D2I Upgradation Using Binarization Technique

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Abstract — *A challenging task that arises due to the high inter/intra variation between the document background and the foreground text of different document images is eliminated in this paper. We used a document image binarization technique that addresses the issues of Segmentation of text from badly degraded document images by using adaptive image contrast. The adaptive image contrast is a combination of the local image contrast and the local image gradient that is tolerant to text and background variation caused by different types of document degradations. An adaptive contrast map is first designed for degraded document image input, in this proposed technique. The contrast map is then binarized and merged with Canny edge map to identify the text stroke edge pixels. The document text is then segmented by a local threshold that is estimated based on the intensities of detected text stroke edge pixels within a local window.*

***Key Words*: Thresholding, Binarization, Optical Character Recognition, Canny Edge Detection**

1. INTRODUCTION

To analyze the document, its image is binarized before processing it. Image binarizing means segmenting the document background & the foreground text. For confirming document image processing task an accurate document image binarization technique should be used. After studies in document image binarization for years, the thresholding of degraded document images is still found to be a challenging task due to the high inter/intra variation between the text stroke and the background of the document across various document images. The stroke width, stroke brightness, stroke connection, and document background differ in handwritten text within the degraded documents. Moreover, bleed through degradation is observed in historical documents by a variety of imaging outputs. For most of the current techniques many kinds of document degradations, it is still an unsolved problem of degraded document image binarization due to the document thresholding error.

The method can handle different degraded document images with least number of parameters, making it simple & robust. It uses the adaptive image contrast which is a combination of local image contrast & local image gradient. Thus it is capable of bearing the text & background variation induced by different types of document degradation.

In the preprocessing stage for document analysis, image Binarization is performed and its aim is to segment the foreground text from the background of the document. A quick and correct document image binarization technique is necessary for the ensuing document image processing tasks such as optical character recognition (OCR). Binarization is a process where each pixel in an image is converted into one bit and based on the mean value of all the pixel you assign the value as '1' or '0'. If greater then mean value then it's 1' otherwise it's 0'. A binary image is a digital image that has only two values for each pixel. Usually, the two colors used for a binary image are black and white so any two colors can be used. The color refers to the object(s) in the image is the foreground color while the remaining image is the background color. In the document scanning industry, this is often mentioned as bi-tonal.

2. RELATED WORKS

Author S. vishnupriya, P.Saranya, E.Elangovan from IEEE concluded that the extraction of text from badly degraded image document is a very challenging task due to the variation in the foreground and background text of various document images. The proposed system tackles this problem by the combination of several state-of-the-art binarization methodologies as well as on the efficient incorporation of the edge information of the grey scale source image. Given a degraded document image an adaptive contrast map is first constructed. The contrast map is then binarized and combined with Canny edge map to identify the text stroke edge pixels. The document text is further extracted using globally matched wavelet filters. Finally, Fisher classifier is used for improving the result of image segmentation. The approach is simple, robust and applicable to images of typewritten text as well as handwritten text or a mixture of both.

Author Mrs. Preeti Kale, Prof. G.M. Phade, Prof. Pravin A. Dhulekar, Dr. S.T. Gandhe worked on "Enhancement of old images and documents by Digital Image Processing Techniques" from IEEE referenced that documents can be a valuable source of information but often they suffer degradation problems, especially in the case of historical documents, such as strains, the background of big variations and uneven illumination, ink seepage, etc. Binarization techniques should be applied to remove the noise and improve the quality of the documents. Collections of historical and old document images care commonly provided to the public through digital libraries. Specialized processing is required to these document

images for removing background noise in order to become more legible. A hybrid binarization approach is proposed in this paper for improving the quality of the old documents. Combination of global and local thresholding techniques are used for the same. Initially, a technique named global thresholding is applied to the whole image. The image area that still has background noise is detected and the technique is again re-applied to each area separately. Therefore, a better adaptability is achieved for the algorithm where various kinds of noise re-exist in different areas of the same image. The advantage of applying global thresholding is that it avoids the computational and time cost of applying a local thresholding in the entire image. Hence it is indicated that this technique is pretty effective in removing background noise and improving the quality of degraded images.

Author Landu Jiang, Kai Chen, Shibo Yan, Yi Zhou Haibing Guan worked on "Adaptive Binarization for Degraded Document Images" referred that various types of degradations such as uneven illumination, shadows, low contrast, smears and heavy noise densities often make thresholding of the document images a difficult job. In this paper, we describe a new adaptive approach for degraded-document binarization. We use the dilation and erosion in grey-scale image processing; as result get a new image in which the shadow levels and noise densities will be greatly reduced. After that, we design the binarization technique combined the method which improved Niblack and the local thresholding using the small neighborhood which influenced the mean value of the areas.

Author Bolan Su, Shijian Lu, and Chew Lim Tan, Senior Member worked on "Robust Document Image Binarization Technique for Degraded Document Images" from IEEE concluded that a Segmentation of text from badly degraded document images is a very challenging task due to the high inter/intra-variation between the document background and the foreground text of different document images. In this paper, we propose a novel document image binarization technique that addresses these issues by using adaptive image contrast. The adaptive image contrast is a combination of the local image contrast and the local image gradient that is tolerant to text and background variation caused by different types of document degradations. In the proposed technique, an adaptive contrast map is first constructed for an input degraded document image. The contrast map is then binarized and combined with Canny edge map to identify the text stroke edge pixels. The document text is further segmented by a local threshold that is estimated based on the intensities of detected text stroke edge pixels within a local window. The proposed method is simple, robust, and involves minimum parameter tuning. It has been tested on three public datasets that are used in the recent document image binarization contest (DIBCO) 2009 & 2011 and handwritten-DIBCO 2010 and achieves accuracies of 93.5%, 87.8%, and 92.03%, respectively, is significantly

higher than or close to that of the best-performing methods reported in the three contests.

3. IMPLEMENTATION

GRAY SCALE CONVERSION

The luminance of a pixel value of a grayscale image ranges from 0 to 255. The conversion of a color image into a grayscale image is converting the RGB values (24 bit) into grayscale value (8 bit). Various image processing techniques and software applications convert color image to grayscale image.

CONTRAST IMAGE CONSTRUCTION

Contrast image construction detects the stroke edge pixels of the document text properly. The constructed contrast image has a clear bi-modal pattern. It can be used to detect the text stroke edges of the document images effectively that have a uniform document background. On the other hand, it often detects many non stroke edges from the background of the degraded document that often contains certain image variations. To extract only the stroke edges properly, the image gradient needs to be normalized to compensate the image variation within the document background.

EDGE DETECTION

To gray scale region in each block i.e. Object & background. Segmentation of an image by classifying.

 A) Background pixels with grayscale values greater than the threshold.

 B) All other pixels is called object pixels.

Deciding whether the pixel belongs to object or background. The structural operator of size 3*3 or 5*5 pixels. Division of image into hundreds of blocks. Considering this variance of grayscale values of pixels in a block, the edge in that block is obtained.

POST PROCESSING

To further improve quality of Image
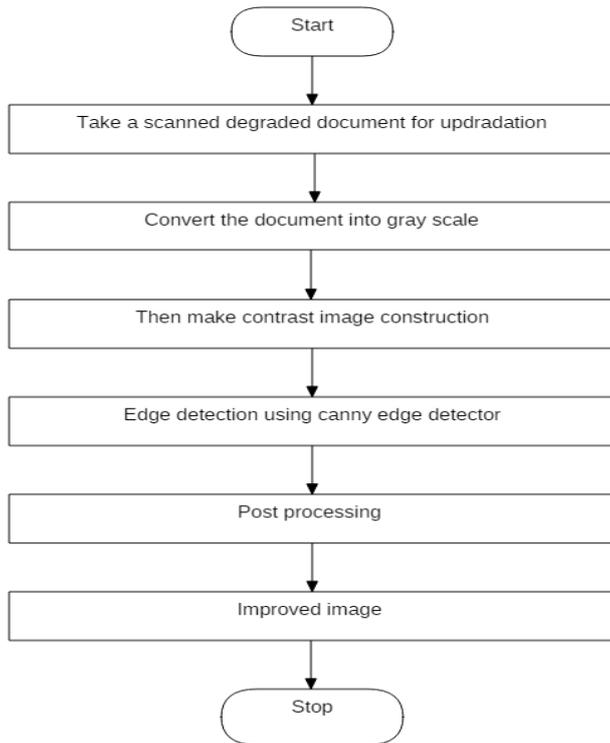
Input-Output of the previous algorithm

Output – Final Improved Image
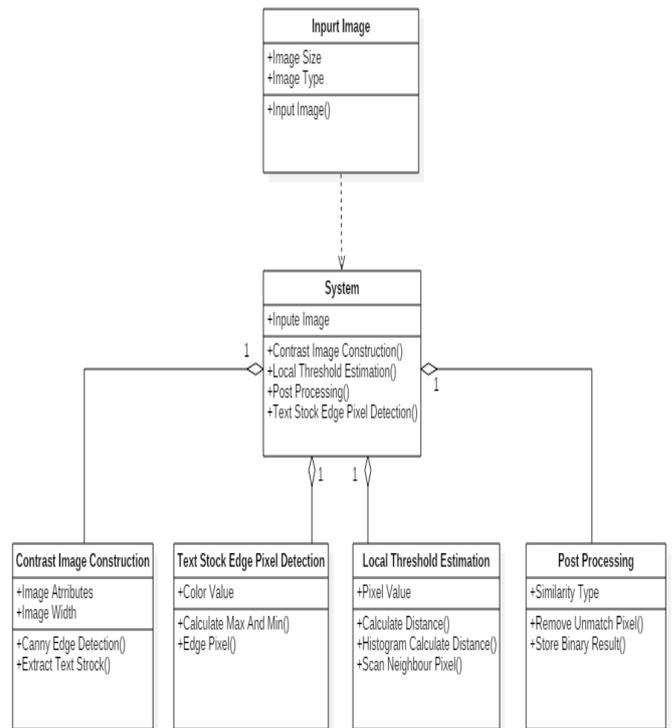
Algorithm:-

- Find all connected components, remove others.
- For each reaming pixel get its neighborhood pixel
- If original pixel = neighborhood pixel
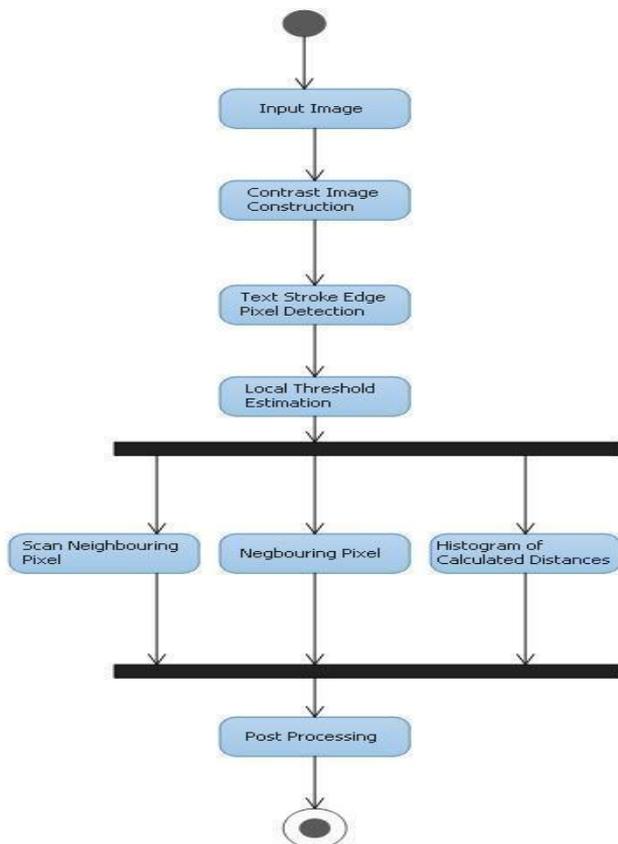- Make it as foreground otherwise background.

DIAGRAMS

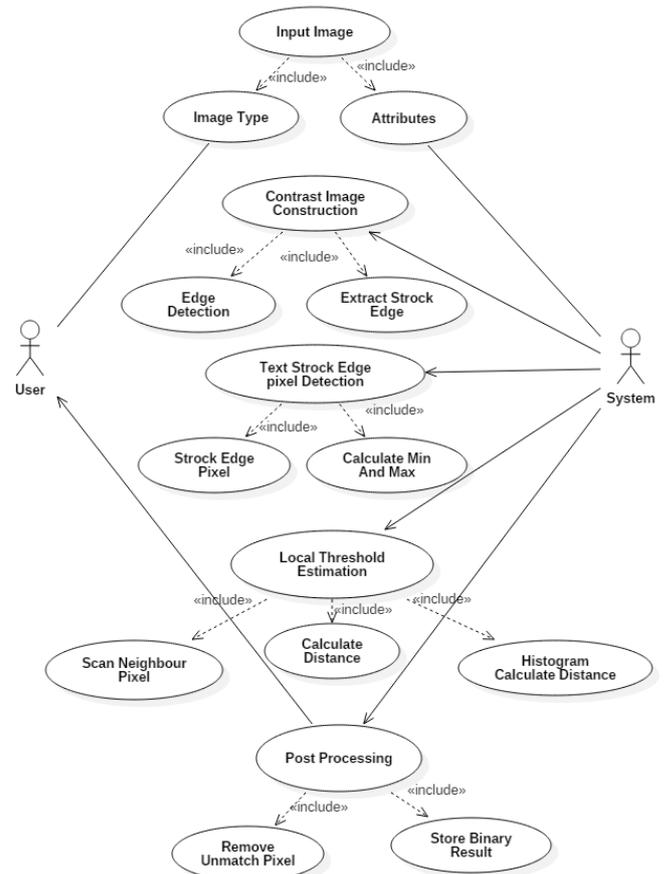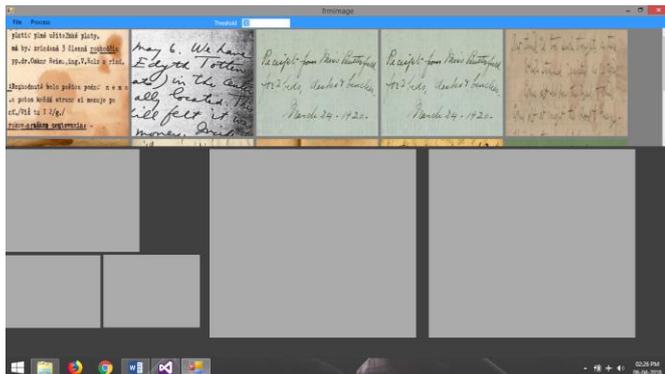### FLOW CHART

ACTIVITY DIAGRAM

CLASS DIAGRAM

USE CASE DIAGRAM

4. RESULTS

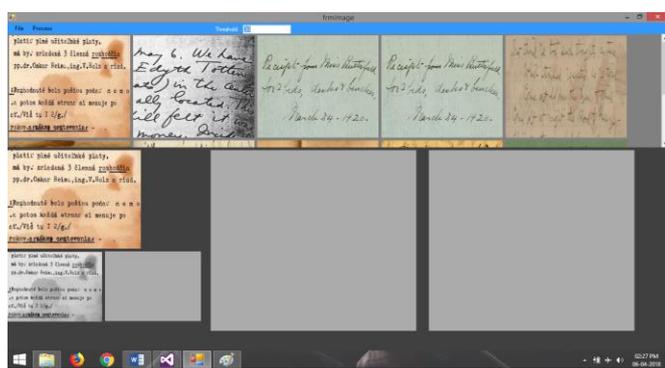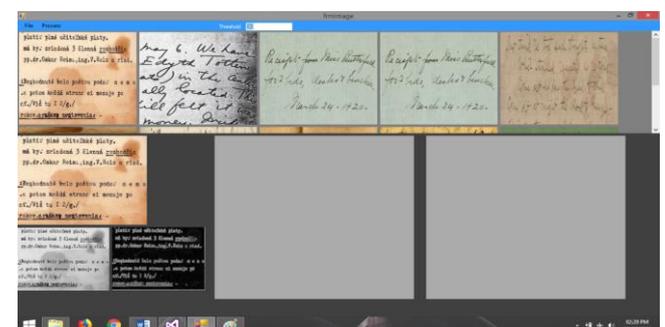### After Selecting the Folder
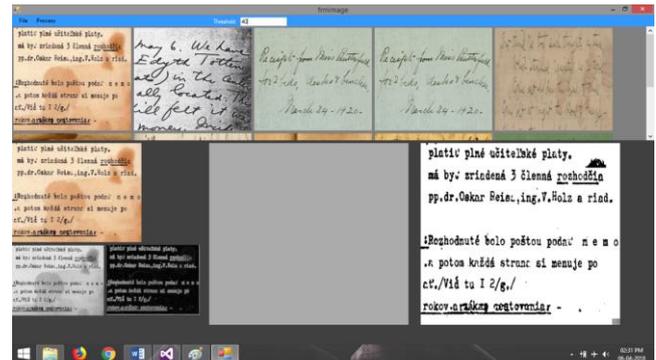

After selecting the image

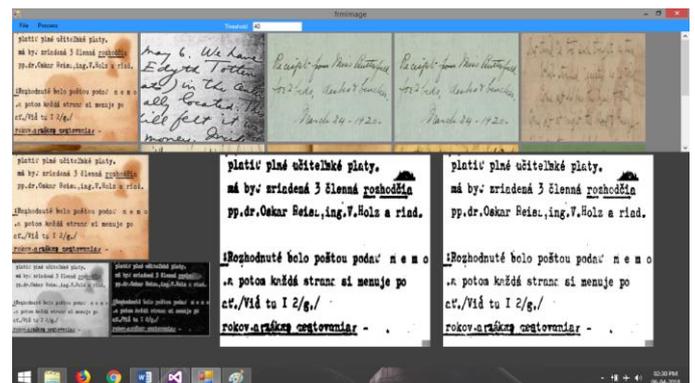
The output of Grayscale

The output of Contrast image Construction

The output of the Canny edge detection

The output of post-processing

5. CONCLUSIONS

It provides an adaptive image contrast based document image binarization technique that is liberal to various document degradation such as uneven radiance and document smear. The proposed technique is simple and robust, only a few parameters are involved. Besides, it works for different kinds of degraded document images. This makes the use of local image contrast that is evaluated based on the local maximum and minimum threshold.

REFERENCES

[1] S. vishnupriya, P.Saranya, E.Elangovan, "A Novel Approach for Document Image Binarization" IEEE, (2015).

[2] Mrs. Preeti Kale, Prof. G.M. Phade, Prof. Pravin A. Dhulekar, Dr. S.T. Gandhe "Enhancement of old images and documents by Digital Image Processing Techniques" IEEE (2017).

[3] Landu Jiang, Kai Chen, Shibo Yan, Yi Zhou Haibing Guan "Adaptive Binarization for Degraded Document Images" IEEE (2009).

[4] Bolan Su, Shijian Lu, and Chew Lim Tan, Senior Member "Robust Document Image Binarization Technique for Degraded Document Images" IEEE, (2013).

[5] B. Gatos, I. Pratikakis and S.J. Perantonis "Improved Document Image Binarization by Using a Combination of Multiple Binarization Techniques and Adapted Edge Information" IEEE (2009).

[6] Hojin Cho, Myungchul Sung, Bongjin Jun "Canny Text Detector: Fast and Robust Scene Text Localization Algorithm" IEEE (2016)

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