Tesseract Studio .Net

Introduction

A Windows program to create, review and correct OCR data in searchable PDF files using Tesseract 4.0 OCR engine.

Features

- Supports image and multipage PDF files, with or without prior OCR data.
- Can run or re-run the Tesseract OCR process the current page, all pages or selected pages.
- Preserves any visible text on a PDF page while performing OCR on the image elements only.
- For multi-page files, multiple instances of the tesseract engine run in parallel for improved performance. The speed improvement depends on the number of processor cores.
- Identify and display OCR text at the word level with detected word boundaries visible.
- The built-in spell checker automatically tags words not found in the dictionary.
- Display PDF pages in the following modes:
  - Image with OCR text hidden
  - OCR text visible and image hidden
  - OCR text visible on faded image
- Use any installed font to display OCR text. Fonts are automatically scaled to fit word boundaries.
- Click on a visible word to open a text editor to correct OCR mistakes.
- Split a selected word at the current cursor position into two words, or merge the selected word with the next word.
- Modify or move word boundaries.
- Create new OCR words, delete existing words.
- Supports any number of Undo and Redo operations.
- Save corrections as searchable PDF files. Optionally save as PDF/A or encrypted PDF files.
- Experimental support for removing grid lines and handling a mixed-mode page with both light text on dark background and dark text on light background. This is common with table headers.
- Capture and examine debug intermediary images and OCR output in text.

License

Tesseract Studio is released under Opait Freeware license which allows any legal use for free. The only limitation is that the product cannot be sold for a fee.

Installation

Tesseract Studio is packaged as a Windows MSI and can be downloaded from the product web site:

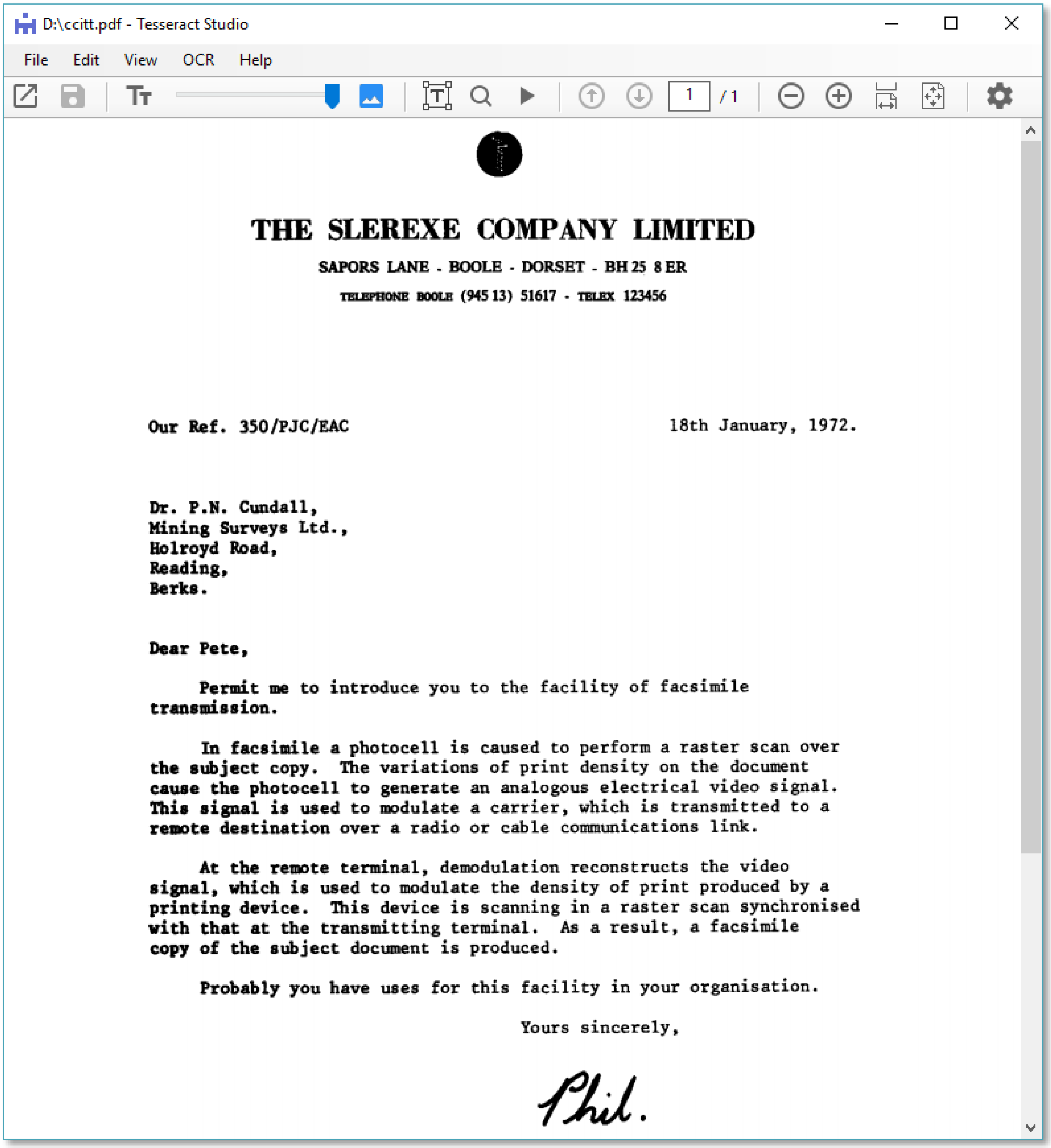
https://www.opait.com/tesseractstudio

Acknowledgments

Tesseract OCR Apache License Version 2.0
Leptonica by Dan Bloomberg Creative Commons Attribution 3.0 United States License
Pdfium Copyright 2014 PDFium Authors. All rights reserved.
Hunspell Copyright © 2002-2017 Németh László
NHunspell Copyright © Maierhofer Software

User Guide

In this section we will use a classic TIFF sample file from CCITT which has been converted to a searchable PDF using Tesseract OCR 4.0. You may download the file from here: ccitt.pdf



THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC 18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

Yours sincerely,

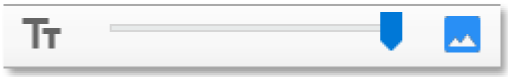
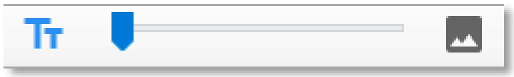
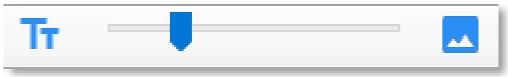
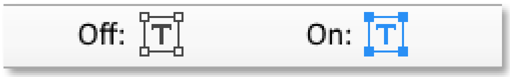
Phil.

We could also start with the original TIFF file and perform the OCR processing within the Tesseract Studio as described later in this document.

The PDF page is currently in the image display mode which shows the original TIFF image with the OCR text hidden behind the image.

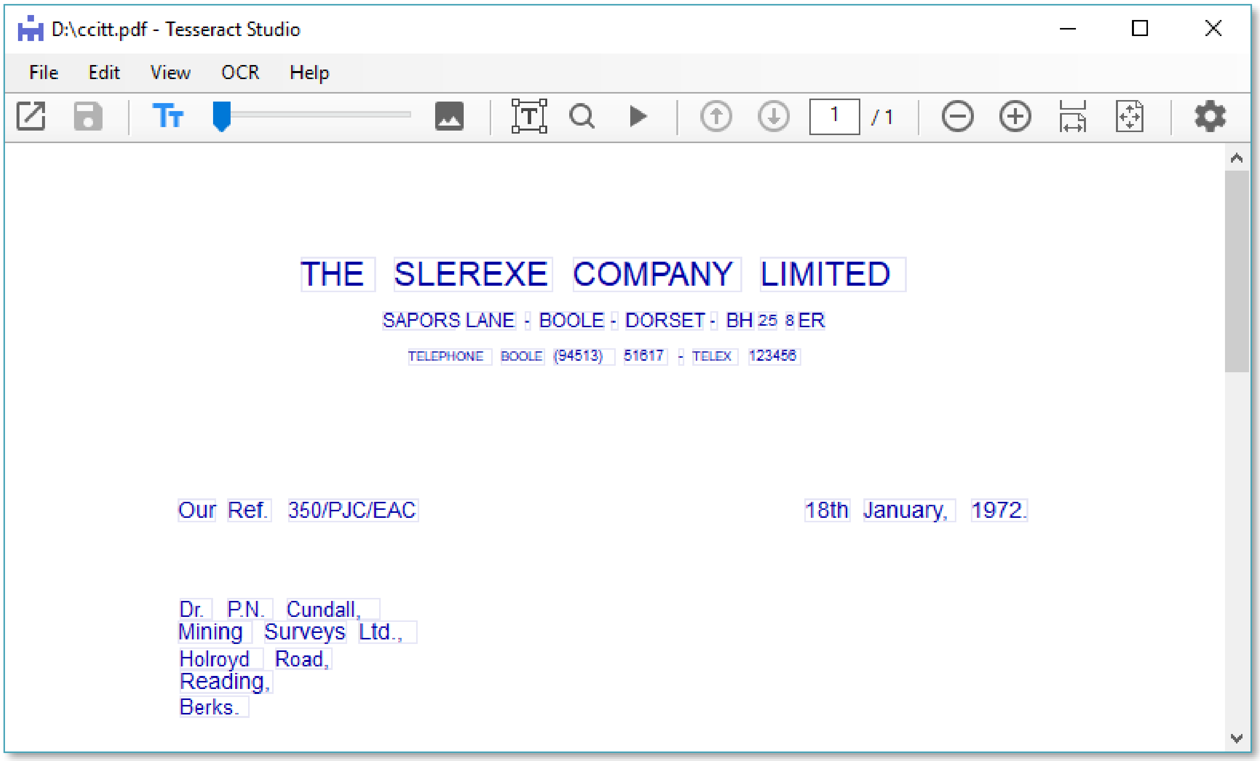
Display Modes

The slider on the toolbar controls relative opacities of the text and image layers:

Image Mode	
Text Mode	
Text Overlay Mode	
Layout Mode	

You may also toggle quickly between image and text modes by pressing the text or image icons at the two ends of the slider bar. OCR data can be corrected in one of text or the text overlay modes.

Text Mode



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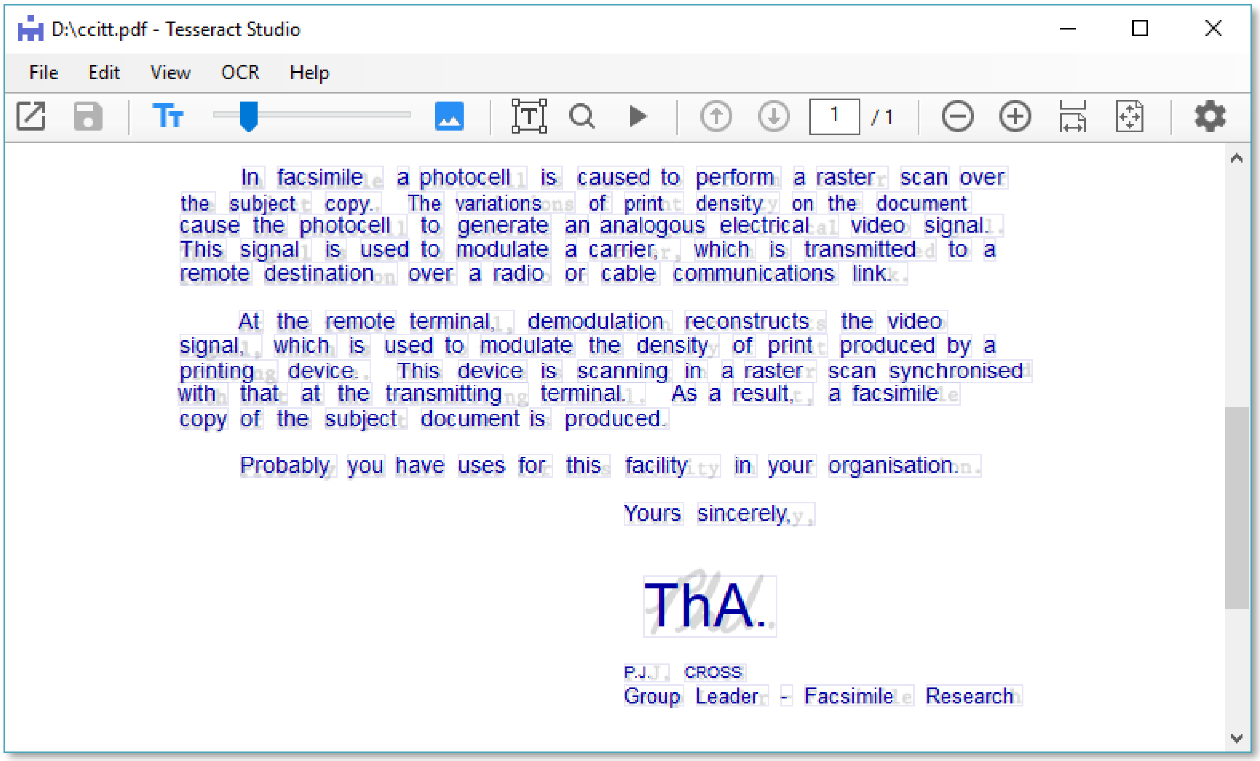
18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

The page is displayed in the text mode with the image layer hidden. The display font, text colors and the opacity of word boundaries can all be controlled using the options dialog.

Text Overlay Mode



In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

Yours sincerely,

ThA.

P.J. CROSS
Group Leader - Facsimile Research

The page is displayed in text overlay mode where the original image is visible in the background at opacity level determined by the position of the slider bar.

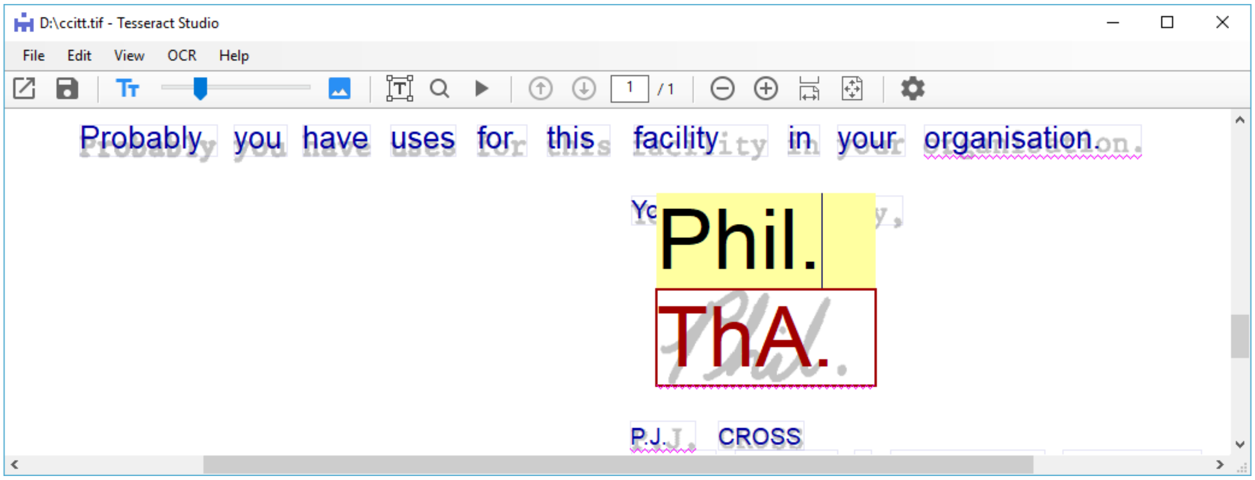
Layout Mode

The layout mode toggles between correcting OCR text and correcting the layout of the OCR words.

Layout Mode is Off	Layout Mode is On
Edit text of a recognized word	Resize the bounding rectangle of word
Split a word at the current cursor	Move the bounding rectangle horizontally
Merge a word with the next word	Add a new word
	Delete a word

Correcting Recognition Mistakes

The only OCR mistake in this document is the cursive signature which has been mis-recognized as “ThA.” instead of “Phil.”. To correct this problem, we click on the word which opens an edit box, allowing us to replace the text:



Probably you have uses for this facility in your organisation.

Yo

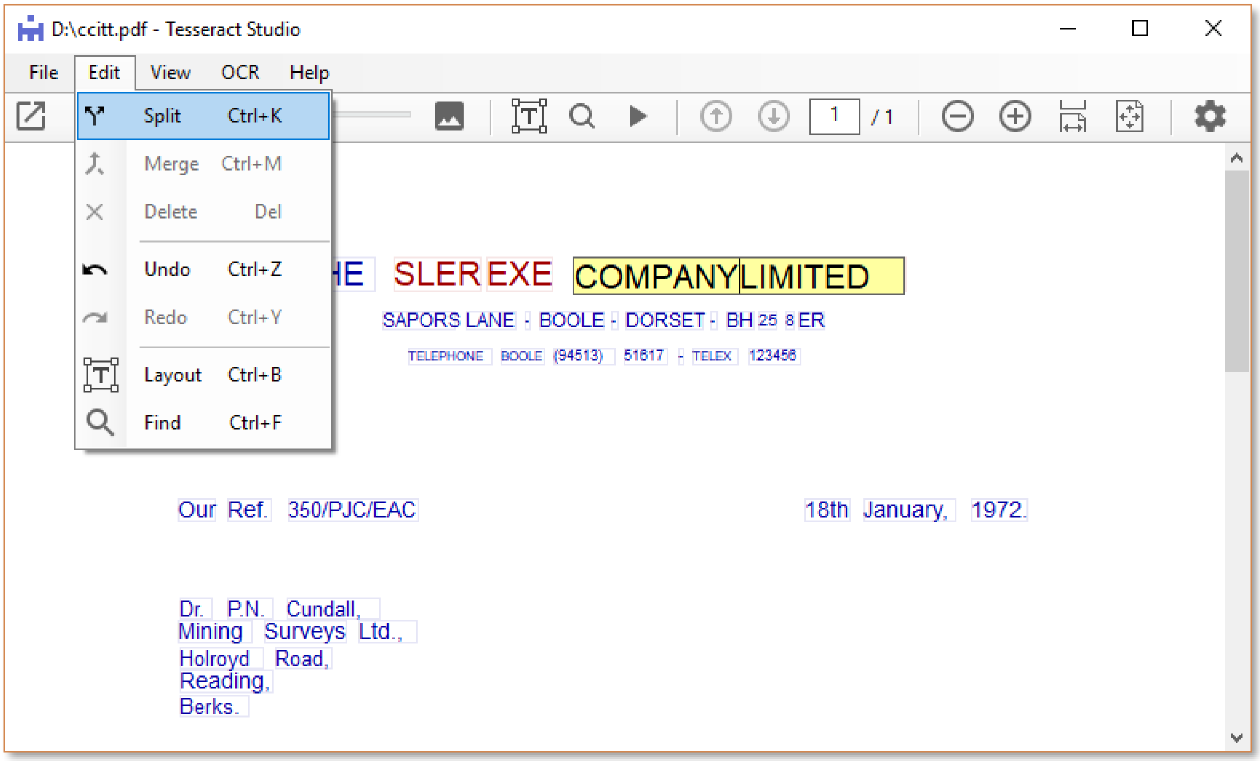
Phil.

ThA.

P.J. CROSS

Correcting Segmentation Mistakes

Another type of OCR mistake which originates from the layout analysis is when the OCR engine breaks a word into two or more words or lumps adjacent words together. The space character is invisible to the OCR process. The decision to insert one or more spaces between characters needs to rely on algorithms that either use heuristics or machine learning to perform text segmentation. Such algorithms are not always perfect. In fact, whether or not one or more spaces were intended between characters of an image is often ambiguous, even to the human eyes, without considering the context of the characters.



HE SLER EXE COMPANYLIMITED

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Dr. P.N. Cundall,
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Reading,
Berks.

Tesseract studio can correct these mistakes by splitting a word at the cursor location or by merging two adjacent words. In both cases, you need to select a word and then right click and use the context menus to split or merge words.

In the example above, we have split SLEREXE to two words SLER and EXE. We have also merged the two words COMPANY LIMITED into a single word. These are, of course, for illustration purposes.

Undo / Redo

To restore the original words, you can use the Undo button or press Ctrl+Z several times.

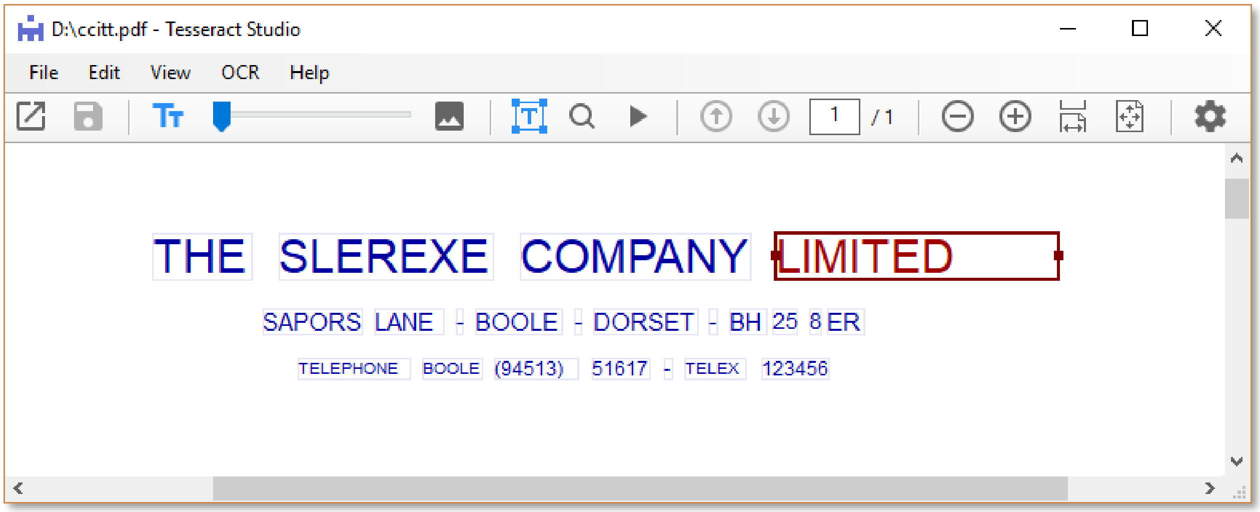
The software supports unlimited levels of Undo and Redo operation.

Correcting Layout Mistakes

The OCR engine will occasionally create spurious words (e.g. recognize a vertical line segment as ‘I’ or ‘]’), miss a word altogether (especially true if some text are in inverted colors, white on gray) or misplace word location horizontally (artifact of classification). The layout mode is provided to correct such mistakes.

Move or Resize Word

To move or resize a recognized word, make sure the layout mode is on and click the bounding rectangle of the word. The rectangle will be selected and can be moved or resized horizontally.



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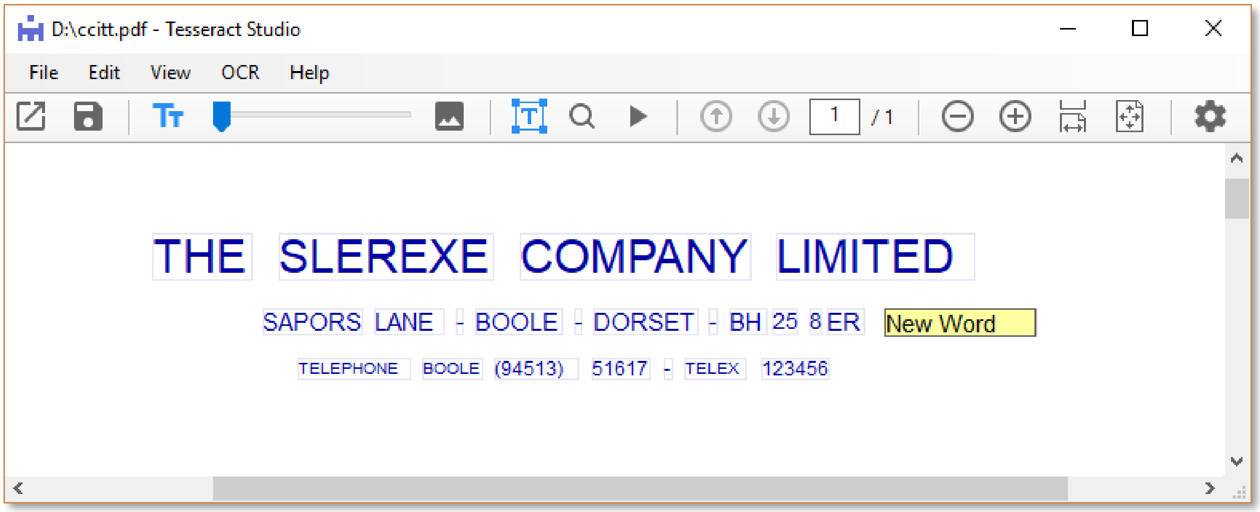
Delete Word

To delete a word, select the bounding rectangle in the layout mode and use keyboard Del key or the menus to delete the word and its bounding rectangle.

Add New Word

To add a new word, select the layout mode and move the mouse cursor to where you wish to insert the word. A new word can only be added to an existing text line. The cursor will change to a cross hair cursor when it detects an existing text line. Draw a bounding rectangle for the new word and enter its text value. The new word will inherit its attributes, such as font size, from a neighboring word.



THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER New Word

TELEPHONE BOOLE (94513) 51617 - TELEX 123456

Running OCR

You may run the OCR process on the current document by clicking the selecting the “Start OCR…” command under the OCR menus. Tesseract Studio will create new OCR data for the current page, all pages in the document or for a selected number of pages.

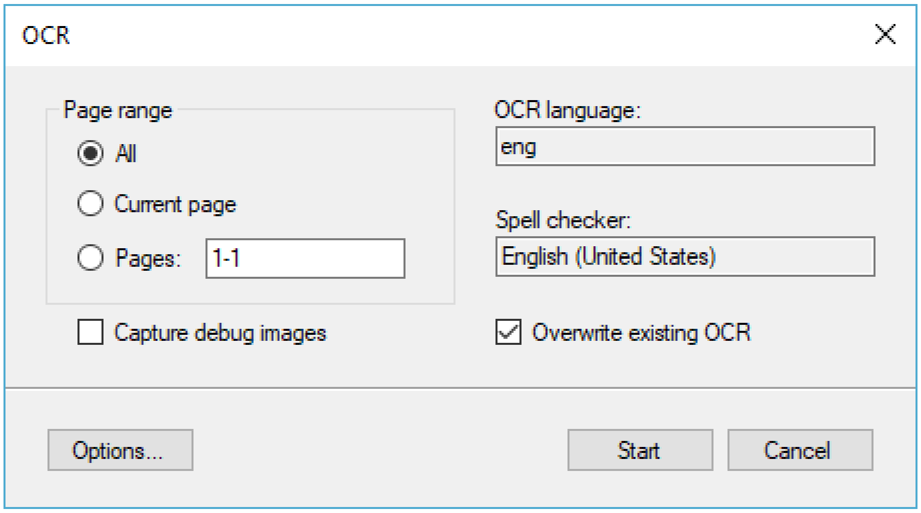
The OCR process will delete any existing OCR data on a page, including all edits made to the data. It will, however, preserve and combine any non-OCR text elements that might already be on a page. The original graphics of the page will also be preserved.

This approach has several advantages over the customary approach of rasterizing the entire PDF page and running the resulting monochrome image through the OCR engine:

- Protects fidelity, accuracy and font attributes of regular text.
- Excludes graphical paths such as line drawings from the OCR engine.
- Reduces the amount of text that the OCR needs to process.
- Maintains original look of mixed-mode (text, image, graphics) pages.

When running the OCR process on multiple pages, Tesseract Studio will automatically create multiple instances of the tesseract OCR engine and run them in parallel to improve the performance. The performance improvement depends on the number of processing cores in the computer.

To run the OCR process, select the “Start OCR…” command from the OCR menus, pick a language, specify the pages that you wish to process and click the Start button.



OCR

Page range

● All

○ Current page

○ Pages: 1-1

□ Capture debug images

OCR language: eng

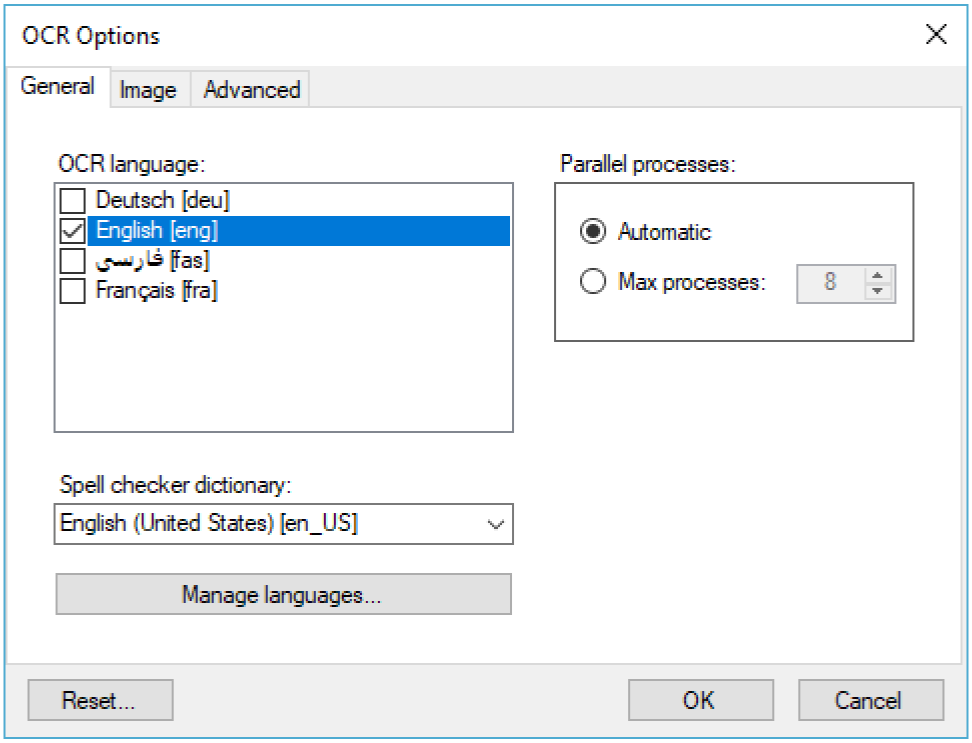
Spell checker: English (United States)

☑ Overwrite existing OCR

OCR Options

Various options that control how the OCR is performed can be set from the dialog accessible via the Options... button on the OCR dialog.

On the General tab, you can select OCR and spelling languages as well as the number of parallel processes that can be used to accelerate OCR of multi-page documents.



OCR Options

OCR language:

□ Deutsch [deu]
☑ English [eng]
□ فارسی [fas]
□ Français [fra]

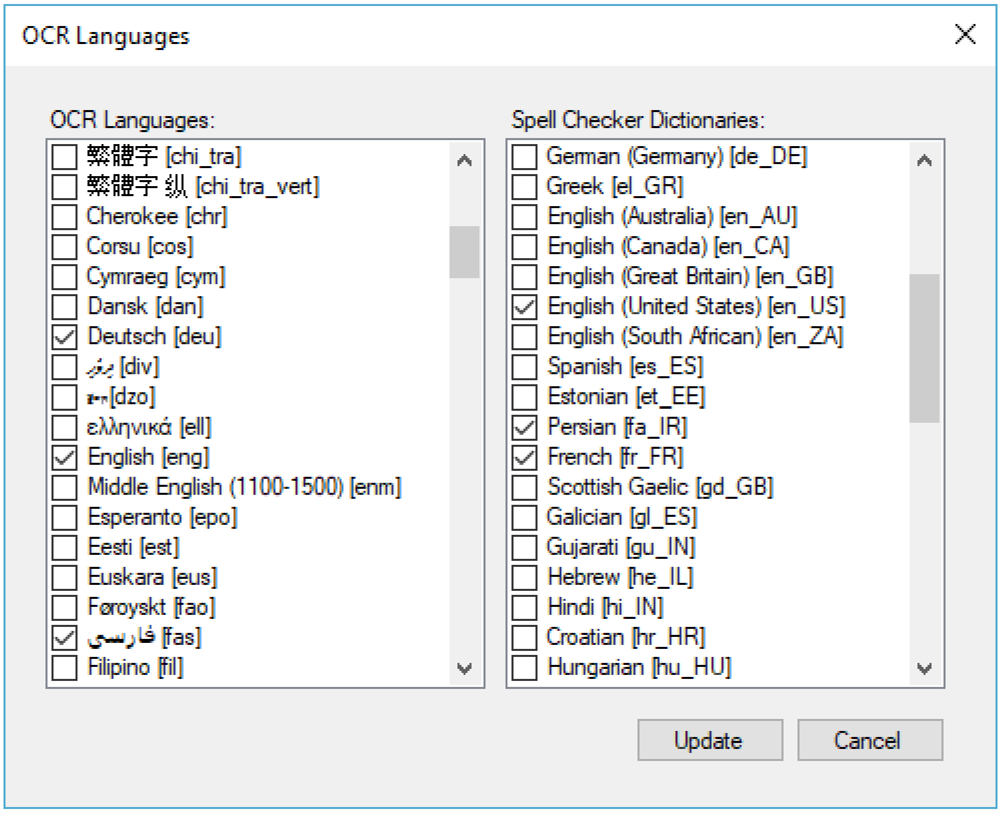
Parallel processes:

● Automatic

○ Max processes: 8

Spell checker dictionary: English (United States) [en_US]

The selection of the OCR and spelling languages is limited to the languages files that have been installed in the computer. You may install or remove these language files using the Manage Languages option:


OCR Languages

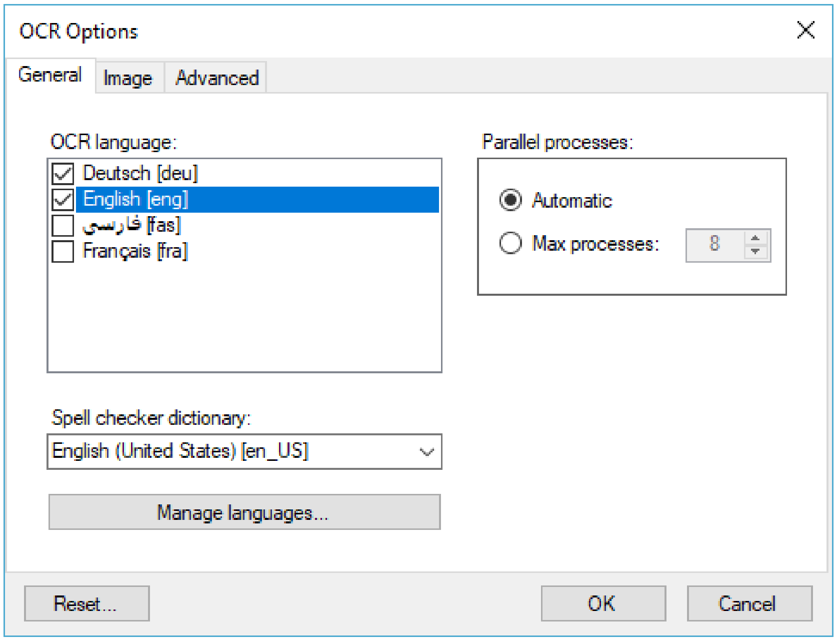
OCR Languages:

□ 繁體字 [chi_tra]
□ 繁體字 纵 [chi_tra_vert]
□ Cherokee [chr]
□ Corsu [cos]
□ Cymraeg [cym]
□ Dansk [dan]
☑ Deutsch [deu]
□ ދިވެހި [div]
□ རྫོང་ཁ[dzo]
□ ελληνικά [ell]
☑ English [eng]
□ Middle English (1100-1500) [enm]
□ Esperanto [epo]
□ Eesti [est]
□ Euskara [eus]
□ Føroyskt [fao]
☑ فارسی [fas]
□ Filipino [fil]

Spell Checker Dictionaries:

□ German (Germany) [de_DE]
□ Greek [el_GR]
□ English (Australia) [en_AU]
□ English (Canada) [en_CA]
□ English (Great Britain) [en_GB]
☑ English (United States) [en_US]
□ English (South African) [en_ZA]
□ Spanish [es_ES]
□ Estonian [et_EE]
☑ Persian [fa_IR]
☑ French [fr_FR]
□ Scottish Gaelic [gd_GB]
□ Galician [gl_ES]
□ Gujarati [gu_IN]
□ Hebrew [he_IL]
□ Hindi [hi_IN]
□ Croatian [hr_HR]
□ Hungarian [hu_HU]

You may also choose more than one language for processing multi-lingual documents. The spell-checker, however, can only use a single (primary) language.


OCR Options

OCR language:

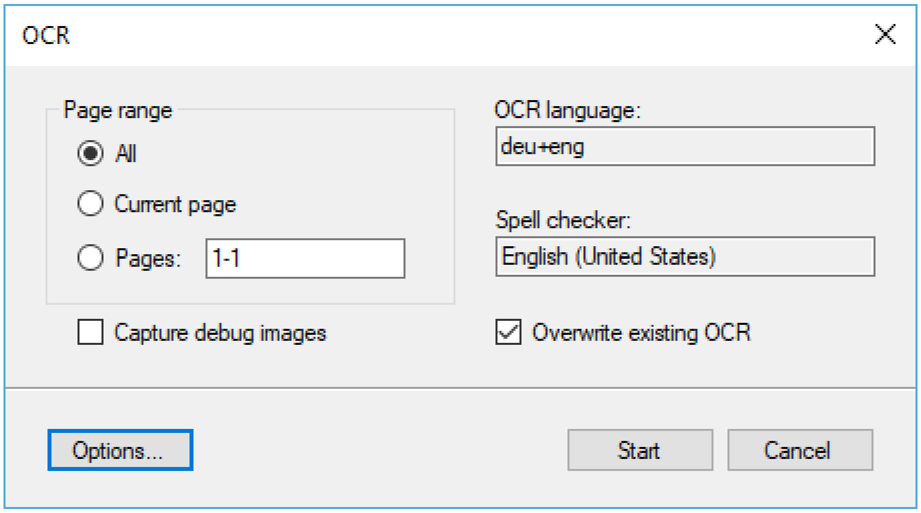
☑ Deutsch [deu]
☑ English [eng]
□ فارسی [fas]
□ Français [fra]

Parallel processes:

● Automatic
○ Max processes: 8

Spell checker dictionary: English (United States) [en_US]

Selection of multiple languages will be reflected on the OCR dialog (e.g. deu+eng for documents that have both German and English text):



OCR

Page range

● All

○ Current page

○ Pages: 1-1

☐ Capture debug images

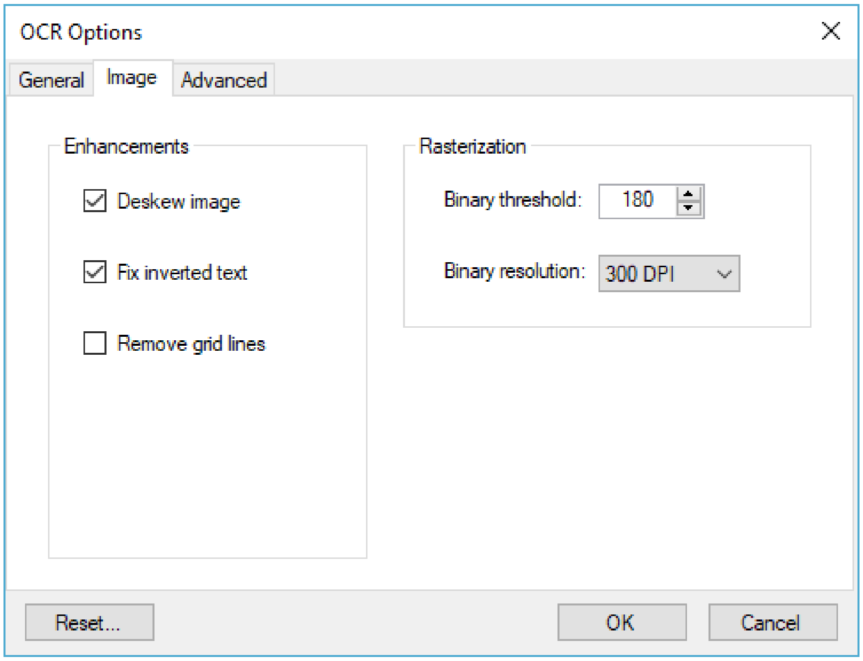
OCR language: deu+eng

Spell checker: English (United States)

☑ Overwrite existing OCR

The Image tab displays a few experimental image enhancement options for dealing with more complex documents. Depending on the source images, these options may or may not affect the accuracy of the OCR data. More options will be added to this list in subsequent releases.

If you check the "Capture debug images" option on the OCR dialog, the intermediate images that result from applying image options to the source images will be captured in a PDF file and displayed after OCR is completed. This PDF will also include the unformatted OCR text as the last page. This is designed for examining the effectiveness of various image enhancement choices.



OCR Options

Enhancements

☑ Deskew image

☑ Fix inverted text

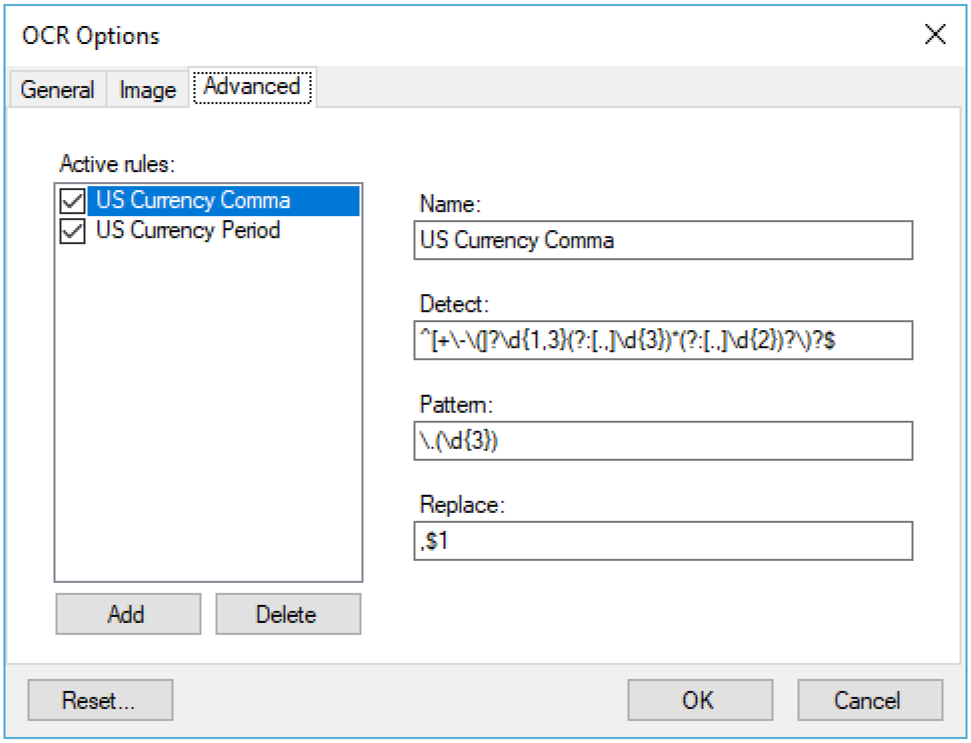
☐ Remove grid lines

Rasterization

Binary threshold: 180

Binary resolution: 300 DPI

The Advanced tab uses regular expressions to post process OCR data and make certain substitutions based on patterns detected in the OCR data. The two included rules try to detect and correct common OCR mistakes with currency amounts that are in US format. These expressions are for illustration only.



Active rules:
- ☑ US Currency Comma
- ☑ US Currency Period

Name:
US Currency Comma

Detect:
```
^[+\-\(]?\d{1,3}(?:[.,]\d{3})*(?:[.,]\d{2})?\)?$
```

Pattern:
```
\.(\d{3})
```

Replace:
```
,$1
```

Technical Discussion on Searchable PDF Files

A searchable PDF file is normally constructed by placing the OCR data in invisible mode behind a scanned image and roughly in correct layout and location. Tesseract uses a zero-glyph font for representing the OCR data. It does not reliably detect font families, attributes or sizes. It also discards character boundaries when creating PDF files.

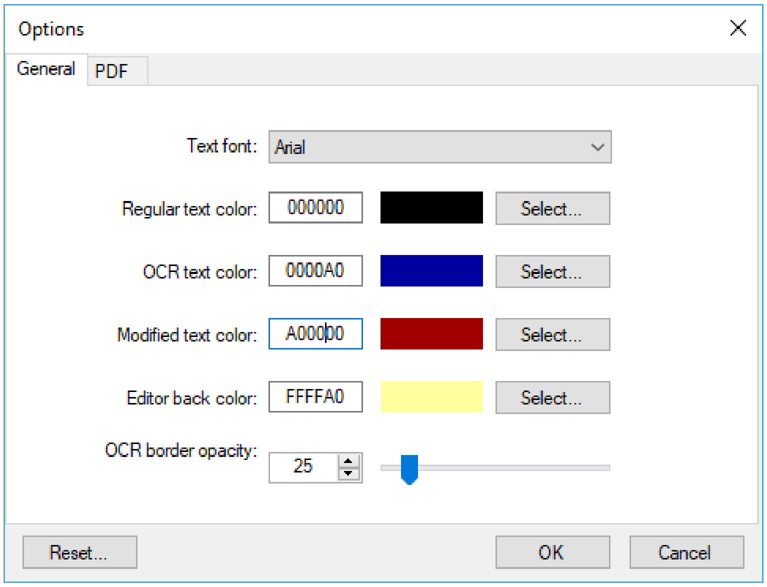
The OCR data is stored as words within a bounding rectangle. The characters of a word are assigned the same width which is computed so that the word fills the bounding rectangle with the character boxes touching. The important parameters of this approach are the Unicode values of the characters and the bounding rectangles of the words.

When making the OCR data visible, we have to choose an installed font, such as Arial, and compute the actual font sizes so that the OCR words roughly fit the bounding rectangles. Since, in reality characters vary widely in width, this mapping is not perfect. The choice of the font size and the rendered width of words are not important. When adding or re-sizing word, it is important to pay attention to the bounding rectangles and not display widths.

On some occasions it might be easier to merge adjacent words and enter a multi-word phrase with explicit spaces separating words. Most PDF viewers will be fine with using explicit space characters to identify word boundaries.

Display Options

The General tab on the options dialog allows setting of fonts, colors and borders for rendering images and text.



Text font: Arial

Regular text color: 000000

OCR text color: 0000A0

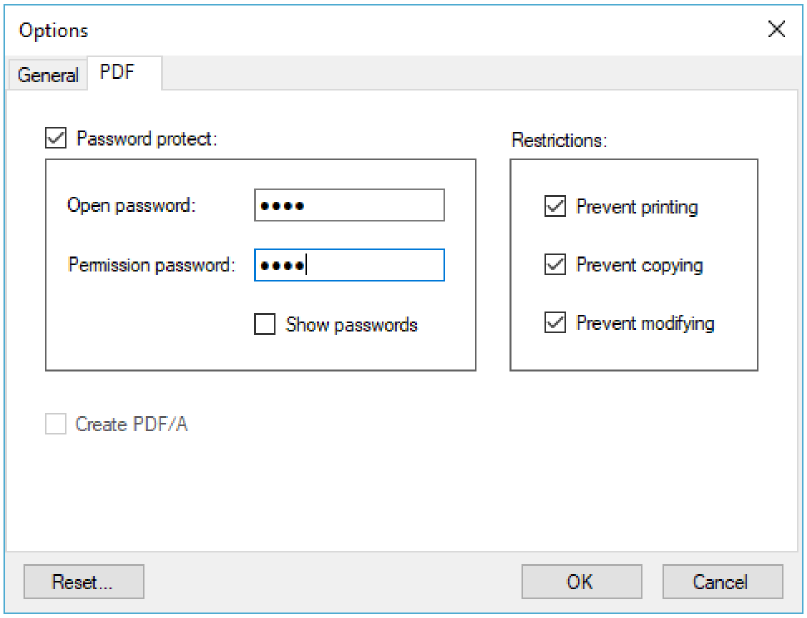
Modified text color: A00000

Editor back color: FFFFA0

OCR border opacity: 25

PDF Options

You may use the PDF tab on the options dialog to select parameters that will apply to all subsequent OCR operations. The PDF/A option will create PDF files that conform to the PDF/A standard for archiving. You may also choose to save PDF files encrypted with a password. You may only use one of these options as PDF/A does not allow encryption.



☑ Password protect:

Open password: ●●●●

Permission password: ●●●●

☐ Show passwords

Restrictions:

☑ Prevent printing

☑ Prevent copying

☑ Prevent modifying

☐ Create PDF/A

More from Opait Software

Opait PDF Creator

Opait PDF Creator is high-performance application which uses managed parallel processes to enable production grade automation of the new Tesseract 4.0 OCR engine. It provides a framework for managing multiple configurable jobs to monitor the file system for qualified files and perform conversion to searchable PDF documents.

Opait PDF Creator has a fully multi-threaded kernel acting as a high-performance document processing server that works with a set of watched folders. As images and image-based PDF files are placed into these folders, or arrive automatically via file transfer, the Opait PDF Creator places them into a managed queue and takes care of tasks like file locking, events handling and communicating with user or API processes.

In time-critical or high-volume environments, multiple instances of the Opait PDF Creator may be deployed to increase performance.

The Opait PDF Creator also supports a plugin API to customize the workflow and integrate with third-party applications.

About Opait Software

Opait Software specializes in high quality extraction of structured data such as fields, tables, sections and paragraphs from unstructured documents in many file formats. Automatic identification and extraction of tabular data, as well as, tagging and filtering NLP elements of PDF documents allows advanced analytics, RPA automation and semantic search using data trapped in PDF and other unstructured documents. These data-mining products are particularly suited to financial modeling and analysis. Automatic processing of statements, remittances, bills, financial reports and contracts are some applications of this technology.