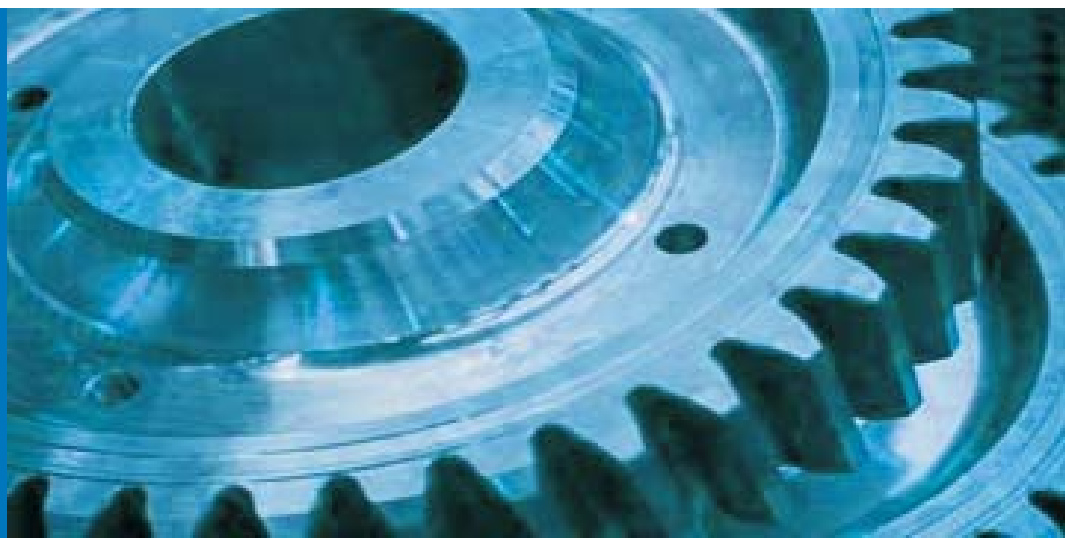




# Image Processing & Image Recognition SDKs

**FREE OR ROYALTIES-FREE SOFTWARE DEVELOPMENT KITS**

ICR \* OCR \* OMR \* BCR \* OCR-A/B \* MICR CMC7/E13B \* CHR \* DESKEW  
\* DESPECKLE \* BLACK BORDER REMOVAL \* LINES REMOVAL \*  
DYNAMIC THRESHOLDING \* FORMS IDENTIFICATION \* IMAGING \*  
QUALITY CONTROL \* FORMS REGISTRATION \* LAYOUT ANALYSIS





# Recogniform IMAGE PROCESSING SDKs

## Lines Removal

This library allows to remove lines from images. Both vertical and horizontal lines can be removed from every kind of form. The removal of lines is a very important pre-processing step before using ICR/OCR and recognizing characters from the acquired document. You can specify several options to fine-tune the process:

- ▶ Mode (horizontal, vertical or both)
- ▶ Min Horizontal Size
- ▶ Max Horizontal Holes
- ▶ Min Vertical Size
- ▶ Max Vertical Holes
- ▶ Perform Characters Reconnection
- ▶ Cleaning

## Dynamic Thresholding Binarization

This library allows you to convert gray-level images into monochrome ones using Dynamic Thresholding. This means that threshold value for binarizing image is not fixed but it is dynamic. It's calculated pixel by pixel to be independent from changes both in foreground darkness and in background lightness and in illumination level. By adjusting contrast levels automatically, Recogniform Dynamic Thresholding library is able to:

- ▶ increase the accuracy of low-contrast documents containing handwritten or typed characters with variable lines thickness and darkness;
- ▶ preserve light foreground details;
- ▶ eliminate dark background zones in a smart way.

The final result is an optimal monochrome image suitable for better visualization, better compression, better optical character recognition and better automatic vectorization. No operator's intervention is required for manual threshold adjustments!

## Forms identification and Registration

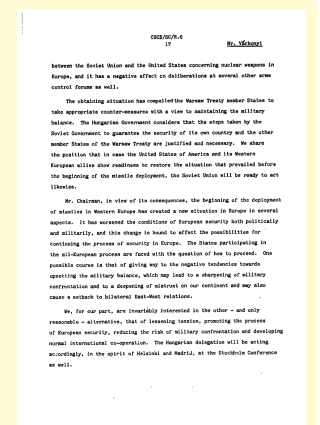
This engine allows to perform the automatic identification and classification of forms using a pre-built database of templates. You can add several empty "templates" forms to your "set" and then perform the identification on a "filled" form, getting back:

- ▶ Form ID
- ▶ Skew
- ▶ Orientation
- ▶ Horizontal and vertical Offset
- ▶ Horizontal and vertical Stretch
- ▶ Horizontal and vertical Magnification factor
- ▶ Similarity percentage

This SDK is very useful in every FORMS PROCESSING application, avoiding manual pre-sorting of forms and allowing to get the recognition areas with great accuracy, compensating scanning displacements.



Problem: uncropped, skewed and dark grayscale image



Solution: auto-crop, deskew and dynamic thresholding

## Black Border Removal

The black border removal SDK allows the automatic black border detection and removal in monochrome or grayscale images. The black border is produced in the images acquired by scanners when paper size is smaller than scanning area or in images acquired from microfilm, microfiches and aperture-cards. Removing the border from the images is a very important pre-processing step that improves the compression rate, reducing file size, and the visualization aspect.

Recogniform library allows user to remove black border both in grayscale and in color images. Black border removal can be carried out in two distinct ways: either cropping the images or white colouring the border area. In the first way the image size is reduced to the effective size of paper, in the second way the image size still remains the same and the image is surrounded by a white extra area. The operation is performed in two steps: the border detection and the border elimination using one of the two available strategies.

You can also set the "Black Percentage", a parameter indicating the minimum percentage of black pixels a line has to contain to be considered dark and, potentially, part of the border.

## Deskew

This deskew SDK (API) allows the automatic skew detection and correction in scanned or faxed images. The skew is the inevitable slope present in the images acquired by scanners using an ADF (automatic document feeder) or received by fax. Straightening the images is a very important pre-processing step for improving the compression rate, the visualization aspect, the line-removal and the accuracy using ICR/OCR.

While other libraries usually allow users to deskew only monochrome images, Recogniform library allows you to deskew both grayscale and color images! Using interpolation in skew correction, the aliasing due to the rotation is minimized and really perfect images are obtained (as rotating the paper!).

You can perform the deskew (skew detection and correction) in one-step, or in two distinct steps. You can set the following parameters:

- ▶ Max Angle
- ▶ Resolution
- ▶ Speed and accuracy
- ▶ Background Color
- ▶ Interpolation YES/NO

## IMAGE PROCESSING

Do you need a **READY-TO-USE** solution? Give a look to our **Recogniform Image Processor**, the powerful, reliable, flexible and unlimited all-in-one solution for batch advanced image and document processing.

More info at: [www.recogniform.com/image-processing.htm](http://www.recogniform.com/image-processing.htm)

## ROYALTIES-FREE SDKs

Do you need to distribute your application without paying royalties? **YOU CAN!** Our royalties-free SDKs allow distribution until 1.000 runtimes free of charge.

Need more info? Write us at [info@recogniform.com](mailto:info@recogniform.com)

# Recogniform IMAGE PROCESSING SDKs

## Despeckle

This despeckle SDK (API) allows the removal of speckle in scanned or faxed images. The speckle is the presence of black points of noise in images acquired by a scanner or received by fax.

Cleaning images is a very important preprocessing step to improve the compression rate, the visualization aspect and the accuracy using ICR/OCR.

Despeckle (speckle detection and deletion) can be very easily performed, specifying the maximum width and height of isolated black elements to be considered as speckle. You have obviously to supply a monochrome DIB (Device Independent Bitmap) in input to the process.

## Imaging

This Imaging SDK (API) allows you to work with digital images, supporting the following functions:

- ▶ scan;
- ▶ load;
- ▶ save;
- ▶ display;
- ▶ process;
- ▶ edit.

Images scanning is supported by scanner's standard TWAIN drivers, with or without user interface. When scanning without user interface, you can set color depth, resolution, size, brightness, contrast and enable or disable adf and duplex mode. Also a simple callback method allows you to scan multiple images in one step when automatic document feeder or duplex are enabled!

Image loading and saving feature allows to read/write images from/to disk. The most common file formats are supported as well as several compression standards. You can load and save images from/to BMP, JPG and TIF files. Multipage TIFF files are also supported; available compression schema are: uncompressed, ccitt-g4, ccitt-g3, packbits, deflate, jpeg and lzw (requires Unisys license in some countries). For JPEG files you can also set the quality factor, in order to balance the quality vs compression ratio. Moreover, the last release of Recogniform Imaging library allows you to read/write PDF multi-page files, without installing Acrobat Reader® on your PC!

Image visualization can be done using a sophisticated Scale-To-Gray algorithm that improves visualization of large images in small screen areas. You can set the zoom factor choosing values ranging from 1% to 1000%. Stretching to fit images to display surface is supported, too.

Image processing functionality allows you to invert, rotate by 90/180/270 degrees, flip and mirror images. You can also extract sub-images as required by ICR/OCR or other tools that only need the field to process and not the full image. For each image you have direct access to the DIB memory handle, so there's no need to deal with proprietary memory formats!

Image editing is very flexible because you can use all graphic Windows API (GDI) on your images, as writing on a standard device context. Two functions allow you to get and release the DC on the images, using them as normal draw surfaces! Also you can import/export images as standard bitmaps (HBITMAP and HPALETTE).

This library can be very useful with all other libraries developed by Recogniform Technologies when you have to supply the DIB (Device Independent Bitmap) handle.

## Layout Analysis

Recogniform Layout Analysis SDK allows to analyze the layout of any document using complex algorithms, recognizing the different kind of areas in the page with high accuracy.

Recogniform Layout Analysis SDK identifies the following types of areas:

- ▶ text
- ▶ inverted text
- ▶ noise
- ▶ images (pictures or drawings)
- ▶ tables (rows, columns and cells)
- ▶ horizontal and vertical lines

After the layout analysis recognition, it is possible to operate a sub-classification defining some rules according to the kind of document to analyze.



To get the best result from the analysis, the quality of the image to process needs to be the best quality possible. To help us in this process, we could use some of Recogniform Image Processing libraries, like Deskew, Despeckle and Black border removal and auto-cropping SDKs.

## Image Quality Control and Usability Assurance (Check 21 compliant)

Our software allows to evaluate automatically image quality and usability measuring image quality defects and/or deviations from the ideal perfect image using state of art technical measurements not requiring any human subjective judgments.

Some of common image quality defects are:

- ▶ Undersize image
- ▶ Folded or torn document corners
- ▶ Folded or torn document edges
- ▶ Document framing error
- ▶ Excessive document skew
- ▶ Oversize image
- ▶ Piggyback document
- ▶ Image too light
- ▶ Image too dark
- ▶ Horizontal streaks in the image
- ▶ Carbon strip detection
- ▶ Image out of focus
- ▶ Above max. compressed image size
- ▶ Below min. compressed image size
- ▶ Excessive spot noise in the image
- ▶ Front-rear image dimension mismatch



## TRY & BUY!

Do you want to evaluate before buying? YOU CAN!  
Our SDKs are available for evaluation with sample applications in source code on our website.

RECOGNIFORM TECHNOLOGIES is a private Italian company, leader in high technology image processing and image recognition software.

Constantly providing solutions to many Industry and Services private Companies, Government Agencies and Educational Institutions all over the world, Recogniform Technologies is the only Italian company to develop all the optical recognition engines used in its products.

All Recogniform Reader features are also available as SDK.

Authorized dealer



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