return certain values from the PrimeOCR license.

Required?:

Optional.

Timing:

Can be made at any time after the pr_open() call.

Input Variables:

short value

0=returns how many days are left until license expires

1=returns how many pages are left until license expires

Typical Return Values:

9999	indicates that value requested is unlimited (i.e. unlimited days or unlimited pages)
-9999	Error: unknown value submitted to call

Notes:

The return value for Pages (“1”) should be multiplied by 10 to get the number of pages remaining.

pr_report_error()

short pr_report_error(short error_number, char * string);

Function:

Returns a text message for an error number.

Required?:

Optional.

Timing:

Can be called at any time.

Input Variables:

short error_number

This error number is generated by the PrimeOCR engine on another call. Once sensed it is sent to this call to translate it into a text message.

Typical Return Values:

-1	PROCRERR.TXT file could not be opened.

Notes:

The call reads the PROCRERR.TXT file for the text message that corresponds to the error number. In some cases the user may wish to modify the PROCRERR.TXT file to return messages that better match their application or environment.

pr_close()

short pr_close();

Function:

Cleans up PrimeOCR engine resources right before exit.

Required?:

Required.

Timing:

Must be the last call made to PrimeOCR engine.

Input Variables:

None.

Typical Return Values:

None.

Notes:

Any calls made to the PrimeOCR engine after pr_close() are not valid.

pr_read_image_RAM()

short pr_read_image_RAM(short ImageWidth, short ImageHeight, short dpi,
unsigned char *DataBlock);

Function:

"Sends" an image to PrimeOCR which developer has already placed in RAM memory, by telling PrimeOCR where to find the image (pointer to memory).

Required?:

This call OR pr_read_image_file() is required to give the PrimeOCR engine an image to process.

Timing:

Can be made at any time before the pr_configure_zone() call. Only needs to be called once per image. If multiple calls are made before pr_recognize_image() then only the last call is valid.

Input Variables:

short ImageWidth

Width of image in memory in pixels. Must be a multiple of 32.

short ImageHeight

Height of image in pixels. Must be a multiple of 32.

short dpi

Resolution of image in dots/pixels per inch. This setting must be 200, 240, 300, 400, or 600. 204 X 196 dpi images (equivalent of fine mode FAX) can be input as 200 dpi images. (200 X 98 FAX images are not supported via RAM input.) See NOTES ON IMAGES, after pr_read_image_file() description, for warning on FAX resolution image location accuracy.

unsigned char *DataBlock

Pointer to binary image in memory (color/gray scale not supported). The format in memory must be a raw bitmap, e.g., not a Windows bitmap. A brief description of this format is in *RAM Based Images*, Chapter 1.

Typical Return Values:

-121	RAM input resolution was not 200, 240, 300, 400, or 600 square
-130	ImageWidth not a multiple of 32
-134	Image Width or Height too small (< 2 pixels)
-136	Image Height not a multiple of 32

Notes:

See NOTES ON IMAGES after pr_read_image_file() description.
PrimeOCR does not free the image memory after use. The developer's application placed the image in memory, and is responsible for deleting the memory used by the image as well.

pr_read_image_file()

short pr_read_image_file(char * filename, short page_number, short * dpi,
short *number_of_pages);

Function:

Reads an image into RAM for PrimeOCR engine usage from an image file, including multipage TIFF files. See Notes below for supported file formats. Image will be converted to a binary image in PrimeOCR's memory (even if it was color/grey scale in file format).

Required?:

This call OR pr_read_image_RAM() is required to give the PrimeOCR engine an image to process.

Timing:

Can be made at any time (i.e. sequence of calls) before the pr_configure_zone() call. Must be called only once per image or memory leaks will occur.

Input Variables:

char * filename

Pointer to a string which includes the full path and filename for the image file, e.g. "D:\IMAGES\4931.TIF".

short page_number

Number of page within an image file (legal numbers are 1 < - > # of pages in file). If a single image file then this number should be 1.

Return Variables:

short * dpi

Resolution of image file in dots per inch.

short * number_of_pages

Returns total number of pages present in multipage image file. **<u>HOWEVER</u>**, on some files it may just return a number that is +1 from "page_number". This indicates that the program can not sense the total number of pages but can sense that at least one more page exists in the file.

Typical Return Error Values:

-121	PrimeOCR could not automatically convert incoming file to input resolution of 200, 240, 300, 400, or 600 square
-130	ImageWidth not a multiple of 32
-134	Image Width or Height too small (< 2 pixels)
-135	ImageWidth results of file read were not a multiple of 32
-140	No filepath/name given
-141	Filepath/name exceeded 260 characters
-142	PrimeOCR engine could not find filepath/name
-144	File did not get read into memory

Notes:

Supported file formats include:

- TIFF (binary, Version 5.0 and above)
  - -uncompressed
  - -Group 3 (fax)
  - -Group 3
  - -Group 4
  - -MultiPage
- TIFF* (color\grey scale)
  - -uncompressed
  - -JPEG

JPEG* (color, grey scale)

PCX*

PDF **

*OCR-COLOR option required to read file.

** OCR-PDFIN option required to read file. PDF Image Only, PDF Image+Text, bw\grayscale\color, multiple page supported. PDF Normal is not supported but approximately 50% of PDF Normal files can be read. PDF files that are encrypted/secured cannot be read. Memory requirements increase by 30MB to 90MB (color) and more if images are bigger than 8.5x11. Processing time increases by 2-10 seconds per image.

File resolutions are read by the PrimeOCR engine and do not need be input by the developer. Supported file resolutions (dpi) are:

600 X 600	
400 X 400	
300 X 300	
240 X 240	
200 X 200	
204 X 196	(Fine mode FAX)
204 X 98	(Standard mode FAX)

PrimeOCR can handle deviations from these desired values.

Standard mode FAX images will automatically be line doubled to 204 X 196 resolution by the PrimeOCR engine.
See *NOTES ON IMAGES* for warning on FAX resolution image location accuracy.

pr_image_information()

short pr_image_information(pr_image_info * image_data);

Function:

Returns width, height, dpi, of image currently in engine. If image was read from a file it will also indicate if this image was color/grayscale or some other non TIFF bitonal format.

THIS CALL WILL BE REMOVED IN A FUTURE RELEASE. USE PR_GET_IMAGE_INFORMATION() INSTEAD.

Required?:

Optional.

Timing:

Call can be made anytime after pr_read_image_xxx() and before pr_del_results().

Input Variables:

None

Output Variables:

pr_image_info * image_data

Pointer to structure that hold image data (defined in PRSTRCTB.H). Width and height are measured in pixels. DPI is measured in dots or pixels per inch. "color_image" indicates whether image files read in by pr_read_image_file() call was a bitonal conventional TIFF file, or some other format such as color, grey scale, PCX, etc.

Typical Return Values:

-140	image_data pointer was null (i.e. not valid).
-118	image has not been loaded into memory yet.

Notes:

Among the uses of this function is to sense whether the image read was a color/greyscale, or some other non conventional image format. A flow of data from such a non standard format should be slightly different vs. a conventional bitonal TIFF file. See *NOTES ON IMAGES* later in this chapter.

pr_get_image_information()

short pr_get_image_information(short data_selector, short * data_return);

Function:

Can return width, height, dpi of image currently in engine. If image was read from a file it can indicate if this image was color/grayscale or some other non TIFF bitonal format. If deskew and/or "weak" autorotate was performed it will report sensed skew and rotation of the image.

Required?:

Optional.

Timing:

Call can be made anytime after pr_read_image_xxx() and before pr_del_results().

Input Variables:

short data_selector

0 = return width (in pixels) of image currently in memory
1 = return height (in pixels) of image currently in memory
2 = return resolution (in dpi) of image currently in memory
3 = return a flag that indicates whether image in memory was a bitonal TIFF file (value 0), or a color/grayscale, or unrecognized bitonal format (value 1). Only valid if image was read in from a file.

4 = returns amount of skew in file prior to deskew. (Only valid if deskew was performed on this image prior to this call). Values represent the number of horizontal pixels for every 1 pixel of vertical displacement, e.g. 50 means 50 pixels of horizontal displacement for every 1 pixel of vertical displacement (50 is noticeable skew). 500 would be very small skew. A negative number means that the skew is counter clockwise.

5 = returns the amount of rotation that "weak" autorotate (autorotate implemented through pr_enhance_image()) performed:
0=no rotation (PrimeOCR thinks image is already upright)
1=90 degrees clockwise (image originally was <----)
2=180 degrees (image was upside down)
3=270 degrees (image was --->)
Note that weak autorotate is fast but only about 90% accurate so the value returned could be incorrect.

6 = return a flag that indicates whether image read in from a file was a PDF file (value 1), or not a PDF file (value 0). Only valid if image was read in from a file.

Output Variables:

short * data_return

Returns the data requested in "data_selector"

Typical Return Values:

-140	image_data pointer was null (i.e. not valid).
-118	image has not been loaded into memory yet.

Notes:

Among the uses of this function is to sense whether the image read was a color/greyscale, or some other non conventional image format. A flow of data from such a non standard format should be slightly different vs. a conventional bitonal TIFF file. See *NOTES ON IMAGES* later in this chapter.

pr_blank_image_area()

short pr_blank_image_area(short number_blank_zones, bbox * blank_zone_array, short number_non_blank_zones, bbox * non_blank_zone_array);

Function:

Blanks rectangular areas of image in memory, except for those areas denoted by “non_blank_zone_array”.

Required?:

Optional.

Timing:

Can be made at any after pr_read_image_XXX() call and before pr_del_results() although most developers will want to call it before pr_recognize_image().

Input Variables:

short number_blank_zones

Number of zones defined in blank_zone_array. Limited to 100.

bbox * blank_zone_array

An array of coordinates on image that defines rectangular areas that should be blanked (any pixels removed). The units of the coordinates is BMUs (1/1200th of an inch) measured from top left corner of image (0,0). A bbox is a structure of four numbers that comprise x1,y1, x2, y2, where x1/y1 comprise the units of the top left corner of rectangle, and xy,y2 comprise the units of the bottom right corner of rectangle.

short number_non_blank_zones

Number of zones defined in non_blank_zone_array. Limited to 100.

bbox * non_blank_zone_array

An array of coordinates, similar to blank_zone_array, except these rectangles will not be blanked by this call.

Typical Return Error Values:

-118	No image is loaded into memory
-163	Array pointer was NULL
-180	x1 coordinate was <0 or >image width
-181	y1 coordinate was <0 or >image height
-182	x2 coordinate was <0 or >image width
-183	y2 coordinate was <0 or >image height

Notes:

There is no memory between calls to this function. In other words, for example, non blank zones defined in one call are not retained for future calls.

No correction is made to zone coordinates for deskew or other image enhancement operations. For example, if your coordinates are accurate on original image, they will not be accurate if the image was deskewed by PrimeOCR. If you desire this capability please call Prime Recognition.

Example C++ Usage:

```
bbox area, nonblankarea[2];
area.xy[0]=1200;
area.xy[2]=6000;
area.xy[1]=1200;
area.xy[3]=6000;
nonblankarea[0].xy[0]=2400;
nonblankarea[0].xy[1]=2400;
nonblankarea[0].xy[2]=3600;
nonblankarea[0].xy[3]=3600;

nonblankarea[1].xy[0]=4800;
nonblankarea[1].xy[1]=4800;
nonblankarea[1].xy[2]=5400;
nonblankarea[1].xy[3]=5400;

status_pi=pr_blank_image_area(1, &area, 2, nonblankarea);
```

This code will blank an area starting 1 inch in from left and top side, to 5 inches in from left and top side, with the exception of two rectangles within this area that will not be blanked. These rectangles are:

- 2 inches in from left/top, and 1 inch high and wide
- 4 inches in from left/top, and ½ inch high and wide

pr_deskew_image()

short pr_deskew_image(deskew flag);

Function:

Will automatically deskew the image in memory based on settings in PRIMAGE.INI file.

Required?:

Optional. (This is a purchased option).

Timing:

Call can be made anytime after pr_read_image_xxx() and before pr_recognize_image().

Input Variables:

deskew flag

deskew is a PrimeOCR defined enum. Allowed values for flag are:

"OFF",

Do not perform deskew (default).

"ON"

Perform deskew. Any zones defined are adjusted in location for any skew. On images with extremely high skew and very close zones this could lead to zones with a substantial amount of overlap.

"ON_NOZONEADJUST"

Perform deskew but does not adjust the zone definitions for any skew found. (Appropriate when you are supplying a fixed zone template and will be deskewing and registering image to fit into the fixed zone template layout.)

“ON_NOOUTPUTADJUST”

Perform deskew but does not adjust the output for any skew found. (Appropriate when you want the output coordinates to match the deskewed image, not the original image.)

“ON_NOZNOUTADJUST”

"ON_NOZONEADJUST" plus “ON_NOZNOUTADJUST”.

Typical Return Values:

-1001	License does not include licensing for deskew.

Notes:

Prime Recognition uses ScanFix to perform its deskew. The settings in the PRIMAGE.INI file correspond exactly to ScanFix settings, and are documented in *Chapter 3*.

If the PRIMAGE.INI file does not exist then PrimeOCR uses default settings. The default settings are those settings present in the PRIMAGE.INI file as it shipped from Prime Recognition.

In general PRIMAGE.INI should be configured so that images with skew of less than .5% are not deskewed because deskew harms the characters resulting in lower accuracy OCR.

The following settings are recommended in PRIMAGE.INI:

```
mindetectlength=600
maxacceptableskew=250
deskewprotect=1
```

pr_preprocess_image()

short pr_preprocess_image(long flag);

Function:

Will preprocess the image in memory using the settings in the PRIMAGE.INI file.

Required?:

Optional. (This is a purchased option).

Timing:

Call can be made anytime after pr_read_image_xxx() and before pr_recognize_image().

Input Variables:

long flag

All operations desired are OR'd (added) together into this flag. The values for this flag are noted in PRSTRCTB.H. For example a setting of "3" turns on PR_HORIZONTAL_REGISTER (1) and PR_VERTICAL_REGISTER (2).

Typical Return Values:

-1031	License does not include licensing for image preprocessing.

Notes:

Prime Recognition uses ScanFix to perform many (but not all) of its image preprocessing. The settings in the PRIMAGE.INI file correspond exactly to ScanFix settings, and are documented in *Chapter 3*.

If the PRIMAGE.INI file does not exist then PrimeOCR uses default settings. The default settings are those settings present in the PRIMAGE.INI file as it shipped from Prime Recognition.

The PR_AUTOROTATE setting is much faster than the pr_auto_rotate() call but significantly less accurate at finding the correct orientation. You can use both PR_AUTOROTATE and pr_auto_rotate(), indeed this is a good strategy in most cases. Call Prime Recognition to discuss our recommendations in this area. PR_AUTOROTATE does not work well with Asian Languages.

The PR_FIX_SIZE setting will change the size of the image (and stated resolution) so that IF it exceeds 5400 pixels in width or height, it will be changed to have a maximum size of 5400 pixels. (please contact Prime if you need this size modified).

We do not recommend the use of PR_ROTATE value in this call (sometimes called “weak” autorotate) if the language is Asian or Russian.

pr_auto_rotate()

short pr_auto_rotate(short confidence_in, short * confidence_out, short * orientation);

Function:

Will automatically rotate the image until it finds an orientation that generates an OCR confidence of equal or greater to "confidence in". If no orientations achieve this target then the orientation that generates the highest confidence is returned.

This function can be somewhat slow and is, in some ways, not very sophisticated. It runs one conventional engine on the full page to determine the OCR confidence. Images in which only a small minority of the text is captured may find this overhead too high, and/or if text on the page is rotated in several directions no clear answer may emerge from this function.

However, this function is very good at finding the correct orientation in the vast majority of cases. Another "auto_rotation" feature is available in the image preprocessing call. This call is significantly faster than pr_auto_rotate() however it is much less accurate.

For most users the pr_auto_rotate() function will work well, especially if performed as an exception process to the regular OCR processing, i.e., not performed on every image.

Required?:

Optional. (This is a purchased option: image enhancement).

Timing:

Call can be made anytime after pr_read_image_xxx() and before pr_recognize_image(), however it should be called right away after pr_read_image_xxx() so that any other calls are applied to the correctly oriented image.

Input Variables:

short confidence_in

This is a value from 100-900. The value of 700 is recommended for most applications. The function will rotate the image and calculate the OCR accuracy for this orientation. If the value exceeds "confidence_in" the function stops rotating the image. This rotated image is then used for all further processing within the engine. (For Asian languages this value is overwritten with 900).

Return Variables:

short * confidence_out

This is a value from 100-900. This value reports the OCR confidence of the orientation that was selected. You may enter a null pointer if you do not want this data.

short * orientation

This is a value from 0-3. This value reports the orientation that was selected.

0=original orientation
1=original orientation + 90 degrees
2=original orientation + 180 degrees
3=original orientation + 270 degrees

You may enter a null pointer if you do not want this data.

Typical Return Values:

-810	confidence_in was <100 or >900
-811	no image has been loaded to rotate
-1031	License does not include licensing for image enhancement

Notes:

In most applications the number of pages that are not correctly oriented is a small percentage of the total. In this case we recommend you design your application so that it initially processes the image without calling the pr_auto_rotate() call. Use the "cut_process_short" string option to reduce processing on those pages that are rotated. Use the "average_confidence" string option to calculate the confidence of OCR. If it falls below a threshold, delete the OCR results, read the image file again, and this time call the pr_auto_rotate() function before processing image.

If no page exceeds the threshold, then the best orientation is selected, but only if the confidence of this page exceeds the confidence of the original orientation by a certain “hurdle” amount. By default this hurdle is 125. You can increase (or decrease) this hurdle amount via a string option entitled “rotate_hurdle”. An example use of this string option would be “rotate_hurdle, 175”. This would increase the hurdle to 175.

It is important for accuracy that the proper language is set prior to making this call. For example, if you set the language to English, but are submitting French documents, the accuracy of this call will be diminished significantly.

This call does not work well for images that are very large and have only small pockets of text (for example, engineering drawings).

pr_save_image()

short pr_save_image(char * filename);

Function:

Will save the current image in memory to a TIFF group 4 file. This function is useful if you want to save the processed version of an image that has been deskewed or put through some other preprocessing step. It also has some use in debugging to see, for example, if a image loaded through pr_read_image_RAM() has been correctly loaded.

Required?:

Optional.

Timing:

Call can be made anytime after pr_read_image_xxx() and before pr_del_results().

Input Variables:

char * filename

Full path and file name to which you want to save image.

Typical Return Values:

-811	Image has not been loaded into engine
-814	filename is a null pointer

Notes:

THIS FUNCTION WILL BE REMOVED IN FUTURE RELEASES, USE pr_save_image_mpage() INSTEAD.

pr_save_image_mpage()

short pr_save_image_mpage(char * filename, short append);

Function:

Will save the current image in memory to a TIFF group 4 file (unless original image was in greyscale/color, see notes). This function is useful if you want to save the processed version of an image that has been deskewed or put through some other preprocessing step. It also has some use in debugging to see, for example, if a image loaded through pr_read_image_RAM() has been correctly loaded.

Required?:

Optional.

Timing:

Call can be made anytime after pr_read_image_xxx() and before pr_del_results().

Input Variables:

char * filename

Full path and file name to which you want to save image.

short append

PR_APPEND (0) will append this file to any existing file.
NO_APPEND (1) will cause a new file to be created (use for page 1 of a new file)
PR_LAST_PAGE (2) not currently used in this call.

Typical Return Values:

-811	Image has not been loaded into engine
-814	filename is a null pointer

Notes:

If the original image was in color or grayscale, then the saved image will be in color or grayscale. The only modification to the original image will be any autorotation that was performed to the image. (Deskew or other changes to the image in memory are not saved to this color/grayscale image). The Append functionality only works for multi-page file formats like TIFF (not, for example, JPEG).

NOTES ON IMAGES

Image size is limited to 22" x 22". However, OCR accuracy declines rapidly for zones that exceed 4400 pixels in height or width. Therefore if the image is defined as one zone a practical limit of the image is 4400 pixels wide and high. (For asian language images the limit is 22.5 inches in height and width, and 12,500 pixels).

Text in images must be upright, PrimeOCR has two functions that can automatically orient the text correctly.

PrimeOCR will work on skewed images, however, skew in excess of .5% will harm OCR accuracy. We recommend you deskew images with skew above .5% (if possible, prior to being sent to PrimeOCR and prior to zone coordinate determination.) You may also wish to deskew images with less than .5% skew. The deskew process harms the image so OCR accuracy will actually decline slightly, however even small amounts of skew will hurt format retention so if this is important you may wish to trade off some OCR accuracy to achieve better format retention.

FAX resolution files (204 X 196 or 204 X 98)

Warning

The PrimeOCR engine must use a 200 X 200 resolution which leads to a 2% distortion of any image location data. If extreme image location accuracy is required then adjust all coordinates sent to the engine and received from the engine by plus or minus 2% as required.

PrimeOCR requires the following image attributes:
-The most significant bit is to the left of the least significant bit in each image byte
-A "0" bit is the equivalent of white on a image (and "1" is black)

Color/grayscale images

Color/grayscale images (or any type of image that is not a standard bitonal TIFF format file) is treated slightly different from a conventional file:

-You must have licensed the OCR-COLOR option to read these kinds of files.

-Internally PrimeOCR converts the image to a bitonal image for OCR purposes.
-You can not send these types of files to PrimeOCR via the pr_read_image_RAM() call (only the pr_read_image_file() call).

-Any image enhancement will be made on the binary version of the file, it will not affect the original version of file. Similarly, saving the file, for example often done after image enhancement, will save the binary version of the file, not a new color/grey scale version. This has some significant implications, for example, if you plan on using an output format that includes character location data, such as PRO, or PDF, you should only use the Deskew setting of "ON" (integer value of "1" in template file). This value of deskew means that the character location data (and word, line, and other location data) is always in terms of the original color/greyscale image.

-If you select an output option such as RTF or PDF Normal, and define image zones (either manually or through autozoning), the image zones will be in JPEG format.

pr_set_new_document()

short pr_set_new_document(document_source flag);

Function:

Notifies PrimeOCR Engine that this image is or is not from the same document (or a very similar document in terms of font and image quality) as the previous image.

Required?:

Optional. The default is that each page is from a new document/document type.

Timing:

Can be made at any time before the pr_recognize_image() call. Should be called only once per image. If this call is made multiple times before pr_recognize_image() then only the last call is actually acted upon.

Input Variables:

document_source flag

document_source is a PrimeOCR defined enum. Allowed values for flag are:

"NEW_DOCUMENT",

This image is from a different document or document type as the previous image.

"SAME_DOCUMENT"

Typical Return Values:

-150	flag was not a valid document_source value

Notes:

NEW_DOCUMENT is the default.

The SAME_DOCUMENT setting can increase the accuracy in some situations because PrimeOCR will "learn" between documents and OCR the later documents more accurately. However, if you fail to reset the flag to NEW_DOCUMENT when the document or type changes then accuracy on these later documents will be reduced. Do not expect visually noticeable accuracy improvements from this setting. The NEW_DOCUMENT setting is "safer" in that it assumes nothing about each image.

pr_set_language()

short pr_set_language(language flag);

Function:

Sets the language of the recognized text for a page. (This is a purchased option.)

Required?:

Optional. US is the default and is available in the base product.

Timing:

Can be made at any time before the pr_recognize_image() call. Should be called only once per image. If this call is made multiple times before recognize_image() then only the last call is acted upon.

Input Variables:

language flag

languages is a PrimeOCR enum. Allowed values for flag are:

"DANISH"
"DUTC" (Dutch)
"FRENCH"
"GERMAN"
"ITALIAN"
"NORWEGIAN"
"PORTUGUESE"
"SPANISH"
"SWEDISH"
"UK" (English)
“US" (English)
“ALL_LANGUAGES” (custom setting)
“CHINESE_SIMPLE”*
“CHINESE_TRADITIONAL”*
“JAPANESE”*
“KOREAN”*
“RUSSIAN”**

*(requires Asian Language option)
**(requires Russian Language option)

Typical Return Values:

-157	flag was not a valid language value

Notes:

If choosing a non-US language, make sure the other language files are loaded into PRDEV\BIN.

Asian Languages:

All will recognize English characters in the same document (accuracy on English characters is substantially below “US” setting).

These fonts are recognized:

Simplified Chinese: Hei, Song,Kai, FangSong
Traditional Chinese: Ming, Kai, Hei, Yuan
Korean: Batang, Myeongjo, Gothic
Japanese: MS Gothic, MS Mincho

Only PDF, RTF, ASCII/FASCII and a custom version of PRO file output are supported at this time for Asian Language output. If you are interested in other formats please let us know.

Russian Language:

The Russian characters within Unicode character set from 0401 – 044F are recognized.

Only PDF, RTF, ASCII/FASCII and a custom version of PRO file output are supported at this time for Russian Language output. If you are interested in other formats please let us know.

pr_set_low_quality()

short pr_set_low_quality(page_quality flag);

Function:

Indicates whether this image is low quality (e.g., poor quality standard mode FAX or dot matrix).

Required?:

Optional.

Timing:

Can be made at any time before the pr_recognize_image() call. Should be called only once per image. If this call is made multiple times before recognize_image() then only the last call is acted upon.

Input Variables:

page_quality flag

page_quality is a PrimeOCR enum. Allowed values for flag are:

"DEFAULT"

Default setting, no assumption made about quality of document.

"LOW_QUALITY"

This image is known to be quite poor quality.

Typical Return Values:

-151	flag was not a valid page_quality value

Notes:

Only set quality to "LOW_QUALITY" when the image quality is quite bad, e.g. poor quality standard mode fax. This setting will somewhat boost speed, with a small increase in accuracy.

pr_set_printer_type()

short pr_set_printer_type(print_type printer);

Function:

Indicates type of print (character formation) on this image.

Required?:

Optional. Default is machine print.

Timing:

Can be made at any time before the pr_recognize_image() call. Should be called only once per image. If this call is made multiple times before pr_recognize_image() then only the last call is acted upon.

Input Variables:

print_type printer

print_type is a PrimeOCR enum. Allowed values for printer are:

"MACHINE"

Machine print characters, i.e., fully formed characters from laser printer, typewriter, typeset, etc.

"MACHINE_FIXED"

MACHINE characters which are known to be fixed pitch (all characters have same width).

"DOT_MATRIX"

Characters were formed by a dot matrix printer with spaces between dots (if dots overlap then use the MACHINE setting.)

Typical Return Values:

-152	printer was not a valid print_type value.

Notes:

Dot matrix print has higher error rates, and takes longer to process than machine print characters.

pr_autozone()

config_zone * pr_autozone(auto_zone auto_order, short * num_zones, short * status);

Function:

> Automatically determines zoning of a image.

Required?:

> Optional.

Timing:

> Must be made before pr_set_number_of_zones(), and pr_configure_zone(). Should be called only once per image. Although this call identifies zones the developer's application must still call pr_set_number_of_zones() and pr_configure_zone() for each zone.

Input Variables:

> auto_zone auto_order
>
> > auto_zone is a PrimeOCR enum. Allowed values are:
> >
> > > "NO_AUTOZONE"
> > >
> > > > Used to turn off autozoning.
> > >
> > > "PR_SEGMENT"
> > >
> > > > Segments the image into text zones (image zones are ignored). Zones are returned in order of top to bottom of image. Developer's application can review the zone information and modify anything including number of zones, zone location, etc. The OCR output is ordered as per the zone numbers. Recommended for use with RTF output and most other applications.
> > >
> > > "PR_ZONE"
> > >
> > > > Segments the image into text zones (image zones are ignored). Zones are returned in order of top to bottom of image. (The number of zones, zone order, and zone locations cannot be changed). Zones in OCR output are automatically re-ordered in the "reading order". Use PR_SEGMENT unless you really need the reading order of the text preserved.
> > >
> > > "PR_SEGMENT_IMAGE_TEXT"
> > >
> > > > PR_SEGMENT except image zones are also captured. A image zone is a picture or some other relatively dense graphic. Warning: less dense graphics, such as charts, will probably not be sensed as an image zone. They will either be ignored or zoned as text.
> > >
> > > "PR_ZONE_IMAGE_TEXT"
> > >
> > > > PR_ZONE except image zones are also captured. A image zone is a picture or some other relatively dense graphic. Warning: less dense graphics, such as charts, will probably not be sensed as an image zone. They will either be ignored or zoned as text.
> > >
> > > "PR_OBJECTS"
> > >
> > > > “clumps” of text that are grouped together on the image will be identified as text zones. This would be appropriate for

unstructured form data like invoices. (This is the zoning method used within the “objects_single_zone” string option.)

"PR_OBJECTS_ENGINEERING"
PR_OBJECTS with small enhancements designed for engineering drawings.

Return Variables:
short * num_zones
The number of zones defined by the image segmentation.

config_zone *
An array of config_zones (num_zones in size) that holds the coordinates of the segmented zones. Note that all other attributes of a config_zone are not filled in. PrimeOCR creates the memory for this array and frees the array memory during the pr_del_results() call.

Typical Error Values (status values):

-8001	Null num_zones address sent to function.
-8002	Second engine was not defined for this version of PrimeOCR or is not available.
-8004	auto_order was not a valid auto_zone value

Notes:

Automatic zoning is important for text that is in columns. If this kind of text is processed without manual or automatic zoning then the reading order of text is destroyed. Automatic zoning will not work for fine levels of zoning, for example, distinguishing cells in a table or identifying separate fields on a insurance form.

The PR_SEGMENT mode is appropriate for developer's who want to review and potentially modify the text zones that are sensed by PrimeOCR before character recognition. The developer takes responsibility for the ordering of the zones.

The PR_ZONE mode is appropriate when the developer wants PrimeOCR to perform all zoning automatically, including the ordering of the output to follow the "reading order" of the text.

Automatic zoning is a difficult recognition task. Do not expect automatic zoning to be 100% accurate. On complex pages it is often virtually impossible to achieve a perfect reading order.

Although this call identifies zones the developer's application must still call pr_set_number_of_zones() and pr_configure_zone() for each zone. This allows the developer to set other attributes of each zone, such as LEXICAL check. It also allows the developer, in the PR_SEGMENT mode, to modify the number, location, and order of the zones.

Image zones, if recognized, will be reported first.

You can force autozoning to ignore the edges of a page when doing autozoning. See the file …\BIN\“autozone_margins.ini.example” for more information.

The following code example illustrates an example usage of this call:

```
config_zone  * zdata;  short num_zones, status;
zdata=pr_autozone(PR_ZONE, &num_zones, &status);

status=pr_set_number_of_zones(num_zones);

//Generate configuration information for each zone
long zone_location[4];
for (i=0; i<num_zones; i++)
{
    zone_location[0]=zdata[i].zone_location.xy[0];
    zone_location[1]=zdata[i].zone_location.xy[1];
    zone_location[2]=zdata[i].zone_location.xy[2];
    zone_location[3]=zdata[i].zone_location.xy[3];

    // Send zone information to Prime Recognition engine
     status=pr_configure_zone(i,NO_RESTRICTIONS,LEXICAL,999,zone_location);
}
```

Autozoning is a difficult task for many applications. Please contact Prime Recognition to investigate whether we can custom modify our autozoning technology to work better in your application.

pr_get_autozone()

short pr_get_autozone(short zone_number, long *x1, long *y1, long *x2, long *y2);

Function:

Gets restriction and coordinates for a specific zone that was created by pr_autozone() call. Especially useful for VB programmers who can not get back config_zone structure from pr_autozone() call.

Required?:

Optional.

Timing:

Must be made after pr_autozone() call and before pr_set_number_of_zones(), and pr_configure_zone() calls.

Input Variables:

short zone_number

target zone number. zone_number is 0 based and must be between 0 and number of zones returned by pr_autozone() call.

Return Variables:

short pr_get_autozone()

This value is the type of zone found, it can be NO_RESTRICTIONS, or PR_IMAGE.

long * x1, *y1, *x2, *y2

Bounding box of zone identified in BMUs (1/1200th of inch). All dimensions are relative to top left corner of image (0,0).

Typical Error Values (status values):

-114	Engine not open yet
-1901	zone_number >239
-1904	No autozoning data exists (probably did not call pr_autozone() yet).

Notes:

pr_set_number_of_zones()

short pr_set_number_of_zones(short num_zones);

Function:

Tells the PrimeOCR engine how many zones will be defined on this image.

Required?:

Required.

Timing:

Can be made at any time before the pr_configure_zone() call(s). Should be called only once per image. If this call is made multiple times before recognize_image() then only the last call is actually acted upon.

Input Variables:

short num_zones

Number of zones that will be defined on this image. This must be greater than 0.

Typical Return Values:

-160	num_zones is <1
-162	num_zones is >2000

Notes:

num_zones minus 1 defines the last zone number that is valid for this image. In other words if there are 3 zones on a page, they must be numbered 0,1,2. Zone numbers must start at 0, be consecutive, and stop at num_zones minus 1.

pr_get_number_of_zones()

short pr_get_number_of_zones();

Function:

Retrieves how many zones will be defined on this image.

Required?:

Optional (but highly recommended in certain cases, see Notes).

Timing:

Can be made at any time.

Input Variables:

Typical Return Values:

Number of defined zones

Notes:

This call can be used for any purpose but it is strongly recommended for use if a string option has been set which cuases pr_recognize_image() to find and OCR added rotated zones. In this instance make the call immediately after pr_recognize_image().

pr_configure_zone()

short pr_configure_zone(short zone_number, zone_content restrictions, lexical check,
long level, long zone_location[4]);

Function:

Sets configuration data for ONE zone.

Required?:

Required.

Timing:

Can be made at any time after number_of_zones() and pr_read_image_file/_RAM() and before the pr_recognize_image() call.

Input Variables:

short zone_number

Can be used to "name" or identify a zone for developer's purposes. zone_number is 0 based and must be between 0 and num_zones-1. The only significance to the PrimeOCR engine of a zone number is that the engine will process and report its results in order by zone number.

zone_content restrictions

zone_content is a PrimeOCR enum. Allowed values for restrictions are:

NO_RESTRICTIONS
PR_ALPHA (or ALPHA_ONLY for backward compatibility)
PR_NUMERIC (or NUMERIC_ONLY for backward compatibility)
NO_RESTRICTIONS_UPPERCASE
NO_RESTRICTIONS_LOWERCASE
PR_ALPHA_UPPERCASE
PR_ALPHA_LOWERCASE
PR_BARCODE (See prbarcode.ini for more configuration options)

The characters in each set are defined in Appendix A. If it is known that text in zone is alpha only, or numeric only then OCR will be faster and more accurate if the text is restricted. Otherwise set to NO_RESTRICTIONS.

The PRTRAIN custom engine also supports the following content types:

PRTRAIN_ALL	(all defined character groups)
PRTRAIN_0	(Characters in group 0)
PRTRAIN_1	(Characters in group 1)
PRTRAIN_2	(Characters in group 2)

Contact Prime Recognition for more information on the PRTRAIN engine.

lexical check

lexical is a PrimeOCR enum. Allowed values are:

NO_LEXICAL
LEXICAL

LEXICAL performs a series of checks based on the restriction setting. For example, a NO_RESTRICTIONS setting with LEXICAL causes spelling checks, and tri-gram analysis to be performed.

A LEXICAL setting strongly encourages the recognition of characters in that group. All other characters are reported back as "?" with confidence level of "1".

A NO_LEXICAL setting causes recognition to encourage the recognition of characters in these groups, however, characters that are not in these groups may still be reported, particularly if they are high confidence.

long level

PrimeOCR has predefined several values for level:

LEVEL_1	-provides conventional OCR accuracy and speed (e.g., M/Text OCR).
LEVEL_2	-provides 15% better OCR accuracy (and other PrimeOCR benefits) at roughly 2.1 times slower speed than standard OCR.
LEVEL_3	-provides 58% better OCR accuracy (and other PrimeOCR benefits) at roughly 3.1 times slower speed than standard OCR.
LEVEL_4	-provides 74% better OCR accuracy (and other PrimeOCR benefits) at roughly 5.8 times slower speed than standard OCR.
LEVEL_5	-provides 76% better OCR accuracy (and other PrimeOCR benefits) at roughly 7.1 times slower speed than standard OCR.
LEVEL_6	-provides 80% better OCR accuracy (and other PrimeOCR benefits) at roughly 8 times slower speed than standard OCR.

(Levels 4, 5, and 6 are options to the base product. These test results are from a range of documents, your results could vary.)

Zones that require high accuracy should set accuracy improvement to the highest possible setting. If processing speed is more important than accuracy, then lower settings are available. Most OCR applications will benefit much more significantly from increased OCR accuracy than increased speed.

We encourage most developers to use these predefined values for level. However, developers may input their own values for level. An example value would be "770199". This tells the PrimeOCR engine to run engine five and six and weight each engine's output with a "7", do not run engine 4: "0", run engine three with a weight of "1", run engine 2 with a weight of "9", and run engine 1 with a weight of "9". (This example obviously assumes a PrimeOCR engine that is licensed for LEVEL_6) Another example is LEVEL_3 which is predefined as "999". This tells PrimeOCR to run engines 3, 2, and 1 with "9" weights. Leading zeros are assumed, therefore "999" implicitly means do not run engines 5 & 4 on this zone.

The weight of an engine can vary from 0-9. "0" tells PrimeOCR to not run the engine on this zone. "9" gives the highest weight to this engine. It is OK to give any number of engines the "9" weight.

If you are processing a range of document types then we strongly recommend staying with the LEVEL_X settings. If you are always running a very specific type of document then it may be worth experimenting with engine weights to see if accuracy/speed can be improved.

The potential benefits of engine weight tuning are two fold:

-You may choose to not run an engine. On a specific document type one engine may not be helping recognition enough to merit its processing requirements.

-You may give lower weights to the output of an engine that performs poorly on a specific document type. This results in higher PrimeOCR accuracy.

long zone_location[4]

Coordinates of a rectangle that enclose the zone on the original image that was passed to PrimeOCR. These coordinates are measured in 1/1200 of an inch from the top left corner of the image (point 0,0). Zones may overlap but this is not recommended as text that is present in two zones will usually have higher error rates.

zone_location[0] is the x value of the top left hand corner of the zone.
zone_location[1] is the y value of the top left hand corner of the zone.
zone_location[2] is the x value of the bottom right hand corner of the zone.
zone_location[3] is the y value of the bottom right hand corner of the zone.

If each zone location coordinate is entered as 0 (zero), PrimeOCR will automatically set the zone coordinates for the full page. This feature is helpful for applications which want to OCR the whole page as one zone. A negative number will move the zone coordinate in from the edge of the page by the value of the number.

Typical Return Values:

-153	restrictions was not a valid zone_content value
-154	level was not a valid accuracy_improvement value.
-161	number_of_zones <1 or number_of_zones > number of zones defined for this image
-170	zone_number <0
-171	zone_number > number of zones defined for this image
-180	zone_location[0] either <0 or larger than image width
-181	zone_location[1] either <0 or larger than image height
-182	zone_location[2] either <0 or larger than image height or <= zone_location[0]
-183	zone_location[3] either <0 or larger than image height or <= zone_location[1]

Notes:

If consecutive images contain the same zones then 1 or more zones can be configured once and then multiple images processed. Zone coordinates should obviously be contained within the actual image. Zones do not have to be defined in a particular order. If possible do not have the same text in two overlapping zones.

If you attempt to set an accuracy level which uses an engine which has not been installed, or whose appropriate language file has not been installed then the engine will be automatically turned off and the action noted in the PROCR.LOG file.

pr_configure_OMR_zone()

short pr_configure_OMR_zone(short zone_number, long zone_location[4]);

Function:

Sets configuration data for one OMR zone. OMR stands for Optical Mark Recognition. A typical example would be a check box that is filled in on a form. The output for this zone will be a number 0-100, which describes the percentage of the zone that was "black".

Required?:

Optional.

Timing:

Can be made at any time after number_of_zones() and pr_read_image_file/_RAM() and before the pr_recognize_image() call.

Input Variables:

short zone_number

Can be used to "name" or identify a zone for developer's purposes. zone_number is 0 based and must be between 0 and num_zones-1. The only significance to the PrimeOCR engine of a zone number is that the engine will process and report its results in order by zone number. This zone_number must an original number and part of a sequence with any other zone types such as regular zones or image zones.

long zone_location[4]

Coordinates of a rectangle that enclose the zone on the original image that was passed to PrimeOCR. These coordinates are measured in 1/1200 of an inch from the top left corner of the image (point 0,0). Zones may overlap.

zone_location[0] is the x value of the top left hand corner of the zone.
zone_location[1] is the y value of the top left hand corner of the zone.
zone_location[2] is the x value of the bottom right hand corner of the zone.
zone_location[3] is the y value of the bottom right hand corner of the zone.

If each zone location coordinate is entered as 0 (zero), PrimeOCR will automatically set the zone coordinates for the full page. This feature is helpful for applications which want to OCR the whole page as one zone. A negative number will move the zone coordinate in from the edge of the page by the value of the number.

Typical Return Values:

-161	number_of_zones <1 or number_of_zones > number of zones defined for this image
-170	zone_number <0
-171	zone_number > number of zones defined for this image
-180	zone_location[0] either <0 or larger than image width

-181	zone_location[1] either <0 or larger than image height
-182	zone_location[2] either <0 or larger than image height or <= zone_location[0]
-183	zone_location[3] either <0 or larger than image height or <= zone_location[1]

Notes:

If consecutive images contain the same zones then 1 or more zones can be configured once and then multiple images processed. Zone coordinates should obviously be contained within the actual image. Zones do not have to be defined in a particular order.

pr_configure_image_zone()

short pr_configure_image_zone(short zone_number, long zone_location[4]);

Function:

Sets configuration data for one image zone. The output for this zone will be a G4 TIFF file comprising only the area described by the zone location (if the original image was color/greyscale or a non standard file format then the image zones will be in JPEG format). On execution of this call a file with the name "~PRIMG", and the extension "AAAABBBB" (where A and B is defined below), is created in the application's directory (typically "...\PRDEV\BIN). A call to pr_convert_output_to_file() then changes the name and moves the file to the output directory.

Required?:

Optional.

Timing:

Can be made at any time after number_of_zones() and pr_read_image_file/_RAM() and before the pr_recognize_image() call.

Input Variables:

short zone_number

Can be used to "name" or identify a zone for developer's purposes. zone_number is 0 based and must be between 0 and num_zones-1. The only significance to the PrimeOCR engine of a zone number is that the engine will process and report its results in order by zone number. This zone_number must an original number and part of a sequence with any other zone types such as regular zones or image zones.

long zone_location[4]

Proper values must be 0 and <32000 and less than image width/image height.

Coordinates of a rectangle that enclose the zone on the original image that was passed to PrimeOCR. These coordinates are measured in 1/1200 of an inch from the top left corner of the image (point 0,0). Zones may overlap.

zone_location[0] is the x value of the top left hand corner of the zone.
zone_location[1] is the y value of the top left hand corner of the zone.
zone_location[2] is the x value of the bottom right hand corner of the zone.
zone_location[3] is the y value of the bottom right hand corner of the zone.

Typical Return Values:

-161	number_of_zones <1 or number_of_zones > number of zones defined for this image
-170	zone_number <0
-171	zone_number > number of zones defined for this image
-180	zone_location[0] either <0 or larger than image width
-181	zone_location[1] either <0 or larger than image height
-182	zone_location[2] either <0 or larger than image height or <= zone_location[0]
-183	zone_location[3] either <0 or larger than image height or <= zone_location[1]

Notes:

Image zones are saved with an eight character extension that denotes the page number and image zone on that page. The first four characters of the extension refer to the page number. The last four characters refer to the zone number on that page. (Zone numbers start at 0). Each character can vary from 0-9. For example, an image zone on the 12th page, that has a zone number of 2 will be named "~PRIMG.00120002". Therefore "0012" refers to the 12th page in the document, and "0002" refers to the 3rd zone on that page (the first zone is 0, second zone is 1, third zone is 2, etc.).

pr_load_page_template()

short pr_load_page_template(char * filename, short * num_zones);

Function:

Reads a template file and makes relevant calls to configure engine. Some functionality supported in a template file can not be set by this call (see "Notes below") and any document settings (such as output format) are also ignored. This call is useful to set the page and zone data for a single page.

Required?:

Optional.

Timing:

Can be called anytime after pr_read_image_xxx() and before pr_recognize_image() call.

Input Variables:

char * filename

The full path including file name and extension of the PrimeOCR format template file. This template file must be in a version that is compatible with engine.

Return Variables:

short * num_zones

The number of zones described in the template file.

Typical Return Values:

-140	filename was a null pointer
-141	filename was >260 characters in length
-142	filename could not be found
-144	could not open filename file
-146	num_zones was a null pointer

Notes:

If autorotation, deskew, image preprocessing, or save image settings are non zero then these functions will be called in that order within this call. The image saved in the pr_save_image() call will be the same name as the original file but with a ".fix" extension.

Any document and autozoning settings are ignored.

pr_recognize_image()

zonestructure * pr_recognize_image(short *status);

Function:

Performs recognition on image based on all configuration settings and returns recognized characters and other output.

Required?:

Required.

Timing:

Should be performed only after all configuration data for the engine, page, and zones have been set.

Input Variables:

None (status is a returned value).

Return Values:

The PrimeOCR results are an array of zonestructures (defined in PRSTRCTB.H). There are "num_zones" number of elements in the array. ("num_zones was defined in pr_set_number_of_zones().)

If an error occurs the return pointer is NULL, no output is returned.

Typical "status" Return Values:

-283	Too little RAM available. Free up RAM by closing other applications or rebooting. PrimeOCR's memory requirements are described in *Chapter 2*.
-400	Process exceeded maximum time length. Most likely cause is too little RAM available.
-887 to -997	License problem.
-998	Hardware key functioning but incorrect key attached to the port. ONLY RUN THE SOFTWARE WITH THE KEY THAT CAME WITH THE PRODUCT. Call Prime Recognition.
-9999	Too little RAM available. Free up RAM by closing other applications or rebooting. PrimeOCR's memory requirements are described in *Chapter 2*.
-XXX	Please report any other error messages to Prime Recognition.

Notes:

This function will not return until PrimeOCR processing is complete. On poor quality images with a lot of text, on a slow PC the PrimeOCR engine could take several minutes to return.

pr_language_id()

short pr_language_id(short confidence_in, long accuracy_level, short other_language_check, short * confidence_out, short * language1, short * language1_chars, short * language2, short * language2_chars);

Function:

Reports back two most prevalent languages of text on page. Includes confidence of analysis, and number of characters of each language.

Required?:

Optional.

Timing:

Should be performed only after all configuration data for the engine, page, and zones have been set. The timing is the same as the pr_recognize_image() call.

Input Variables:

short confidence_in

If the confidence level of the roman language identification exceeds this level, asian languages will not be tested (800 is a good level).

long accuracy_level

Sets which engines will be used for processing in pr_language_id(). We recommend 99 (Level 2), other common choices would be 9 (Level 1), or 90099(Level 3). Level 2 is the best combination of speed and accuracy.

short other_language_check

If a value of "1" is "ORd" into the value then Asian languages will be checked. (Can slow down processing considerably, if Asian languages are not present set this to 0). Requires an Asian Language Option license.
If a value of "16" is "ORd" into the value then Russian language is checked. For example, 1 checks Asian language only. 17 (1+16) checks both Asian and Russian. 16 checks only Russian.

Return Values:

short * confidence_out

Reports the confidence of language identification, range is 100-900, with 900 meaning very high confidence. Very roughly, 800 + is high confidence, 700-800 is marginal, <700 is low confidence.

short * language1

Reports the language that is most prevalent on page. Values can range from 0 to number of languages supported by PrimeOCR (for example, 16 in version 5.0, 11 roman languages, 4 Asian languages, Russian). The values for valid languages can be found in prstrctb.h (look for enum language).

short * language1_chars

Reports the number of characters of language1 found on page. This number is an approximation, it is not precise.

short * language2

Reports the language that is second most prevalent on page.

short * language2_chars

Reports the number of characters of language2 found on page.

Typical "status" Return Values:

Notes:

Make sure appropriate language packs are loaded. (Standard installation only includes English and other European languages including Russian. A separate language pack is required for Asian languages).

The following are strong recommendations but not requirements:

Use pr_autozone() prior to pr_language_id to find zones unless you know images are single zone. The define the autozone results to the engine using pr_set_number_of_zones() and pr_configure_zone().

pr_set_user_dictionary()

short pr_set_user_dictionary (char * user_dictionary);

Function:

Configures PrimeOCR to use a user dictionary during character recognition and, optionally, during pr_lexical_plus() call.

Required?:

Optional.

Timing:

Should be called prior to any other lexical check call. Can be called multiple times, however, if user_dictionary value does not change then user_dictionary will not be reloaded.

Input Variables:

None.

Typical Return Values:

0	Dictionary loaded successfully
-114	Engine not loaded
-143	Could not find dictionary file/path

Notes:

This call only sets a configuration flag. The actual usage of dictionary occurs later during processing.

Dictionary file should be an ASCII text file, with one word per line. Words must be between 2-32 characters in length. We recommend you place only uncommon words in this file, common words are most likely to be already in the existing main dictionary. One way to see if you should add a word to the user dictionary is to turn on the Lexical Plus functionality and run through some sample documents, with the log file turned on. Check …\lexical.log to see what words were not found in the existing main dictionary (or existing user dictionary), add these words to user dictionary.

There is no hard limit to the number of words you can add to the user dictionary, however, speed and effectiveness start to decline if dictionary exceeds approximately 5000 words.

pr_configure_lexical_plus()

short pr_configure_lexical_plus(short language, short score_threshold, short debug);

Function:
Configure the lexical plus engine.

Required?:
Optional.

Timing:
Should be called before pr_lexical_plus().

Input Variables:

short language
Language to be used for lexical checks (Only "10", which corresponds to short value of language enum for US English, is allowed in current release).

short score_threshold
The minimum value a lexical check word must score to be considered a valid solution for replacing the original word.

short debug
If a non zero value then the activities of the lexical plus engine are reported in a ASCII file, LEXICAL.LOG, in the application's directory (e.g. PRDEV\BIN).

Typical Return Values:

0	Threshold changed successfully
-20949	Lexical engine has not been opened

Notes:

The lexical plus engine will generate scores for possible changes to a suspect word. Higher scores indicate higher confidence that the word suggested is the correct match for the candidate word. Any lexicon solutions that have a score lower than the score_threshold are discarded. The highest scoring solution is selected as the solution.

The score_threshold range is 60-98. For example, a score_threshold of 95 will narrow solutions to words that match candidate words very closely. Erroneous solutions are minimized with a score_threshold set this high. With a score threshold of 65, on the other hand, the lexicon engine will provide more solutions but the chances of getting in-correct solutions increases. The default score threshold of 85 reduces in-correct solutions while maximizing opportunities to find lexical solutions to candidate words.

We strongly suggest you turn on the debug setting when first using the lexical plus engine so as to better understand the changes that this technology makes to the output.

Special features of Lexical Plus are implemented in LEXPLUSPRO.INI in the INSTALLATION\BIN directory.

pr_lexical_plus()

short pr_lexical_plus (zonestructure * good, short number_of_zones, short zone_number, short spell_check, short suspect_level, short lexical_good_confidence_weight, short lexical_fix_confidence_weight, short lexical_no_fix_confidence_set);

Function:

Uses intelligence based on language understanding to improve OCR results. Can be used to modify confidence levels of output and/or change recognized characters.

Required?:

Optional.

Timing:

Should be called only once, following pr_recognize_image(). Should be called after pr_configure_lexical_plus() and pr_set_dictionary() (if a user dictionary is desired).

Input Variables:

zonestructure * pr_output

The pointer (or equivalent) that was returned from pr_recognize_image().

short number_of_zones

Number of zones to send to the file. This number must be equal to or less than the original number of zones reported by PrimeOCR.

short zone_number

Zone number to check with lexical plus process. "-1" will process all zones.

short spell_check

-Range: 0-9, default=8 (if non zero)
-Any word containing one or more characters at this confidence level or below will be "suspect" and will be checked via a sophisticated spell check process.
-A higher number is more aggressive at applying spell check to more and more words in document.
-This number can usually be set higher than LexicalCheck below, since no changes are made to chracters, and any confidence changes are likely to be correct.

short lexical_good_confidence_weight

-Range: 0-9, default=8
-0: no changes to confidence values if suspect word is changed by lexical process
-Corresponds to spell_check setting. ("spell_check" turns on this portion of lexical process, this setting controls what happens if characters/words are found in).
-If spell_check is non zero, and a word is found in lexical plus process, then confidence of characters in word are increased in proportion to this value.

short suspect_level

-Range: 0-9, default=6 (if non zero)
-Any word containing one or more characters at this confidence level or below

will be "suspect" and sent to lexical process for possible change. A higher number is more aggressive at applying lexical check even to characters more likely to be correct. Be cautious in increasing this value above 6 or 7, unless your application lends itself clearly to lexical processing.

short lexical_fix_confidence_weight

-Range: 0-9, default=6 (if non zero)
-0: no changes to confidence values if suspect word is changed by lexical process
-Corresponds to suspect_level setting. ("suspect_level" turns on this portion of lexical process, this setting controls what happens if characters/words are modified).
-Character confidence values are increased proportional to this weight factor (if changed by lexical plus process). Use this feature, for example, to reduce "suspicious" characters during later manual verification. Be cautious in increasing this value above 6 or 7, unless your application lends itself clearly to lexical processing.

short lexical_no_fix_confidence_set

-Range: 0-9, default=2 (if non zero)
-0: no changes to confidence values if suspect word is changed by lexical process
-Corresponds to suspect_level setting. ("suspect_level" turns on this portion of lexical process, this setting controls what happens if characters/words are not found in lexical database).
-Indicates the confidence level to which a character will be changed if the word in which it was placed was "suspicious" and not found in lexical database. Use this feature, for example, to find "suspicious" characters for later manual verification. In general you should not use this feature unless your application words conform very closely to a user dictionary and/or our general language dictionary.

Typical Return Values:

0	Output successfully checked
-5000	Confidence mask was not valid
-5001	AddItem function failed, lexical_word_in not valid
-20949	Output could not be checked because lexical engine was not started, or lexicons were not loaded.
-20959	Could not check zone because lexical engine was not started, or lexicons were not loaded.
-20969	Could not check word because lexical engine was not started, or lexicons were not loaded.

Notes:

Do not use this call unless your application lends itself to lexical analysis.

Always turn on debug setting in pr_configure_lexical() and look at results in LEXICAL.LOG in a trial run to make sure the changes caused by pr_lexical_plus() are positive to your application.

NOTES ON OUTPUT

You can access PrimeOCR's output in three ways.

1. Access the output in memory directly by manipulating the zonestructure returned by the pr_recognize_image() call. The C source code example included shows how to do this. Programmers comfortable with C will find this method easy and fast.

2. Access the output in memory by using the pr_output_xxx() calls. All output information is available through these calls. Visual Basic programmers will find these calls very useful, it is much easier to return a single dimension array to Visual Basic from a DLL than it is to return a pointer to a data structure and then try to manipulate the data structure directly. C programmers may also wish to use these calls if they like to have explicit calls to get output.

3. Use the pr_convert_output_to_file() call to move output into a file. From here it can be accessed as any text file can be accessed by C, Visual Basic, or any other programming language.

pr_output_OMR_percent()

short pr_output_OMR_percent(short zone_number);

Function:

Returns the percent of OMR zone that is black pixels.

Required?:

Optional.

Timing:

Should be performed only after pr_recognize_image() and before pr_del_results().

Input Variables:

short zone_number

The target zone number. Must be between 0 and number of zones -1.

Return Values:

Returns the percent of OMR zone that is black pixels. If the number is negative (0 is a possible outcome if zone was totally white pixels) then the return is an error.

Typical Error Return Values:

-1901	zone_number was larger than the number of zones -1

Notes:

See *Notes on Output* section.

pr_output_zone_lines()

short pr_output_zone_lines(short zone_number);

Function:

Returns the number of lines in a zone.

Required?:

Optional.

Timing:

Should be performed only after pr_recognize_image() and before pr_del_results().

Input Variables:

short zone_number

The target zone number. Must be between 0 and number of zones -1.

Return Values:

Returns the number of lines in a zone. If the number is negative (0 is a possible outcome if no text was recognized in the zone) then the return is an error.

Typical Error Return Values:

-1901	zone_number was larger than the number of zones -1

Notes:

See *Notes on Output* section.

pr_output_line_length()

short pr_output_line_length(short zone_number, short line_number);

Function:

Returns the length of a specific line in a specific zone.

Required?:

Optional.

Timing:

Should be performed only after pr_recognize_image() and before pr_del_results(). Will probably be used after pr_output_zone_lines() was used to identify the number of lines in a zone.

Input Variables:

short zone_number

The target zone number. Must be between 0 and number of zones -1.

short line_number

The target line number. Must be between 0 and number of lines -1.

Return Values:

Returns the number of characters in the target line, or, in other words, the length of the line in characters. If the number is negative then the return is an error. 0 is not a possible outcome as a line will not be reported in the first place if no text was recognized in the line.)

Typical Error Return Values:

-1901	zone_number was larger than the number of zones -1
-1902	line_number was larger than the number of lines -1
-1904	Operation assumes OCR output but no OCR output has been created yet or it was already erased.

Notes:

See *Notes on Output* section.

pr_output_line_data()

short pr_output_line_data(short zone_number, short line_number, long * x1, long *y1, long *x2,
long *y2, long * height, char * text, char * confidence, char * chardata, char *pointsize);

Function:

Returns all OCR data for a specific line except for character bounding box data. (See pr_output_char_box() for character bounding box data.)

Required?:
Optional.

Timing:
Should be performed only after pr_recognize_image() and before pr_del_results(). Will probably be used after pr_output_line_length() was used to identify the size of the line so that the proper amount of memory can be allocated for the line results.

Input Variables:
short zone_number
The target zone number. Must be between 0 and number of zones -1.

short line_number
The target line number. Must be between 0 and number of lines -1.

Return Values:

All return values are returned through pointers supplied by the developer through the call. If any pointer value is NULL the value will not be returned. In other words, if you don't want a particular output then enter NULL in its place in the call.

long * x1, short *y1, short *x2, short *y2, short * height
These are pointers to longs supplied by the developer's application. The call will set the value of these pointers to the baseline coordinates (x1, y1, x2, y2) of the line plus the height of the line. Refer to *Chapter 5* for a discussion of these attributes.

char * text, char * confidence, char * chardata, char * pointsize
These are pointers to strings supplied by the developer's application. The call will copy the output to these strings. The strings represent the recognized ASCII text, the confidence level for each character, the character data (bold, underline, etc.) for each character, and the point size of each character. Refer to *Chapter 5* for a discussion of these attributes. The developer's application is responsible for allocating enough memory in the strings to hold the output. The size of each string is exactly equal to the line length reported by pr_output_line_length() plus 1 (for the terminating 0).

Typical Error Return Values:

-1901	zone_number was larger than the number of zones -1
-1902	line_number was larger than the number of lines -1
-1904	Operation assumes OCR output but no OCR output has been created yet or it was already erased.

Notes:

If programming in a language that is “managed” code, such as C#, you will most likely need to set the string length(s) you send to this call for output. For example:

```
Short zone_number; zone_number=0;
Short line_number; line_number=0;
Short line_length; line_length=pr_output_line_length(zone_number, line_number);
StringBuilder recognized_text=new StringBuilder(line_length+1);

Status=pr_output_line_data(….. recognized_text, ….);
```

Where recognized_text is the char * text variable, expected to hold the return recognized text. (This is required because the PROCRB.DLL and its attendant API was written in C++, so it is “unmanaged” code.)

See *Notes on Output* section.

pr_output_char_box()

short pr_output_char_box(short zone_number, short line_number, short character_number,
long * x1, long *y1, long *x2, long *y2);

Function:

Returns the bounding box for a specific character.

Required?:
Optional.

Timing:
Should be performed only after pr_recognize_image() and before pr_del_results(). Will be probably used after pr_output_line_length() was used to identify the proper range of characters.

Input Variables:
short zone_number
The target zone number. Must be between 0 and number of zones -1.

short line_number
The target line number. Must be between 0 and number of lines -1.

short character_number
The target character number. Must be between 0 and number of characters in the line -1.

Return Values:
All return values are returned through pointers supplied by the developer through the call. If any pointer value is NULL the value will not be returned. In other words, if you don't want a particular output then enter NULL in its place in the call.

long * x1, short *y1, short *x2, short *y2
These are pointers to longs supplied by the developer's application. The call will set the value of these pointers to the character bounding box (x1, y1, x2, y2). Refer to Chapter 5 for a discussion of the character bounding box.

Typical Error Return Values:

-1901	zone_number was larger than the number of zones -1
-1902	line_number was larger than the number of lines -1
-1903	character_number was larger than the length of line -1
-1904	Operation assumes OCR output but no OCR output has been created yet or it was already erased.

Notes:
See *Notes on Output* section.

pr_configure_output()

short pr_configure_output(enum config_output flag);

Function:

Adds word data to "in memory" and PRO file based output.

Required?:
Optional.

Timing:
Should be performed only after pr_recognize_image() and before pr_del_results(). If used to modify PRO file based output it should be performed before pr_convert_output_to_file(). This call is not "sticky", i.e. it must be called for every page.

Input Variables:
enum config_output flag
If set to 1 it will add word data to in memory data structure and PRO file output.

Typical Error Return Values:

-114	PrimeOCR engine is not open
-1561	flag value was illegal
-1904	Operation assumes OCR output but no OCR output has been created yet or it was already erased.

Notes:
The impact on PRO file based output is as follows:

"Format" on line 1 of output will be "1" instead of "0".
After the standard output for each line of text, 7 lines of data are added:
-# of words on line of text
-Character positions (zero based) that start each word (separated by commas) (e.g. Word 2 starts at character position 13)
-Character positions (zero based) that end each word (separated by commas) (e.g. Word 2 ends at character position 22)
-Left edge in BMUs of each word (separated by commas)
-Top edge in BMUs of each word (separated by commas)
-Right edge in BMUs of each word (separated by commas)
-Bottom edge in BMUs of each word (separated by commas).

The "in memory" impact is defined in *prstrctb.h* (see, for example, prword structure).

pr_convert_output_to_file()

short pr_convert_output_to_file(zonestructure * pr_output, short number_of_zones, char * out_filename, output_type output, char * image_name, char * user_tag, short append);

Function:

Converts RAM based PrimeOCR output to a file based output. If image zones were defined the image zone files created during the pr_configure_image_zone() may be converted as appropriate depending on the output format choosen.

Required?:

Optional.

Timing:

Should be performed after pr_recognize_image() and before pr_del_results().

Input Variables:

zonestructure * pr_output

The pointer (or equivalent) that was returned from other api calls such as pr_recognize_image().

-or NULL (0)*

-or string "CURRENT RESULTS" (this will not supported in future releases)*

* which is handy if you are using a language that makes working with pointers difficult. The output used is the zonestructure that is in memory from previous api calls.

short number_of_zones

Number of zones to send to the file. This number must be equal to or less than the original number of zones reported by PrimeOCR. If 0 is sent, PrimeOCR will use its internal value for number of zones.

char * out_filename

A pointer to a character string which includes full path and DOS file name. This string is required. This string points to the location to which to write the output file. Developer may attach any file extension desired, PrimeOCR does not supply a default extension.

output_type output

output_type is a PrimeOCR enum. Some example values are:

ASCII
FASCII
PR
ASCII_NOZONEBUFFER
FASCIITAG
PR_RTF
PDFTO
PDFIO
PDFIT
COMMA
HTML

XML_PRO
(see PRSTRCTB.H for more – custom values developed by Prime may also used here).

Please see *Chapter 6 – Output Formats* for a description of the more important formats.

char * image_name

A pointer to a character string supplied by the developer. Should include the full path/file name of the image. This string is optional in general but required in a number of cases including PDF output, if PRO will be read by PrimeVerify and PrimePost, etc.. (If input is a PDF color image then this string should be defined as 256 characters in length, and PrimeOCR will change this path to a path to a temporary TIFF image). Enter a blank string (“”) if no entry is desired. Output as the third line in a PR output file. Note that if this string is present the third line of output will include not just the image name, but a tab character, followed by the page number, another tab character, followed by a flag that indicates whether the image is black&white (0), or color/gray scale (1). These later two parameters are automatically supplied by PrimeOCR.

char * user_tag

A pointer to an arbitrary character string supplied by the developer. This string is optional. Enter a blank string (“”) if no entry is desired. If the string is present it will be output as the second line in a PR output file.

short append

Allowed values are:

PR_APPEND
NO_APPEND
PR_LAST_PAGE

PR_APPEND and NO_APPEND are mutually exclusive of each other. PR_LAST_PAGE may OR’d to either value.

PR_APPEND will add the new output to the end of an existing file, if it exists. If a file does not exist it will create a new file. The added output is not changed in any way by PR_APPEND (except for RTF and PDF formats), in other words, for example, under the PR output format, the added material will include the 3 header lines, etc. No attempt is made to insert any other delimiter between previous output and this output.

NO_APPEND will overwrite any existing file, or will create a new file if one does not already exist.

PR_LAST_PAGE signals to the engine that this is the last page of output in this file. **This value must be set for the PDF output option**, however, no other output options require this flag.

Typical Return Values:

-140	No output filepath/name given
-141	Output filepath/name exceeded 260 characters
-143	PrimeOCR engine could not find output path or did not have writing privileges to this path
-156	flag was not a valid output_type value

-1562	flag was not a valid output_option value
-161	number_of_zones <1 or number_of_zones > number of zones defined for this image
-190	pr_output pointer is not valid

Notes:

If RTF or PRO formats are choosen and image zones were defined then the image zone files that were produced to the application directory (see pr_configure_image_zone()) are renamed with the image's file name and moved to the same directory as the RTF or PRO file.

If the PDFTO (PDF Normal) format was chosen then the image zone files are removed from the application directory and incorporated directly into the PDF format file.

If PDF is the image input format and output format is PRO then we recommend saving the internal OCR image to a file and putting this file in the image path. Tools such as PrimeVerify and PrimePost that may need access to the input image can not read PDF files.

Bookmarks may be added to PDF output. See …\BIN\BOOKMARK.INI.EXAMPLE for more information.

Document properties may be added to PDF output. See …\BIN\DOCPROP_PDF.INI.EXAMPLE for more information.

pr_del_results()

short pr_del_results(zonestructure * pr_output, short delete_flag);

Function:

Frees up memory allocated by PrimeOCR for one image/page. Memory allocations occur within the PrimeOCR engine occur during pr_read_image_file(), pr_autozone(), and pr_recognize_image().

Required?:

Yes. If the memory used by PrimeOCR is not freed then eventually PrimeOCR output will consume all available memory and Windows will not function properly.

Timing:

This call should be made after the last relevant call has been made, for most developers that will be pr_recognize_image().

So, for example, this call should be performed after PrimeOCR output has been processed by the end user. Freeing the memory will effectively erase the PrimeOCR output (pr_del_results() does not blank the results but it tells Windows that this memory is now free for other uses.)

Input Variables:

zonestructure * pr_output

The pointer that was returned from pr_recognize_image()(or string "CURRENT RESULTS" which is handy if you are in VB or C#). If pr_recognize_image() has not been called (and will not be called), then you can input NULL here.

short delete_flag

If this flag is less than 0 then the image in memory will not be deleted (and may be used again). Any number greater than -1 will cause all memory to be deleted.

Typical Return Values:

-13XXX

Exception caused by deleting memory. If you are manipulating the output in memory you may be causing this problem (copy the output first to your own datastructure before manipulating it). Or this error may be caused by Windows memory getting scrambled over time, and application should be restarted, and in some more extreme cases the PC may need to be rebooted. If this problem continues we would recommend a weekly (or daily schedule in extreme cases) of rebooting the PC.

Notes:

Converting RAM based PrimeOCR output to a file does not automatically free up the RAM based PrimeOCR output memory.

pr_string_options()

short pr_string_options(char * command_string, char * answer);

Function:

Allows Prime Recognition to add custom functionality without changing the API. The actual functions performed by the string options can vary dramatically. Each call to this function can perform one option, in other words, if multiple options are desired you will need to call this function multiple times.

Required?:

Optional.

Timing:

Often the timing of this call is very important, however, the specific timing is solely based on the actual string option functionality.

Input Variables:

char * command_string.

A pointer to a string which includes all parameters of the option separated by commas. Since comma is used as a delimiter you cannot include a comma as one of the parameters.

Return Value:

char * answer

A pointer to a string which may be used to supply data back to developer. However, many string options may not use this parameter, in which case the developer may call the function with answer=NULL. If the string option does use this parameter then the developer must make sure that the length of the answer string is large enough to hold the return value.

short return from function

Some functions may also return a positive integer to the developer through the function’s return value. A negative return value is always an error.

Typical Error Return Values:

-12001	Command string was NULL
-12002	Answer string was NULL (Only reported if non NULL answer string is required)
-12003	Command string did not include any known commands
-12004	Command string did not include the correct number of commands
-12005	One or more of expected commands was blank
-12006	One or more of expected commands was incorrect/unrecognized

Notes:

The currently supported string option calls are documented in *Chapter 5 – String Options*.

pr_pre_process_PDF()

short pr_pre_process_PDF(short setting, char * pdf_input_path, short * result, char * txt_output);

Function:

Checks a PDF file to see if the file includes searchable text. The function can also extract text from the PDF file and save the extracted text to a file.

The function will identify the file as being searchable if any page includes searchable text.

This call is totally independent of the PrimeOCR engine overall.

Required?:

Optional.

Timing:

Can be made at any time, including BEFORE the pr_open() call.

Input Variables:

short setting

0 = do not extract text from the PDF file

1 = extract text from the PDF file

char * pdf_input_path

Pointer to a string which includes the full path and filename for the PDF file to read, e.g. "d:\images\4931.pdf".

char * txt_output

Pointer to a string which includes the full path and filename for where the searchable text should be saved to, e.g. "d:\images\4931.txt". The searchable text will only be saved to the output file if the setting variable is set to "1".

Return Value:

short * result

0 = no searchable text found

1 = searchable text found

pr_find_binarize_setting()

short pr_find_binarize_setting(char * filename, short page_number, short confidence_in, short * confidence_out, short * binarize_brightness);

Function:

For a given color or grayscale image file, and for a specific page in that file, it will determine the best setting for brightness that will generate the best accuracy OCR output.

This “brightness” value corresponds exactly to the value of PRIMAGE.INI\[Color/Gray Image Binarization]/Brightness. This function will effectively override the value of Brightness in the PRIMAGE.INI file. All binarization after this call will use this found value of Brightness.

Required?:

Optional.

Timing:

Can be made at any time after the pr_open() call. Ordinarily it would be done before the pr_read_image() call.

Input Variables:

char * filename

Pointer to a string which includes the full path and filename for the image file, e.g. "D:\IMAGES\4931.JPG". (PDF images are not currently supported.)

short page_number

Number of page within an image file (legal numbers are 1 < - > # of pages in file). If a single page file then this number should be 1.

short confidence_in

100-900, with higher values of confidence_in will result in more effort at finding the optimal binarization setting. On average output will be better at higher settings, but processing will be slower. Almost all changes in processing occur between values of 800-860 so we recommend a setting between 800 and 860.

Return Value:

short confidence_out

100-900, with 900 indicating that the brightness value found should create very high OCR confidence when the image is binarized and put through OCR.

short * binarize_brightness

0-255 The optimal brightness value found. This value will override the brightness setting in PRIMAGE.INI and will be used for any further binarization of files.

Notes:

If image is not a color or gray scale image the function will return a value of –1.

If image is in a PDF file the function will return a value of –1. (This function is not currently supported for images in a PDF file).

This function does not attempt to find the best value for Contrast. (Brightness has a much larger effect on binarization than contrast.)

This call may consume a significant amount of time.

Chapter 11 Example Applications

A number of sample applications are included when the Developer files are installed from the installation program. The samples are available in different languages:

-C
-C++
-C#
-Visual Basic

In some cases multiple versions exist, including .NET versions, and Visual Studio variations (e.g. VS 6, VS 2005, VS 2010, VS 2015). We also have included a sample REST API implementation.

C Source Code Sample Application

A simple application is included in the Toolkit that interfaces to the PrimeOCR API. The sample was written in C using Microsoft Visual C++. (C++ and C# for later versions of Visual Studio are also included). We highly recommend that you look at the sample application early in your reading, as it will illustrate quickly how to interface, control, and interpret the output of the PrimeOCR engine.

You can easily perform a basic test of the PrimeOCR engine accuracy by modifying the path noted below to read a user supplied image.

Functionality

The sample application:

-initialize PrimeOCR engine
-loads supplied test image
-configures PrimeOCR engine
-recognizes image
-converts PrimeOCR RAM output to PrimeOCR file output
-releases PrimeOCR RAM memory
-closes PrimeOCR engine

The sample application makes almost all configuration calls for each image. This is not necessary if the configuration items do not change between images, and does slow down processing to some extent.

Files

This application includes:

PREXC32.EXE	compiled application (put in \BIN directory)
PRAPIN.C	C source code
PRAPIN.RC, PRAPIN.H RESOURCE.H, PREXC.ICO	Resource & other files
PREXCVC5.DSP	Project file for VC++6.0
PREXC VC5.DSW	Project file for VC++6.0
TEST1.TIF, TEST2.TIF	Test images (put in \JOB directory)

Output

The example program will produce a PrimeOCR format ASCII file in the image directory, with the same file name as the image file, except with a ".PRO" extension, that includes all recognized text, confidence levels, line and character location data. (If the confidence level\character coordinate option was not purchased then only the recognized text will be output.) A text only (no line coordinates, etc.) version will be put in the same directory with a ".TXT" extension added to the image file name.

Example Source Code

The example application has virtually no user interface and is not "event" driven as a "good" Windows program should be, it is intentionally simplistic to focus attention on the PrimeOCR code. All PrimeOCR code and processing occurs within the lines noted below in the WinMain function.

```
//**********************Prime Recognition Example Code Start**********


PrimeOCR Code...


//**********************Prime Recognition Example Code End************
```

Except for the required PrimeOCR header files, all other code outside of these lines is used to create a minimal Windows program to "host" the PrimeOCR process. The example program reports errors, if any, through a message box and terminates. Feel free to modify and use the sample application code to create an interface to the PrimeOCR engine.

Warning

During the use of a development tool such as Visual C++, set the output file name (for the application) to the \BIN directory. Otherwise, if you let the output executable default to \WINDEBUG, for example, then the engine will fail to initialize since the executable is not in the \BIN directory.

Visual Basic Source Code Sample

Overview

An example is also provided for VB6. VB6 is rather old at this point, but the coding suggestions below are also applicable to other languages that do not allow/encourage the use of pointers.

Visual Basic applications can access Windows based DLLs such as PrimeOCR. Located in the SAMPLES\VB directory are all source files for a working VB 6.0 application, called PREXVB32.EXE, that can process an image through the PrimeOCR engine. This example is extremely simplistic and does not attempt to use all PrimeOCR calls.

Files included are:

-PROCRB.BAS
: Includes prototypes and global constants required to interface to the PrimeOCR engine DLL through VB. You must add this file to any project that will interface to the PrimeOCR engine DLL.

-PRVBEX32.FRM, PREXVB32.VBP, PREXVB32.VBW
: The source code to the VB example. This source code can be modified and used in any way by the developer without royalty or other legal restriction so long as it is used with the PrimeOCR engine.

-PREXVB32.EXE
: Compiled version of source code. You can run this program immediately if you installed PrimeOCR to the C:\PRDEV directory. If not you will have to edit the PRVBEX32.FRM to point to the TEST1.TIF correct path and recompile application.

Warning

When using the "Make EXE file" command in VB we recommend you create the EXE into the \BIN directory. This means that you do not have to create a PATH to \BIN.

Special Considerations of Interfacing to PrimeOCR via Visual Basic

1. Callback functions are not supported by Visual Basic therefore the callback function pointer in pr_open must be NULL (see PRVBEX32.FRM source code for an example).

2. It is difficult to return and send complex data structures in Visual Basic. Therefore the calls that require the zonestructure returned from the pr_recognize_image() call: pr_del_results() and pr_convert_output_to_file(), can instead be sent the string "CURRENT RESULTS". This will

cause these calls to use the latest results, which have been kept in the engine, for their operation (see PRVBEX32.FRM source code for an example).

3. In C based example programs we often show how to manipulate the PrimeOCR output in memory by operations on the zonestructure returned from the pr_recognize_image() call. In Visual Basic we strongly recommend that you instead use the pr_output_xxx() calls to get output in memory.

4. A small number of non-critical calls have not been tested under VB. These are highlighted in the PROCRB.BAS file.

PrimeOCR REST API Implementation

The PrimeOCR functionality can be accessed via a REST style API. (i.e., HTTP based web service). Offering functionality via HTTP web services has become popular due to a number of advantages it offers in network architecture.

Prime has developed a simple example implementation which can:

- Allow an arbitrary number of independent users submit images for processing
- Each submission can have a different PrimeOCR configuration

The Prime example implementation code/documentation is located in the \Samples\REST subdirectory. The discussion below uses this sample. But we would expect developers to use this sample as merely a starting point for their implementation.

Multiple levels of software are required in any REST API, most of which are not supplied by Prime. The choices at each level are many, and the proper choice is dependent on many factors including developer preference.

As with any development effort, a familiarity with the underlying environments is required. In this case a number of different environments are used, most of which are rapidly evolving, so this will be significantly more difficult than, for example, writing a Windows application to use the PrimeOCR engine on one PC.

Note that more detailed notes/discussions are available in the sample code files.

Architectural Levels

There are three main architecture levels.

- User application
- Web Server
- PrimeOCR application

User application

We further divide this layer into two sub levels:

- Application logic
- HTTP interface library (CURL in the example implementation)

The user application sends a number of commands that have been defined on the Web Server. The core application logic is to send an image to the Web Server and get back the resulting PrimeOCR output. In addition some basic housekeeping commands that are implemented in the Web Server are illustrated. (For example, the number of images in process.)

These commands are sent to the Web Server through the CURL library (using HTTP). Users may wish to replace CURL with other libraries of their choosing.

The sample application is written in VS2015 C++ in a very basic style. As in our other source code samples, the sample REST application is intentionally simplistic to be easy to read/understand. For example, it is missing some of the most basic programming features such as thorough error checking.

The code for the sample user application is in the …\SAMPLES\ REST\Client\C++ subdirectory. A file called "PrimeOCR REST API Client Installation Notes.pdf" is also available in this subdirectory which provides helpful notes on how to use the sample.

Web Server

A set of commands is defined that can be implemented on the Web Server. This set of commands defines the PrimeOCR REST API system functionality. We have documented the sample commands in a separate document called "PrimeOCR Sample REST API.pdf". Again, you may wish to implement your own set of commands/functionality.

The sample Web Server was designed to:

-Allow multiple independent users to submit units of work called "tasks"

-Each task will have one "configuration" of PrimeOCR (so PrimeOCR configuration settings can differ between tasks, with some small restrictions)

-Multiple images can be submitted in each task

-PrimeOCR output will be returned as it becomes available (which may not be in the order it was submitted).

-Commands are available that measure statistics for each task (e.g. Number of image files waiting to be processed.)

The sample implementation was written in PHP/Slim framework on a Microsoft IIS server. As mentioned before, users may wish to implement this functionality in a different server type and/or language.

The code for the sample web server is in the \Server subdirectory. A file called "PrimeOCR REST API Client Installation Notes.pdf" is available in this subdirectory which provides notes how to install the specific environment used by the sample.

PrimeOCR based Application

The Web Server will place input image files into one main directory (with extension ".img"), with each task given its own subdirectory. PrimeOCR must be able to read from these directory/subdirectories, and be able to create output in a different directory (it will create the same sub directory structure as the input directory). This output directory must be accessible to the Web Server. So PrimeOCR can be located on any machine that has this access (e.g., same machine as Web Server in a very simple system, or a different machine(s).)

Prime envisions three basic types of PrimeOCR providing this functionality:

-User developed application that interfaces to PrimeOCR API

-PrimeOCR Job Server

-PrimeOCR High Volume Job Server

User developed PrimeOCR application

This functionality is up to the user, so we will not describe further.

PrimeOCR Job Server

The standard PrimeOCR Job Server, including multiple copies each cooperatively processing the same job, can be used to poll the input directory for images, and send OCR results to the output directory. Please refer to Chapter 4 in this manual for a basic discussion of PrimeOCR Job Server.

Notes on configuration:

-If configuration items will be changing between tasks, you should configure these configuration items as string options at the bottom of the PTM file (as opposed to configuring string options in the Setup screen) (see discussion at beginning of Chapter 5).

-Job File

Use any editor to create an ANSI format file that has these contents (you can cut & paste from below text if you like):

```
 Prime Recognition Job File
Version 3.60
 1
 c:\inteput\wwwroot\ocrinput\*.img+  | OUTPUTSUBPATH c:\inteput\wwwroot\ocroutput
 CONTROL
```

In this example we use c:\inteput\… as the directories. You should use the paths you intend to use on your system. (Each of these paths must be the paths also used by the Web Server).

"CONTROL" in the above file directs the job server to look for a template file (OCR configuration file) that will be created in the top level Task subdirectory by the Web Server. It will be called "control.ptm". This file must exist in the directory for any OCR work to be performed.

Name this file XXX.job (XXX is your choice). Place this file in the directory in which the Job Server looks for Job files (this is configured in Setup\Input\Job Directory\Primary Job Directory). Delete any other job files that are in this directory (for example, the sample jobs that were installed during installation.)

-Setup\Input

-Job Directory\Once OCR of job is complete = Do not Erase Job File

-Job Directory\Once all jobs are complete = Continuously poll for next job

-Setup\Output

-Path = Save OCR output in the same directory as the image file (this setting will be overwritten by OUTPUTSUBPATH above but still important that this is the configured setting).

-Existing Output\Skip files with existing output = Yes

PrimeOCR High Volume Job Server

For high volumes (which, as a rough rule, require more than four regular Job Servers), we recommend using the “High Volume” version of the Job Server. This version was designed to scale to 100 servers with low communications overhead. If your environment has very good network performance you may be able to efficiently use more than four Job Servers. (Please contact your Prime representative if you are interested in the High Volume version of the Job Server.)

The architecture of the High Volume Job Server fits well with a REST API application. Merely configure the InputDirectory to the equivalent of:

```
c:\inteput\wwwroot\ocrinput\*.img+
```

and the OutputDirectory to:

```
c:\inteput\wwwroot\ocroutput\*.img+
```

Chapter 12

OCR Job Server as a Service

PrimeOCR, in the form of the OCR Job Server application, can be run as a Windows Service. The application will run with no user interface, and can be configured to start automatically when Windows starts without a user login (useful in a high security environment.)

Installation of Service

(PrimeOCR will be installed automatically as a service during installation. However, you may use the instructions below to also manually install and uninstall the service as you wish.)

From the command prompt or the Run command, enter:

```
C:\prdev\bin\ocrjob32service.exe –Install
```

(use your actual path)

Warning (for Vista and later OS)

You will need to start the command prompt using “run as Administrator”.

Removal of Service

From the command prompt or the Run command, enter:

```
C:\prdev\bin\ocrjob32service.exe –Uninstall
```

(use your actual path)

Configuration of OCR parameters

Run the OCR Job Server program (ocrjob.exe), and configure normally prior to starting PrimeOCR as a service. All settings will be used by the Service version of product, except:

-“Setup\Input\Job Directory\Once all jobs are complete setting” is ignored, it will always be set to “Continously poll for next job” by Service version.
- PrimeOCR.ini\ShowProgressWindow and ShowErrorsDialogBox are ignored.

Configuration of Service

Stop/Start

Go to Windows Start\Control Panel\Administrative Tools\Services.

You should see PrimeOCR as one of the Services. Select PrimeOCR. Right click to bring up actions you can take on PrimeOCR service. You can start/stop, etc. from this point.

Auto Start

Select Properties via the right click. You can change PrimeOCR service to startup when Windows starts. (General tab/Startup type/Automatic).

Auto Restart

You can setup PrimeOCR service to restart if it encounters an error in the Setup\OCR Engine\Error Handling\Restart\Reboot Error List. You must have selected Setup\OCR Engine\Error Handling Restart the Job Server…".

Go to the Recovery Tab (in the right click within Services window). Select "Restart the Service" in the "First Failure" setting. If your "Restart Service after" setting is set to 1 minute, if the PrimeOCR encounters an error in the list, it will restart the service after 1 minute has elapsed.

Error Conditions

You can not run any other instance of PrimeOCR at the same time as the Service is running. If you attempt to do so you will get –8890 errors or –4701 warnings in the log file.

Note that email notifications may not work when the OCR Job Server is run as a service. In some high security environments, the PrimeOCR service may have limited rights, so the email functionally may be prevented from functioning correctly.

Appendix A Recognized Characters

The PrimeOCR engine software can recognize most ANSI characters. In some cases recognized characters will be mapped to other characters. The characters recognized and the corresponding output characters are noted below.

Restricted Sets

The contents of zones can be restricted to increase accuracy and speed of OCR. Below are the PrimeOCR defined restrictions and the subset of characters that are supported in each set.

NO_RESTRICTIONS
All characters listed below

PR_ALPHA
a-z A-Z , . plus international characters

PR_NUMERIC
0-9 , . + - ( ) $ / @ # £

UPPERCASE (applies to NO_RESTRICTIONS and PR_ALPHA)
a-z is not allowed

LOWERCASE (applies to NO_RESTRICTIONS and PR_ALPHA)
A-Z is not allowed

Basic Character Recognition and Mapping

Character	PrimeOCR Output
0-9	0-9
a-z	a-z
A-Z	A-Z

Punctuation and Other Character Recognition and Mapping

(Numbering below is Windows 1252 – sometimes referred to ANSI – matches Unicode except for characters 128-159, which are uncommon characters.)

Dec	Hex	Char	PrimeOCR Output
32	20	(space)	(space)
33	21	!	!
34	22	"	"
35	23	#	#
36	24	$	$
37	25	%	%
38	26	&	&
39	27	'	'
40	28	(	(
41	29	)	)
42	2A	*	*
43	2B	+	+
44	2C	,	,
45	2D	-	-
46	2E	.	.
47	2F	/	/
58	3A	:	:
59	3B	;	;
60	3C	<	<
61	3D	=	=

Dec	Hex	Char	PrimeOCR Output	
62	3E	>	>	
63	3F	?	?	
64	40	@	@	
91	5B	[	[	
92	5C	\	\	
93	5D	]	]	
94	5E	^	^	
95	5F	_	_	
96	60	`	`	
123	7B	{	{	
124	7C	|	|	
125	7D	}	}	
126	7E	~	~	
128	80	€	€	euro symbol
145	91	‘	'	(open single quote)
146	92	’	'	(close single quote)
147	93	“	"	(open quote)
148	94	”	"	(close quote)
149	95	•	*	(bullet)
150	96	–	-	
151	97	—	-	
163	A3	£	£	
167	A7	§	§	
169	A9	©	©	
171	AB	«	«	

173	AD	-	-
176	B0	°	°
182	B6	¶	¶
187	BB	»	»

International Language: International Character Recognition and Mapping

Dec	Hex	Char	PrimeOCR Output
161	A1	¡	¡
191	BF	¿	¿
192	C0	À	À
193	C1	Á	Á
194	C2	Â	Â
195	C3	Ã	Ã
196	C4	Ä	Ä
197	C5	Å	Å
198	C6	Æ	Æ
199	C7	Ç	Ç
200	C8	È	È
201	C9	É	É
202	CA	Ê	Ê
203	CB	Ë	Ë
204	CC	Ì	Ì
205	CD	Í	Í

Dec	Hex	Char	PrimeOCR Output
206	CE	Î	Î
207	CF	Ï	Ï
209	D1	Ñ	Ñ
210	D2	Ò	Ò
211	D3	Ó	Ó
212	D4	Ô	Ô
213	D5	Õ	Õ
214	D6	Ö	Ö
216	D8	Ø	Ø
217	D9	Ù	Ù
218	DA	Ú	Ú
219	DB	Û	Û
220	DC	Ü	Ü
223	DF	ß	ß
224	E0	à	à
225	E1	á	á
226	E2	â	â
227	E3	ã	ã
228	E4	ä	ä
229	E5	å	å
230	E6	æ	æ
231	E7	ç	ç
232	E8	è	è
233	E9	é	é
234	EA	ê	ê

Dec	Hex	Char	PrimeOCR Output
235	EB	ë	ë
236	EC	ì	ì
237	ED	í	í
238	EE	î	î
239	EF	ï	ï
241	F1	ñ	ñ
242	F2	ò	ò
243	F3	ó	ó
244	F4	ô	ô
245	F5	õ	õ
246	F6	ö	ö
248	F8	ø	ø
249	F9	ù	ù
250	FA	ú	ú
251	FB	û	û
252	FC	ü	ü
255	FF	ÿ	ÿ

Asian Fonts/Characters

Character Sets Recognized:

Simplified Chinese: GB-2312
Traditional Chinese: Big5
Korean: Hangul, Hanja
Japanese: Hiragana, Katakana, Kanji

The following fonts in PrimeOCR are supported in the Asian languages:

Simplified Chinese: Hei, Song,Kai, FangSong
Traditional Chinese: Ming, Kai, Hei, Yuan
Korean: Batang, Myeongjo, Gothic
Japanese: MS Gothic, MS Mincho

The output is in Unicode format.

Russian Characters

The Russian characters within Unicode character set from 0401 – 044F are recognized.

Barcode

The list of barcode types is described and configured in prbarcode.ini

The output is as regular characters with associated confidence levels in memory or in the output files.

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