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Enhancing Handwritten Document Images Using Fuzzy Logic

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Abstract: ***The identification of handwritten letter taken by mobile phone, Camera (or) scanned images become one of the prominent area in research. In some cases such process may not good and produce poorly scanned text or text photo images, leads to an unreliable form. Majority of paper forms are filled by hands. Make the letters in clear view is one of the challenging area in Image Processing. Documents and files that were once stored physically on paper are now being converted into computerized form in order to facilitate faster additions, searches, and modifications, as well as to prevent the life of such records. Because of this, there is a great demand for software, which automatically extracts, analyze, recognize and store information from physical documents for later use. The handwritten document software capture was not possible for several years as the technology for such purpose did not exit. The main aim of this paper is to study and evaluate the different technique used for enhancing the letters in documents***
Keywords: Document, segmentation, gray_scale

I. INTRODUCTION

Document Image Enhancement is one of the interesting area in research. Image plays a vital role in many fields such as medical, remote sensing, forensic, identifying letters in handwritten document and even in real life photograph. But most of the time the images are not clear and good due to the inadequate lighting, shaken while taking photos, shutter speed of camera, etc. Therefore, camera-captured document images need preprocessing steps like binarization, skew detection, perspective distortion removal and text line detection for dewarping so that traditional document image processing steps can be applied on them. Segmentation is the process of partitioning a digital text image into multiple segments. The goal of segmentation is to simplify or change the representation of an image into something that is more meaningful and easier to analyze. It will be divided in to three parts as for the segmentation of the text, Line segmentation, Word segmentation, Character segmentation. Segmenting the letters from such image is a challenging one.

II. RELATED WORKS

In this paper [9] Document processing algorithms improve upon the generic methods by incorporating document specific degradation models and text specific content models. Approaches that deal with highly degraded documents take a more focused approach by modeling specific types of degradations. The algorithms used in past few years were Ni - blacks algorithm, canny edge map algorithm, OTSU method, Back ground estimation, dynamic thresholding and image binarization etc. The results obtained by the previously implemented algorithms were not sufficient. So, in this thesis work three filters are proposed to improve the quality of degraded documents.

A. Filter

Median Filter

1) Advantage: The document restoration is to remove some of these artifacts and recover an image

2) Drawback: In our problem is to minimize the mean-square value of the error signal

In this paper [2] Marginal noises are dark shadows that appear in vertical or horizontal margins of an image. This type of noise is the result of scanning thick documents or the borders of pages in books; it can be textual or non-textual. The proposed method reduces the resolution of the image, splits it into blocks and detects blocks that contain noise based on the three assumptions of shape, length and position. The technique performs fairly well to remove the marginal noise only without attached text, but assumptions cause some limitations in detecting all types of clutter noise in an image.

3) Advantage: The reduces the resolution of the imag

4) Drawback: Block splitting to find possible local boundaries between connected block

5) Algorithm: Genetic Algorithm

In this paper [4] the proposed algorithms that address the above-mentioned processing stages come mainly from the fields of image processing, computer vision, machine learning and pattern recognition. Actually, some of these algorithms are very effective in processing machine printed document images and therefore they have been incorporated in the workflows of well-known OCR systems. A horizontal and vertical projection algorithm is used to segment the document into a number of patches, with the nilaback Sauvola's and wolfs binarization with the linear Otsu thresholding for filter. The scan line method is used for the skew detection and correction with adaptive histogram algorithm for image enhancement. Various Printed and handwritten text document are scan for the different preprocessing methods. In the binarization various different algorithms are explain and used the best nilback algorithm.

6) Advantage: It should be confirmed quickly and accurately to improve the accuracy of collection and entry for document

7) Drawback: The projection profile peak times will be longer In this paper [8] Old manuscripts are hand written document which contain important information about a person, place, or event. The old historical images are of great importance for preserving our history, culture or valuable happening. Old manuscript is the sole connection for one to better understand what indeed happened before. Old images get damaged due to poor paper quality, ink expand, presence of noise, background damage due to varying contrast and due to storage condition and other element disruption. The process of improving degraded images is difficult task due to foreground and background variation. Hence customized technique would be required to enhance the old manuscripts.

8) Advantage: The generalization abilities of the MLP

III. GAPS IN LITERATURE

Majority of paper forms are filled by hand. Software works well only on forms with constrained boxes that have a single letter in each box on the form. In cases like paragraph, quotes, checks where the dictionary of terms falls only into numbers, there is a much higher chance of handwritten images improvement in successful manner.

VI. PROPOSED METHODOLOGY

In proposed method, the camera grabbed or scanned images taken as a input image in resized format. It converts the RGB image into gray scale image, for reducing the space size of the image. Gray scale image have many gray shades the background is dominating the letters in the image. Avoiding such problem by convert the gray scale image into fuzzy form, filters are used to remove noise and enhance the contrast level. Fuzzy image is divided into several blocks/frames and using detector unwanted blocks are removed and all other blocks/frames get join, until the process to get accurate result. Finally compare the original and fuzzy enhanced image.

V. CONCLUSION

The main goal of this paper is to presents a fuzzy method for image enhancement. In each technique there are some pros and cons presented. Image enhancement are used to provide better inputs for other automated image processing technique and applied in many fields for example like medical labs, colleges, offices etc. Now a day mobile phones plays a vital role in human's life. If any damage occurs for a image then use the above methodology to detect. Although the method for image enhancement based on fuzzy logic is sufficient but in future efficient methods can be develop for image enhancement which can give more accurate result.

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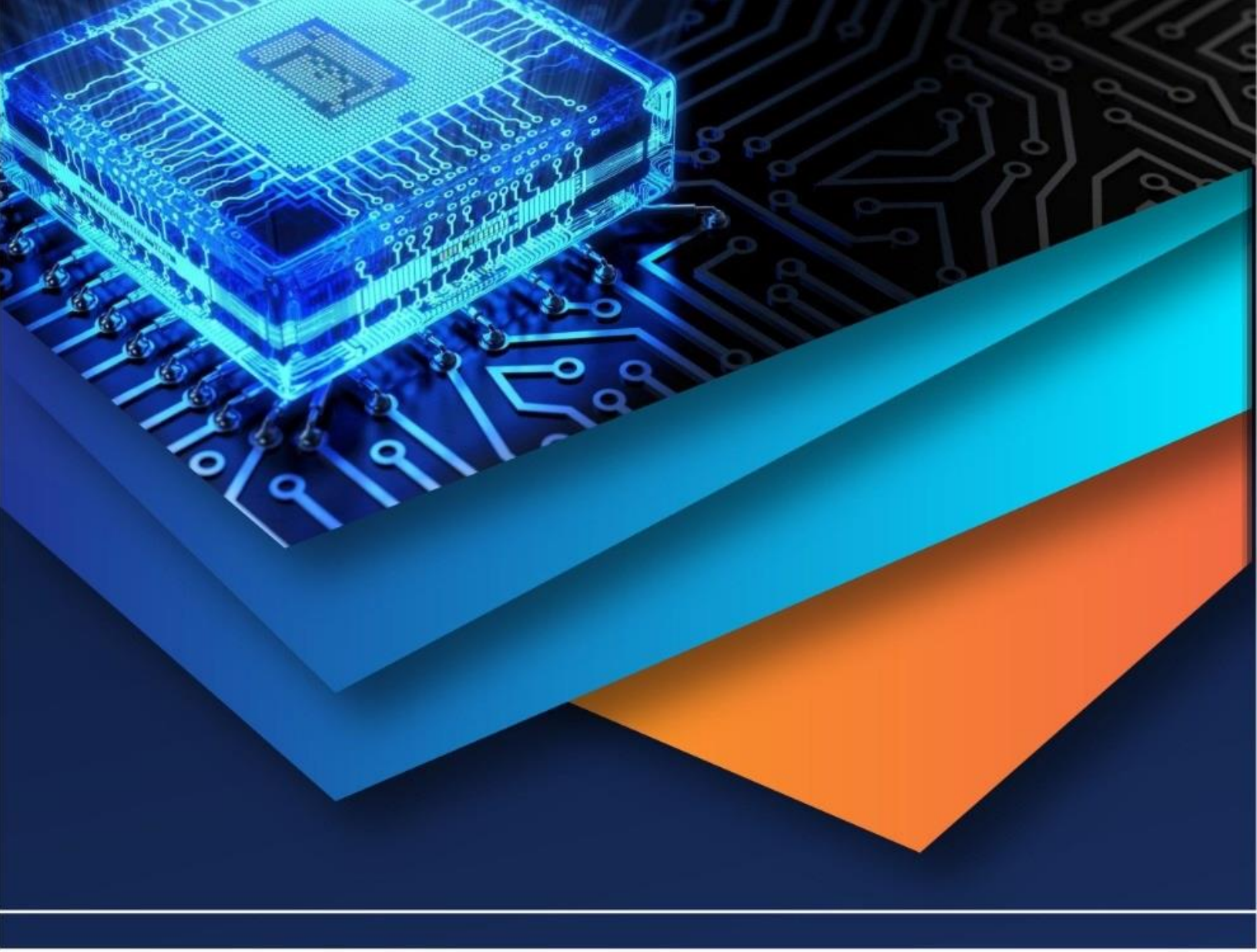

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