

A STUDY ON IMAGE BINARIZATION OF TEXT DOCUMENTS USING DIFFERENT THRESHOLDING METHODS

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Abstract- Document image binarization is performed to fragment closer view content from foundation message in gravely debased documents. The strategy for division in the image binarization system is the real method utilized for the detachment of pixel esteems into double accumulations, dark as closer view and white as foundation. The corrupted images of a document are portioned by utilizing the image binarization method keeping in mind the end goal to secure the reasonable images correct to that of the first images of documents. In this paper, an extensive review has been led on some officially existing papers.

Keywords-segmentation, document image binarization, degraded document image, image contrast.

1. INTRODUCTION

Document image binarization is performed in the preprocessing stage for archive examination. It means to portion forefront content from the foundation content. Recorded documents experience the ill effects of seep through impact where the ink from the opposite side leaks through the front. An document image having an intricate foundation and an archive having little power variety inside the document foundation yet extensive force variety inside the content strokes.

A definitive point of document image binarization, as the name proposes, is to change over the document image into an image with only 2 hues to such an extent that the frontal area content pixels are dark and the foundation is white or the other way around. Despite the fact that it is just required to limit the archive images, because of different reasons this has not been a simple assignment. The reason incorporate uncalled for light, shading because of maturing, between intra force varieties in content pixels and foundation, leak through, blurred ink and decent variety in the kind of record to be handled.

2. THRESHOLDING METHODS

Numerous procedures have been created for document image binarization. As we realize that many debased documents don't have an unmistakable example and it might be in an awful condition. Thresholding alone isn't a decent approach for the corrupted record binarization. Versatile thresholding, which appraises a neighborhood edge for each archive image pixel, is for the most part a best way to deal with manage distinctive varieties inside debased document images.

2.1 Niblack's Method

Niblack [8] is a nearby thresholding technique. In neighborhood thresholding techniques, an alternate edge esteem is computed for every single pixel. It utilizes neighborhood insights of the image, for example, difference, range to ascertain the edge. In Niblack technique a rectangular window is slid over the dim scale image to assess limit of the pixels. It utilizes the neighborhood measurements mean and standard deviation of the window to gauge the limit. Edge $T(i,j)$ is evaluated as appeared in Eq. 2

$$T(i,j) = \mu + k \times \sigma \quad (2)$$

In Eq.2 μ speaks to the mean of the window and σ speaks to the standard deviation of the window. The estimation of k is a consistent and it characterizes the size and nature of binarization. As this technique is reliant upon the neighborhood highlights of the image, it gets influenced by clear ranges in the image and is likewise not productive for the images with foundation clamor.

2.2 Sauvola Method

Sauvola technique [9] is the change of the Niblack strategy. It is nearby fluctuation technique that utilizes standard deviation. Limit is figured as appeared in Eq. 3

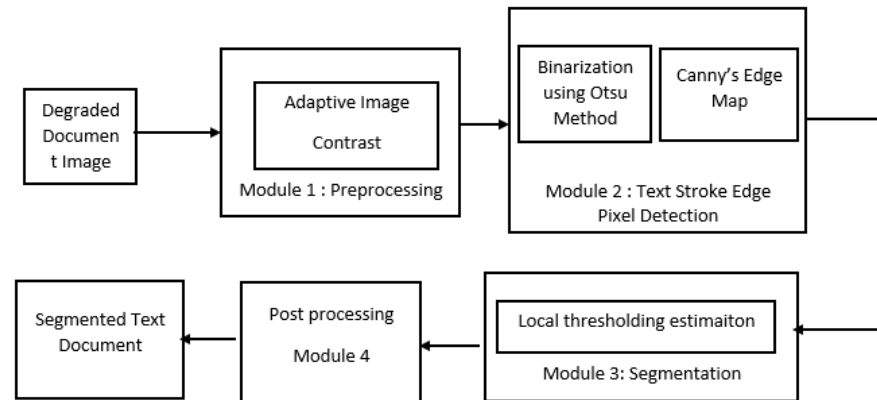
$$T(i,j) = \mu \times [1 + k \sigma / R - 1] \quad (3)$$

In Eq. 3 μ is the mean and σ is the standard deviation of the window. Qualities recommended for k and R are 0.5 and 128. The window size and estimation of k will influence the nature of image however R will have next to no effect. This technique is utilized for archives having uneven enlightenment, light surface and recolored documents. Yet, Sauvola technique diminishes the content after its application.

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2.3 Implemented by Supriya Lokhande and N.A.Dawande,Ami shows the block diagram of the proposed system.



Block diagram of the proposed system

The proposed system consists of four modules:-

1. *Preprocessing Module:*

In this module the adaptive image contrast is calculated with the help of below equation,

$$C(i,j)=\alpha C(i,j)+(1-\alpha)(I_{\max}(i,j)-I_{\min}(i,j))$$

2. *Text Stroke Edge Detection Module:*

In the text stroke edge detection module the textstroke edge pixel candidates are detected by using Otsu method and Canny's edge detection algorithm.

3. *Segmentation Module:*

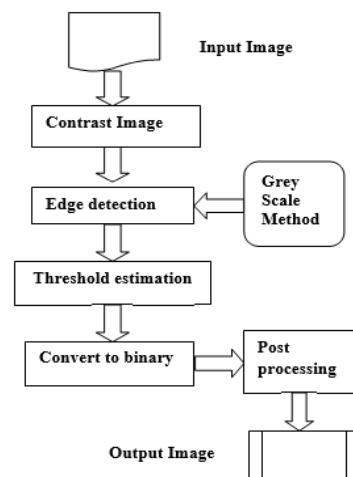
In this the local threshold has been detected using Local Threshold Estimation algorithm.

4. *Post Processing Module:*

Finally, the restored image is produced using the post processing algorithm.

2.4 Proposed by Yogita Kakad and Savita Bhosale

As we saw over, the technique have a few drawbacks. To overcome these drawbacks the system uses new binarization technique along with grey scale method.



There four modules in this system

To identify the correct content stroke it is extremely important to modify the level of differentiation in the image. In this module we are keeping the image differentiate at min or max level. It is depend upon how much the frontal area content is blended with foundation commotion in the image. Here they transform the current level of image differentiate i.e. here they are turning around the shade of the image. The differentiated image is further match with dark scale technique yield image.

Which further will deliver the diagram of the pixel around the closer view content. These pixels at that point partitioned into two classes. In the first place classification is connected pixels and non-related pixels. Associated pixels involves the zone around content stroke. What's more, non-related pixels demonstrates the other boisterous zone introduce in the image. The edge recognized image is then changed over into paired arrangement of 0's and 1's. 0 shows that the image pixels are non-associated pixels and 1 demonstrate that image pixels are associated pixels and the speaks to the content strokes. The pixel 0's are killed from the preparing image in light of the fact that they are a piece of foundation image. Yield of the binarization strategy makes partition in the image. So post handling wipes out the non-strokes image from paired image. What's more, it restores a reasonable picture which comprise of as it were content real strokes. Presently this created image is when contrast and info image, at that point we can without much of a stretch make sense of the essentialness of our framework. Yield image contain clean and decipherable content.

3. PERFORMANCE EVALUATION

The performance evaluation of DIBCO techniques:

- Niblack's and Bernsen's strategy produces extraordinary measure of foundation commotion.
- Sauvola's strategy defeats the foundation clamor issues yet creates diminished and broken characters. In factor differentiate image it regularly does not catch closer view pixels in low difference locales.
- Niblack: It has lowest (ninth) rank, F-measure and PSNR. It has sixth and eight rank achieved F-measure: 37.400, 40.320, and PSNR: 5.271, 4.979 respectively
- Sauvola: Sauvola's method has eighth rank among all the methods on the basis of F-measure (52.441) and PSNR (12.039). It has fourth and sixth rank achieved Fmeasure: 56.790, 40.320, and PSNR: 20.291, 12.576, respectively.

4. EVALUATION MEASURES

The evaluation measures of degraded document images are given in the below table,

Method	Time (sec)	F measure (%)	PSNR (dB)	NRM ($\times 10^{10}$)	IND
Niblack	0.02650	43.356	6.321	16.480	0.204
Sauvola	1.67060	52.441	12.039	32.229	0.355

5. CONCLUSION

This paper shows a review of document image binarization blend structure that enhances the execution of detailed archive image binarization strategies. The given system separates the image pixels into three classes in view of the binary results of given document binarization strategies. Every one of the pixels are then anticipated into a component space. The pixels in frontal area and foundation sets can be seen as effectively named tests, and used to decide the name of those dubious pixels. A classifier is then connected to iteratively order those questionable pixels into frontal area and foundation.

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