

Recogniform Image Quality Control and Usability Assurance



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 present in the image](#)
- [Below minimum compressed image size](#)
- [Above maximum compressed image size](#)
- [Excessive "spot noise" in the image](#)
- [Front-rear image dimension mismatch](#)
- [Carbon strip detection](#)
- [Image "out of focus"](#)

processing...



The system performs quantitative measures of images attributes (e.g. "image skew") and a qualitative assertion about the presence of a defect (e.g. "excessive document skew") using user-defined thresholding parameters (e.g. "minimum and maximum skew angle allowed") that strike an effective and practical balance between correctly identifying defects that might affect usability (avoiding "escapes") and incorrectly identifying defects that won't affect usability ("false positives").

Once the defect is determined, it will be possible to "repair" the defect without re-scan using Image Processing technique ([deskew](#), [despeckle](#), [black border removal](#), [dynamic thresholding](#), etc.), or by a new scanning action: this last option is strictly necessary when the image lost a portion of its content, as caused by improper positioning/feeding on scanner device.

Some of **possible business impacts of image quality defects** are:

- Missing information due to missing/obscured key data fields.
- Financial losses due to document re-scan (work flow and labor expense impact).
- Negative impact on optical recognition ([OCR](#), [ICR](#), [BCR](#), [MICR E13B](#), [MICR CMC7](#), etc.)
- Esthetic artifacts with the document image that could create issues for image print applications.
- Legibility and usability problems.
- Missing image/document during the image capture process due to under-spaced documents.
- No information on the piggybacked item (item behind).

- Potential losses due to lost information.

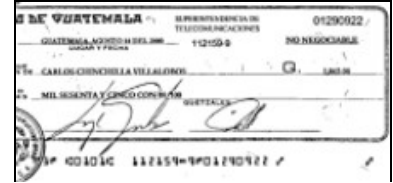
Common Image Defects Overview:

1. Undersize Image

This defect is due to the document image rendition's width or height being below the minimum image size based on the minimum image size and tolerances associated with the image capture platform.

Condition:

- Image width/height < minimum user-defined width/height threshold.



This defect can develop in case of:

- torn document (a significant portion of the original source document is absent);
- folded document (a significant portion of the original source document is folded);
- improperly framed document (the leading or trailing edge of the document has been truncated due to a camera synchronization error during the image capture process).

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2. Folded or Torn Document Corners

This defect is due to the corner of the source document being either missing and/or folded in the document image rendition.

Condition:

- Fold/tear corner width/height > Maximum fold/tear corner width/height threshold.

Independent fold/tear corner width and height thresholds will be defined for each corner of the document, i.e., four separate sets of width and height thresholds.

This defect can develop in case of:

- Folded document corners (a corner of the source document has been folded, causing an area of the document image to be missing and obscured).
- Torn document corners (a missing corner in the source document, resulting in an area of the document image to be missing).



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3. Folded or Torn Document Edges

This defect is due to the edge of the source document being either missing and/or folded in the document image rendition.

Condition:

- Folded/torn edge width > Maximum edge fold/tear width threshold and
- Folded/torn edge height > Maximum edge fold/tear height threshold

Independent folded/torn edge width and height thresholds will be defined for each edge of the document, i.e., four separate sets of width and height thresholds.

This defect can develop in case of torn and/or folded document edge (an edge of the source document has been torn and/or folded, causing an area of the document image to be missing and obscured).



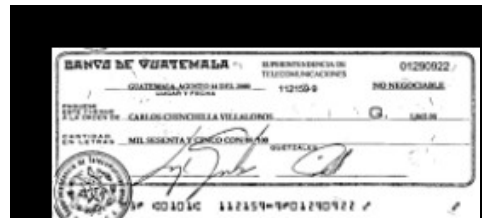
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4. Document Framing Error

This defect is due to the inclusion of additional vertical and/or horizontal scan lines, within the document image, that contain no document pixel data.

Condition:

- Width of additional left/right/top/bottom edge scan lines > Maximum left/right/top/bottom edge over scan threshold



This defect can develop in case of:

- Presence of additional scan lines prior to the left (or prior to the right) edge of the document in the document image.
- Presence of additional scan lines below the bottom (or above the top) edge of the document in the document image.

These conditions can be the result of the image camera system not being able to properly detect the edges of the document during the image capture process.

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5. Excessive Document Skew

This defect is caused by the image document not being in proper alignment with the image camera sensor.

Condition:

- Document Skew Angle < Negative Skew Angle Threshold or
- Document Skew Angle > Positive Skew Angle Threshold



This defect can appear in case of:

- Paper handling problems in the document transport, e.g. document feeder, transport belts/rollers. Documents may not be properly aligned in the transport track, resulting in the document being skewed as it imaged by the camera subsystem.

- Improper alignment of the document on a flatbed scanner. If the document is being imaged using a flatbed scanner, improper alignment of the document on the scanner window will result in a skewed document image.

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6. Oversize Image

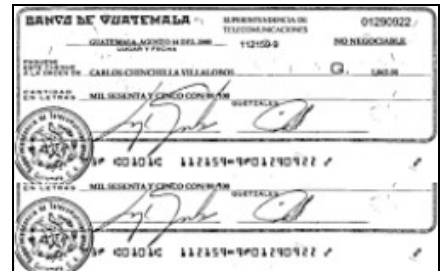
This defect is due to the document image rendition's width or height being above the maximum image size based on a maximum image size and tolerances associated with the image capture platform.

Condition:

- Image width/height > Maximum image width/height threshold

It may verify in case of:

- Overlapped (piggy-backed) documents. An image containing two or more documents that are overlapped as they pass the image camera.
- Under-spaced documents. An image containing two or more documents that are separated by only a small distance (or end-to-end), resulting in two documents being captured as a single image.
- Skewed documents. Excessively skewed documents may cause the maximum image height to be exceeded.



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7. Piggyback Document

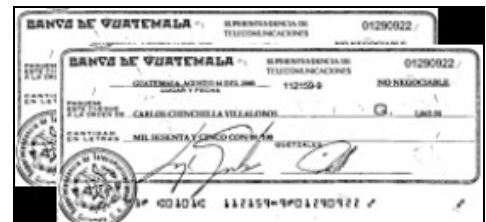
A piggy-back image defect occurs when two or more documents are present and overlapped within the document image.

It may be identified by:

- Document images with more than one document.
- Detected multiple document heights within the document image.

This defect is generally due to:

- Poor document quality.
- Poor document work preparation/sorting.
- Mechanical handling and control problems within the document transport feeder or track.



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8. Image Too Light

For a bi-tonal image, the defect is due to an insufficient number of "black" pixels.

For a gray level image, the defect is due to high "brightness" and low "contrast".

Condition for Bi-tonal Images:

- Percentage of black pixels < Minimum percentage of black pixels threshold.



Condition for Gray Level and Color Images:

- % Average Brightness > Maximum percent brightness threshold and
- % Average Contrast < Minimum percent contrast threshold

This defect can be due to one or more of the following problems:

- Poor printing/writing contrast on the source document.
- Improper thresholding of the document background.
- Illumination problems with the image capture subsystem.
- Image camera calibration problems.

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9. Image Too Dark

For a bi-tonal image, this defect is due to the image having too many "black" pixels.

For a gray level image, this defect is due to the image having insufficient "brightness".

Condition for Bi-tonal Images:

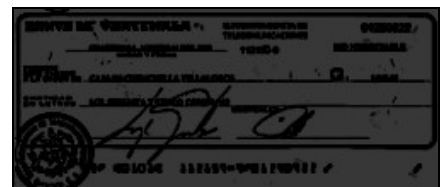
- % of black pixels > Maximum % of Black Pixels Threshold.

Condition for Gray Level and Color Images:

- % Average Brightness < Minimum % Brightness Threshold

This defect could be an indicator of one of the following problems:

- Excessive printing/writing on the source document.
- Improper thresholding of the document background.
- Large amounts of black pixel "noise" present in the image.
- Illumination problems with the image capture subsystem.
- Image camera calibration problems.



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10. Horizontal Streaks Present in the Image

A defect due to the image containing one or more "dark" (for all images) or "light" (for gray level and color images) horizontal streaks that extend horizontally across the majority of the entire document image.

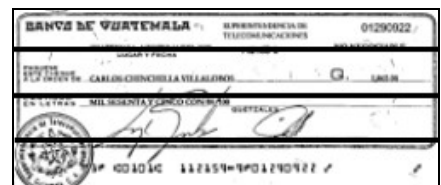
Condition for Bi-tonal Images:

- Largest black streak height > Maximum Black Streak Height Threshold
- Number of black streaks > Maximum Black Streak Count Threshold

Condition for Gray Level and Color Images:

- Largest gray level streak height > Maximum Gray Level Streak Height Threshold
- Number of gray level streaks > Maximum Gray Level Streak Count Threshold

Dark streaks can be caused by a number of factors during the image capture process. Possible sources of dark streaks include the following:



- Dirt and/or ink that can adhere to either the image capture scan window or camera lens commonly present in most high, medium or low-speed document transport imaging systems.
- A scratch or irregularity present on the image scan window or camera lens – top or bottom.
- Dirt or debris on camera calibration targets, i.e., white reference targets.
- Failure of the image camera CCD sensor or electronics.

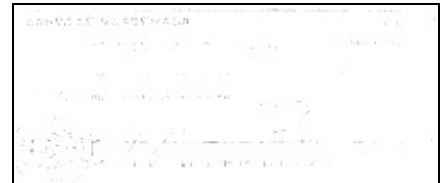
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11. Below Minimum Compressed Image Size

The compressed image size is too low.

Condition for bi-tonal images:

- Compressed Image Size < Minimum Bi-tonal Compressed Image Size Threshold



Condition for gray level and color images:

- Compressed Image Size < Minimum Gray Level Compressed Image Size Threshold

Minimum compressed image size thresholds will be independently established for the front and rear image of the document and will be dependent on the image compression method utilized.

This defect could be an indicator of one of the following problems:

- Improper suppression (thresholding) of the document background.
- Image camera calibration problems.
- Inappropriate compression parameters/settings, yielding an image with a high level of distortion.
- A white document with very little writing or printing, e.g., the rear of a page with a small endorsement.

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12. Above Maximum Compressed Image Size

The compressed image size is too high.

Condition for bi-tonal images:

Compressed Image Size > Maximum Bi-tonal Compressed Image Size Threshold



Condition for gray level and color images:

Compressed Image Size > Maximum Gray Level Compressed Image Size Threshold

Maximum compressed image size thresholds will be independently established for the front and rear image of the document and will be dependent on the image compression method utilized.

A large compressed image packet size is generally an indicator of an image with a high information content, e.g., lots of writing or printing or high contrast background patterns.

In the case of a bi-tonal image rendition, a large compressed image packet size occurs when the image contains a lot of black/white pixel transitions. This could be an indicator that the bi-tonal image has the following attributes:

- a significant amount of image "noise" present in the image;
- a large amount of written/printed data present in the image;

- a significant amount of the image background pattern/scene has been retained during the creation of the bi-tonal rendition.

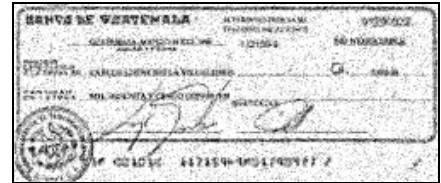
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13. Excessive "Spot Noise" in the Image

Spot noise is an image defect due to image containing "excessive occurrences" (greater than some defined count) of "spot noise" (isolated dark small pixel groups).

Condition:

- Average spot noise count per 1 sq.inch area > Maximum spot noise count threshold.



Noise can be caused by one or more of factors:

- The scanned document may have a "cluttered" background such as a complex high contrast image. When imaged and thresholded, this type of background can result in many small dark regions or noise.
- Noise can result from a document that has very low contrast. In this case the threshold algorithm may produce many isolated dark regions as it struggles to differentiate between what is dark and what is bright. This can happen if the original grayscale image is bright or dark.
- Low contrast and subsequent noise can also occur if there is a problem with the scanning system such as improper illumination.
- Noise could be the result of physical defects on the document being scanned.
- The surface of an item may contain actual dark regions resulting from dirt or other contaminants that will result in a noisy image.

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14. Front-Rear Image Dimension Mismatch

This type of defect indicates that the image height and width do not match between the front and rear images of the source document.

Condition:

Absolute value of the image width/height difference > Maximum image width/height difference.

This defect may verify in case of:

- The front image of document "n" being matched up with the rear image of document "n-1".
- Differences in document framing for the front and rear image renditions of the document.



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15. Carbon Strip Detected (cheques only)

A defect due to the presence of a "carbonized band", that typically extends from the leading edge to trailing edge on the rear of the image, that can potentially interfere with the legibility of endorsements.



Condition:

- A black band is present on the rear of the document image that meets the size and location requirements for a carbonized band.
- The black band height exceeds the Minimum Carbon Strip Height parameter setting.

This defect is generally due to:

- Presence of a carbon strip printed on the rear of the image that facilitates the transfer of information from the image to another document.
- Continued use of carbon has been driven by customer preference for the higher transfer capability and readability it provides.

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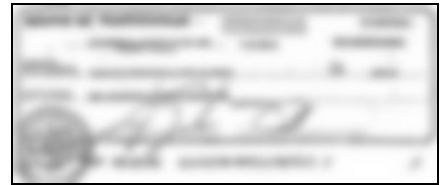
16. Image "Out of Focus"

An image defect due to the image camera subsystem being "out of focus" resulting in blurred image renditions of the document.

Condition: Image Focus Score < Minimum Focus Threshold

This defect is generally due to:

- A change in the image camera's optical-mechanical settings.
- Imaging of a document that is not positioned within the image camera's "depth of focus".



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Price & Ordering Info

For price and ordering information please [contact us](#).

Evaluation Version

Recogniform Image Quality Control and Usability Assurance system is available as SDK for integration in own application or as full ready-to-use batch processing application.

Please [contact us](#) to get an evaluation version.

More Info

If you need further information about this product, please use the [contacts page](#).