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A REVIEW PAPER ON TEXT EXTRACTION FROM TEXTURED IMAGE USING THRESHOLD IMAGE SEGMENTATION

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Abstract: Text extraction is very important in the field of security and data collection from the image. It has a wide range of applications, such as license plate recognition, collecting details from government identity cards, satellite image data, remote sensing, and medical image. For a wide range of applications, it is required that the data collected must be correct, easily understandable, and takes less time to retrieve, yet require less computation. The text extraction in carried out by the process of image segmentation. Among various methods, the most simple and fast method is threshold segmentation method. It is carried out with the assumption that the range of intensity level covered by the text or the object of interest is different from the background. A global thresholding algorithm is performed to extract text from the image.

I INTRODUCTION:

Data is very important in today's world. It is important to collect information from everywhere and then utilize this, to provide customized experience to the users. In this context, the important task is to extract text from the image. It becomes more challenging with the textured background images. The main applications of text extraction are optical character recognition (OCR), license plate detection, road sign detection in autonomous driving, building text reorganization, location identification, automatic vehicle parking, enhancing security systems, aiding the blind and visually impaired individuals and many more. The text extraction is carried out through image segmentation processes. The global threshold segmentation method is used to extract text from the images. In this method, a threshold value of pixels intensity, generally the average value of threshold 'T' is considered. This value is the average of minimum and maximum intensity in the image. Thresholding helps in eliminating the unwanted data and background from the image.

The two most important parameters involved in text extraction are 'Text Pre-Processing' and 'Text Recognition'.

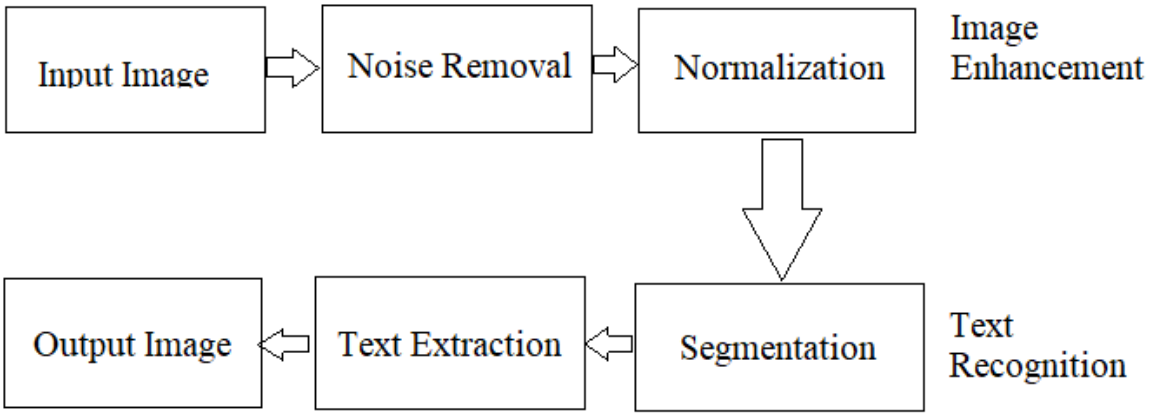


Figure 1.1 Processes in Text Recognition

. The goal of text recognition is to accurately identify and interpret the textual content within an image or document, enabling various applications such as data extraction, information retrieval, language translation, document digitization, and text-to-speech synthesis. Pre-processing is the initial phase in handling scanned images, where various checks and modifications are performed. The scanned image is examined for potential issues like noise, skew, and incline. To address this, the image is first converted to grayscale and then transformed into a binary image. Once pre-processing is complete and the noise is removed, the image is passed to the segmentation stage. In this stage, the image is segmented into individual characters. The binary image is analyzed to identify inter-line areas. If inter-line areas are detected, the image is divided into sections separated by the interline gap. Within these sections, lines are scanned to determine the horizontal and vertical area crossings, which help define the boundaries of the characters. Histogram analysis is employed to determine the width of the horizontal lines and words. Text recognition, also known as Optical Character Recognition (OCR), is a field of computer vision and artificial intelligence that focuses on automatically converting text in images or scanned documents into machine-readable and editable text.

[1,13] The various methods of segmentation are the Threshold, Clustering, and Edge detection methods. [2] The text extraction is used in automatically identification of text from government id cards, License plate [4,7], etc. The object detection in scene images can be detected by threshold image segmentation method [3]. complex shapes, especially curved text can be extracted by using mask tightness text detector. [6] character segmentation of handwritten words can be performed using pixel-based methods. By using noise removal filters, we can easily remove noise from images and videos [10]. Test extraction and detection can also be performed by deep learning-based methods [11], but these methods are complex and takes longer time than usual. [14] Blurring, and morphology techniques can also be used for text extraction. [16] The aid for visually challenged individual can be made using optical character recognition-based text extraction techniques.

II Proposed Methodology

To ease the process, the proposed method has following objectives:

(i) To preprocess the image, which remove noise, dullness, unwanted data and helps in normalization and image enhancement.
(ii) To design a model based on threshold segmentation for the extraction of text from the background.

[1] The threshold segmentation method can be defined by the following transformation from the input image 'f' to the output image 'g':

$$g(x,y) = \begin{cases} 1, & f(x,y) \geq T \\ 0, & f(x,y) \leq T \end{cases}$$

In this transformation, 'T' represents the threshold value. For image elements corresponding to the text object, g(x,y) is set to 1, while for the background elements, g(x,y) is set to 0.

The global segmentation technique is used to extract text from the images. The value of T is decided on the basis of following steps:

(a) Select the initial estimate value for T, this value should be greater than the minimum intensity value and less than the maximum intensity value. It is better to choose the average intensity.
(b) Segment the image using T, this will produce two groups of pixels, G_1 consisting of all the pixels with grey levels greater than T and G_2 consisting of pixels with grey value less than or equal to T.
(c) Compute the average grey levels in G_1 and G_2, and let it be μ_1 and μ_2 respectively.
(d) Compute a new threshold value

$$T = \frac{1}{2}(\mu 1 + \mu 2)$$

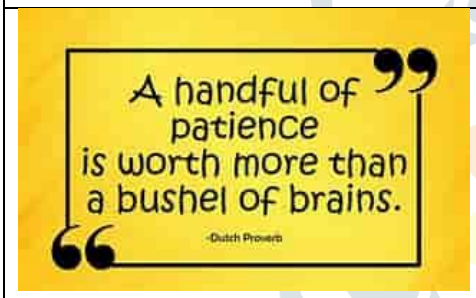
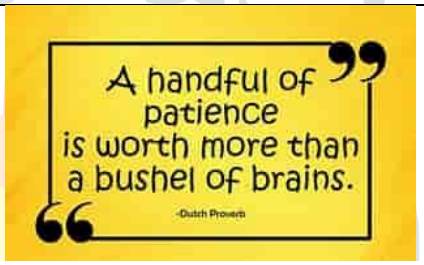
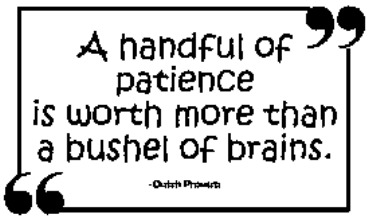
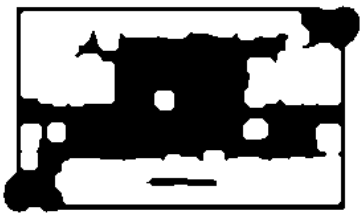
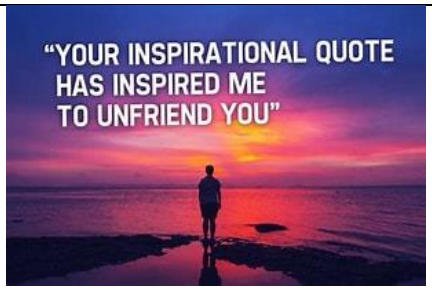
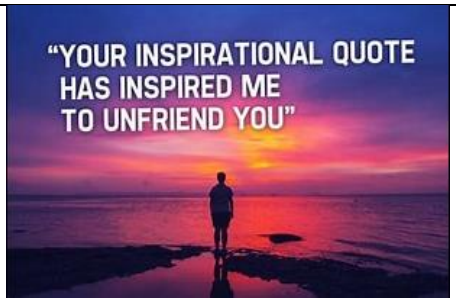
(e) If it does not match with the initial threshold value T, then again repeat the steps (b) to (d).

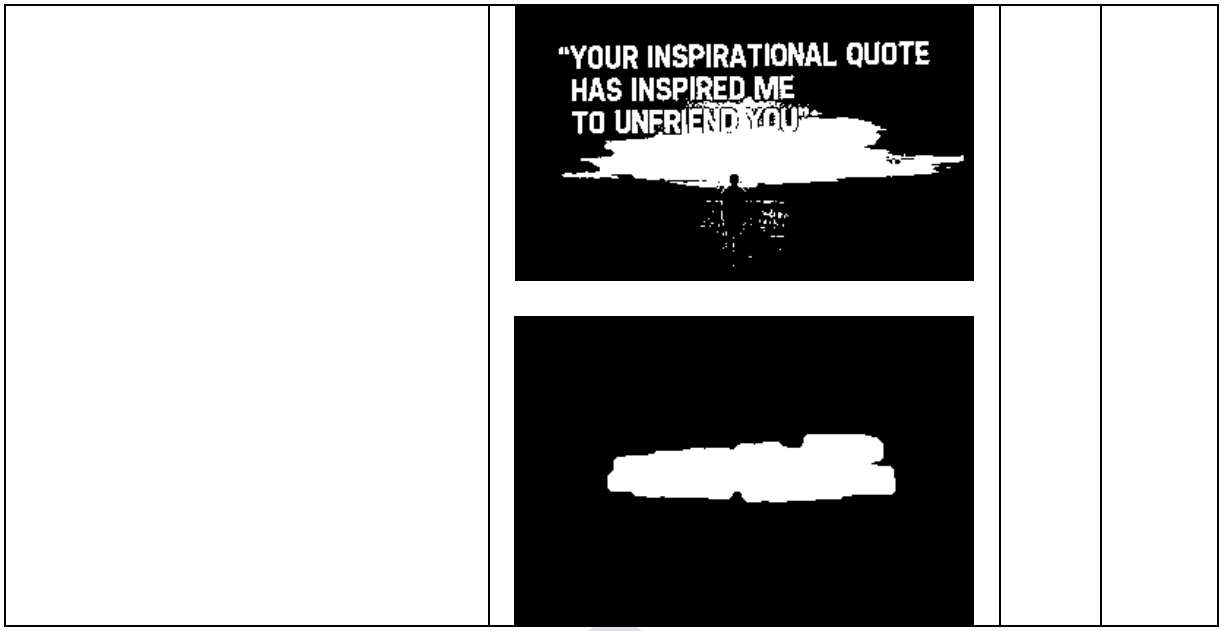
The multiple threshold values help in performing different iteration results. These results are the outcomes of the subtraction of the images after segmentation with the original ones.

III Results

Results show a clear extraction of text from the textured images in the second filtered image. The first filtered image is smoother and more marked the text region. The background is completely removed and the text is clearly visible in the second filtered image. The third filtered image blurs the text extracted. So, the most meaningful filter result come out in the second iteration result.

Table: 4.1 Results based on Image segmentation of sample images with three iterated images

Original Image	Filtered Images	Peak SNR	SNR Value
	  	30.99	28.080
		32.23	25.67



CONCLUSION

The main problem in text extraction from the textured image from A.I. based models is that, it is very complex and requires lots of time. Most of the methods processes complete image along with same background and thus the task to remove the text becomes more severe and complex to perform.

The proposed method demonstrates successful extraction of text from images with a notable improvement in the signal to noise ratio. The text extraction is smooth in second iteration image. The first filter results in sharpening, smoothing and marking the text region in the image. The second iteration results in removing the textured background form the image, giving a clear text, which is understandable and readable. The third iteration results in blurring of text extracted in the second result. Thus, the second result produces the more meaningful text data and is recommended for our purpose. This advancement significantly facilitates the efficient and effective extraction of data from images. Moreover, the run time of approximately five seconds is commendable, demonstrating a swift and efficient process.

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