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Text Extraction using Morphological Operation and DWT from images

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Abstract: Extraction of text from images is important and it is challenging task. This is used in many applications like license plate detection, recognition of object and retrieving of the document etc. In recent year it became one of the challenging and important tasks. In this paper, in first phase colour image is converted into gray scale and applied the median filter to remove noise from image and morphological open operation is performed. And then image is divided into blocks. Then applied discrete wavelet transform for the feature extraction. Threshold is applied to separate text blocks and non text blocks of the images, then merge all text blocks. Finally text is extracted from images.

Keywords: Text Detection, Text extraction, Image Processing, Wavelet features.

I. INTRODUCTION

In the recent years, the world has seen the image and video capturing technologies grow exponentially. Few examples include digital cameras, mobile phones, etc. With the improvisation in image-capturing devices and their ease of use, there is a plethora of images being captured and stored, which may contain useful data. The challenge that remains in front of us is that of processing these images to bring out the required detail. One appealing and developing field comprises of extracting the text from images. Digital image processing is used for extracting the text from image. "Image processing is the study of algorithm that takes image as input and returns an image as output". Images with text have various complexities that arise due to real-world backgrounds, font-sizes, and text-positioning and so on. In some cases, low quality of capturing devices adds another level of difficulty. Existing methodologies for text extraction include region –based, connected-component based, texture-based. Region-based method used gray scale properties to differentiate text from background, whereas texture-based method uses textual properties. There are many hurdles or problems in detection of text, extraction of text and localization of text from images. In the proposed work, in order to overcome all these hurdles and problems that are occur when extracting text from images, texture-based method used in this proposed scheme. In this, image is converted into black and white image and used the filter to remove noises and used morphological operations for the feature extraction from image and for extracting the text from image discrete wavelet transform is used.

The implementation of the following work would prove useful in solving real-world problems such as license plate capturing of speeding vehicles, translation of sign/board, capturing city maps, to capture directive of the routes, to capture public notice and to capture advertisement banners etc. All these images contain useful and important information. And this information present in the images is used in the variety of applications.

II. LITERATURE SURVEY

[1] Author proposed methodology to extract text from images like document images and scene images. Then for extracting the information contain in the image used the discrete wavelet transform (DWT). After that they used sobel edge detector for extracting text edges. And they applied morphological operation to edge map. To improve the performance threshold is applied. It is simple and effective for extracting text from complex background by using the discrete wavelet transform to images. The main problem with this methodology is, for colour image and for intensity and for reflection effects this methodology is not sensitive. The best approaches for extracting text line from images used for centre for unified biometrics and sensor [2]. In this it is based on three connectivity maps. Dynamic steerable directional filter is used for Orientation angle for text lines. Static steerable directional filter generated the adaptive local connectivity (ALCM) map to guess the text line location. Drawback with this technique is that it faces some problems when ALCM images come to binarization and it has some limitation when lines of the text are near to each other. The method to eliminate unwanted text from images was proposed in [3], here they do detection of text from images and then use impainting to eliminate the text from image. To cover the holes generated in the image impainting is applied after the text detection, localization of text and after extracting using the surrounding region. Text detection is performed using feature extraction, stoke filtering and centroid processing. The accurate and robust method is used for text detection from natural scene images. For extracting Maximally Stable Extremal Regions (MSER), a steady and effective removal algorithm is designed in [6] Single link clustering algorithm is used to collect the character candidates into text candidates and then they used self training distance metric learning algorithm that can learn the distance weights and threshold of clustering algorithm. Comic images are of different styles, fonts, gray scale values and complex background so it is difficult in recognizing and

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detecting text from it. In this they used the balloon detection and text blob extraction method [7]. Extracting text from this image is to preserve text and during conversation process formatting is done. It gives high quality of text from printed document. The word segmentation and character segmentation for machine printed Devanageri script is carried out in [8]. In this segmentation of text line, word level and character level is important phase in offline OCR system for devanagiri script in the document image. Maximally Stable Extremal Regions and Support Vector Machine [9] method is used for detection of robust text and recognition. In detection phase, MSER is used to extract potential text and to extract connected component colour clustering is used. To filter of non text region from candidate component used visual saliency and used some earlier information. After in recognition phase to segment word images vertical projection is used. The problem with this method is that it decreases when dealing with dim and not clear images.

III. PROPOSED SYSTEM

In this methodology, it has four phases namely: Image Acquisition, Pre-processing, Feature extraction and Extracted text. The flowchart for the proposed model is shown in below diagram. In figure, image is given as an input and it gives extracted text as output.

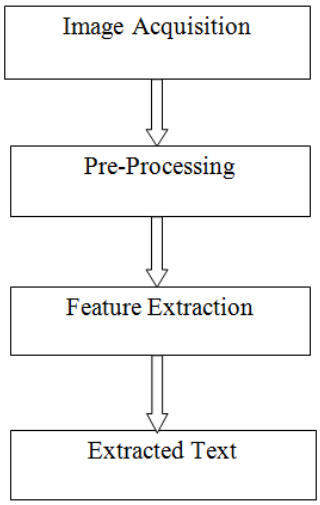

Fig. 1 Flowchart of the proposed system

A. Image Acquisition:
In the proposed method many images are collected. Images are collected are of different styles, different fonts, orientation and different background etc. All these images are used to extract text from those images.

B. Pre-Processing:
Pre-processing is simple processes i.e. it is a basic unit that is carried on any image processing methods whose aim is to remove the unwanted clamour. This improves the image data and heightens the features of the image. It is general operation with images which abstracts at both input and output intensity images. It rejects the low level frequency noise of background, dismisses reflection, masks some part of images, salt and pepper noise. Before going to another steps, the image is resized to constant pixel 300 by 300 (300×300) and then the colour image is converted to gray scale or binary images, it exhibits the primary level of the removing noise from images. After pre-processed to gray scale and applied filter to images to smoothen the images and more than one colour present in the image is reduced as compared to the original image and it also reduces the number of the edges.
In this model, after applying filter to image, image is divided into blocks i.e. divided into 50 by 50 pixels and gets the total number of thirty-six blocks for each image. Then Discrete Wavelet Transform (DWT) is applied to have energy wavelet. It is applied to each block divided.

C. Feature Extraction:
This phase is done after pre-processing, after completion of the pre-processing excepted level of segmentation can be achieved. In this phase, morphological operations are used i.e. opening. This morphological opening operation is erosion and after dilation. It dismisses region of an object that do not contain structuring element and it smoothes coasts of the object. And also it breaks the lean connection and also it removes lean protrusions.
And then discrete wavelet transform is used. It is very useful tool. One dimensional discrete wavelet transform, it separate the input into two components. They are average component and detail component. And discrete wavelet transform for two dimensional, it separate input into four components. They are average component (LL) and three components (LH, HL and HH). It can be used to find out edges of an image. These four images are decomposes as LL, LH, HL and HH. LH contains the horizontal features, HL contains the vertical features, HH contains diagonal features and it contains high frequency information.

D. Extracted Text
In this last phase, to get text from image used the threshold method. To separate the blocks which contain the text and which does not contain, used the threshold value and features of all horizontal, vertical and diagonal. Separated text blocks from which blocks do not contain the text. After getting blocks with text then merge all text blocks to get the text from all those blocks.

IV. EXPERIMENTAL RESULTS

This proposed model is to extract text from images. And in this model tested for 25 images with different background complexity, sizes fonts of the characters in the text. Several images were tested and among them some of the results are given below.

Fig. 2(a) Input image

Fig. 2(b) Extracted text

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Fig. 3(a) Input image

Fig. 3(b) Extracted text

Fig. 4(a) Input image

Fig. 4(b) Extracted text

Fig. 5(a) Input image

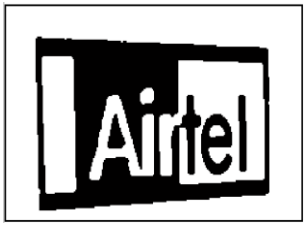

Fig. 5(b) Extracted text

TABLE I: Overall System Performance

Total no of blocks tested (text blocks)	Correctly detected text blocks	Falsely detected text blocks	Detection rate %
900(456)	437	19	95.83%

V. CONCLUSION

In this work, the method of extraction of text from images is proposed using discrete wavelet transform and morphological open operation. It has given best results even when images contain complexity of background, different styles and different font etc. It is the robust method. The proposed model is demonstrated to be capable for extracting text from images. This proposed system is robust and it has attained detection rate of 95.83%.

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BIOGRAPHIES

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