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An Enhanced Approach for Character Recognition Based On Discriminative Semi-MarkovModel

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Abstract **- A methodology for extracting text from Video obtaining from frames, Text that appears in these images contains important and useful information. Text extraction in images has been used in large variety of applications such as mobile robot navigation, document retrieving, object identification, detection the vehicle license plate, etc. In this paper, we employ discrete wavelet transform (DWT) for extracting text information from complex images. The input image may be a color image or a grayscale image. If the image is color image, then preprocessing is required. For extracting text edges, the sobel edge detector is applied on each sub image. The resultant edges so obtained are used to form an edge map. Morphological operations are applied on the processed edge map and further thresholding is applied to improve the performance**.

Keywords**-- Edge detector, discrete wavelets transform (DWT), Image segmentation, Text extraction and Text recognition.**

I. INTRODUCTION

Extracting text in natural image, as opposed to scans of printed pages, the faxes and business cards and it's an important step for a number of the Computer Vision applications, such as computerized aid for visual condition. Retrieving texts with help of environment of both indoor and outdoor, it's provides contextual clues for a wide area. Moreover, it has been shown that the performance of image extraction algorithms [1] depends critically on the performance of their text some modules. For example, two book covers of similar design but with text different, may be virtually indistinguishable without detecting. Our past of years to detect the text in complex image using **text recognition** and some rule to performed. In traditional optical character recognition (OCR), a printed document is scanned to an image and translated into some machine readable text format. Although researchers have made significant progress, machines have yet to match human reading performance. Finding and reading ambient text in the environment captured by a camera, involves the Scene text recognition (STR)[4]. Basically Detection and extraction of text in images have been used in many applications approach. The previous work does not overcome the some problems, our approach to solve the problem in this paper, use the discrete wavelet transform (DWT) process and some filters helps to extract the text from complex background.

II. RELATED WORK

This paper method work well if the text with a clear character shape is present in the images. Thus, document analysis- based methods for text extraction from camera images and scene text extraction from natural scene photographs may not be suitable for scene text detection or extraction from video images. Several methods for text detection and extraction in video frames have been explained in the literature[2]. These model can be broadly classified into three categories, namely, a connected component-based, the Binarization, and the edge and gradient-based methods. A classical text detection algorithm based on connected component analysis. In this method, connected components based on colors are selected[1], which will be regarded as text if they satisfy some geometrical features. It is also used connected component analysis to locate text in complex color images. Although the method is a classical one, it fails when multiple color characters are present in a text line. Connected-component-based methods are good for caption text with plain background images[5], but not for images with cluttered background and particularly for multioriented scene text.main drawback in the rest of the paper, Its robustness in complex background may not be satisfactory due to the limitation of spatial domain features.It requires more time to process due to the large number of features.Accuracy is very low and More complexity for large size of images.

a) Connected component-based:

CC-based methods begin with CC extraction and localize text regions by processing only CC-level information. There are three type of problems to be handle in CCs,

1) To extract text-like CCs.
2) To filter out nontext CCs.
3) To infer text blocks from CCs.

After the CC extraction, CC-based approaches filter out nontext CCs [3]. In the end, features "the number of holes in a CC," such as "aspect ratio," and "the variance of the stroke width within each connected component". It can also,its connected component based approach to detect the text in the image.

b) Binarization:

A binary image is a digital image that has only two possible values for each pixel. A binary image can be stored in memory as a bitmap, a packed array of bits. A 640×480 image of storage is requires 37.5 KiB. Because of the small size of the image files, document management solutions and fax machine usually use this format. Another class of operations is based on the notion of filtering with a structuring element [6]. The structuring element is binary image, usually vary small and which is passed over the target the image, and a similar manner to a filter in the greyscale image processing. Since the each pixels can only have in two values, we build binary images [7].the Binarization techniques, which have been proposed especially for document binarization,can alternatively be used for the binarization of the identified text blocks. These techniques are preferable to be applied in cases where the text blocks contain noise that must be removed.

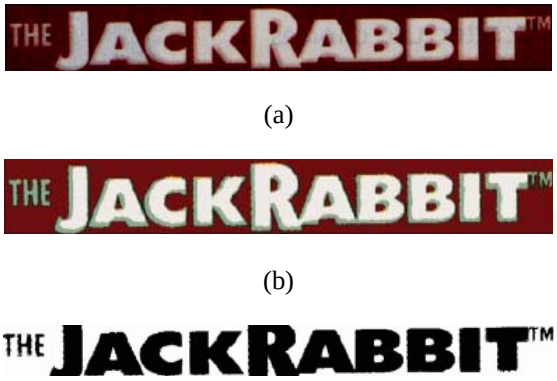

Fig.1: (a) Original color image, (b) Color image reduction, (c)Binarization result.

The original image are applied in the reduction method , after the color to be changed and applied the binarization techniques to remove the noise in the image.

A connected-component based method which combines color clustering [3][8], a black adjacency graph (BAG), and an aligning-and-merging-analysis scheme and a set of heuristic rules together to detect text in the application of sign recognition such as street indicators and billboards[7]. Uneven reflections result in incomplete character segmentation which increases the false alarm rate in this method. Existing OCR (Optical Character Recognition) engines can only deal with printed characters against clean backgrounds, and it cannot handle characters embedded in textured or complex backgrounds ,shaded[10]. The purpose of extraction in this stage is accurate binary characters to extract from the localized text regions so that we can use the existing OCR directly for recognition text in image. Finally the text extracted binary output image[9]. The image to extract text is different font size and different angle of text position, it's Shown on the figure: 2, basically the original image with color text, its use the method to extract the text from the color image that is very complicated process.

Fig.2: Image Object label with colors, different font sizes and orientation alignments (a) scene images (b) Extracted the text.

III. DWT(DISCRETE WAVELET TRANSFORM)

The DWT block computes the discrete wavelet transform (DWT) of each column of a frame-based input, we choose scales and positions based on powers of two ,so called dyadic scales and positions then our analysis will be more efficient and light accurate. Obtain an analysis from the discrete wavelet transform (DWT). For more information on DWT, a powerful tool for modeling the characteristics of textured images.

It can decompose signal into different components in the frequency domain, and the 2-d DWT in which it decomposes input image into four components or sub-bands. One average component (LL) and three detail components (LL, HL, HH) as shown in Fig. 3 and 4. Sub-bands are used to detect candidate text edges in the original image.

This stage solution in the four LL, HL, LH and HH sub image coefficients. The traditional edge detection filters can provide the similar solution as well but it cannot detect three kinds of edges at a time. Therefore, processing time of the traditional edge detection filters is slower than 2-d DWT.

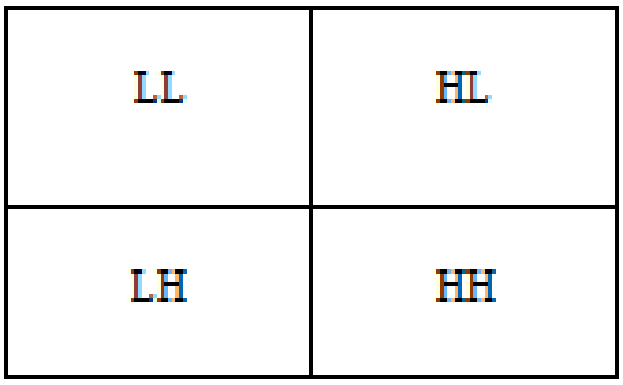

Fig.3: Result of 2-d DWT decomposition.

Fig.4: Image to DWT coefficient.

The DWT to follow on stage filter, that filter are two stages. First one is low pass filter and another one is high pass filter, basically that method are take the input from video frame only.

A time-scale representation of a signal is obtained using filtering techniques. different cutoff frequencies Filters and low pass filters to analyze a low frequencies. Then after the signal passes through the filters its resolution is changed by up-sampling and down-sampling operations. Down-sampling is to remove some of the samples of the signal and up-sampling is to add new samples to the signal.

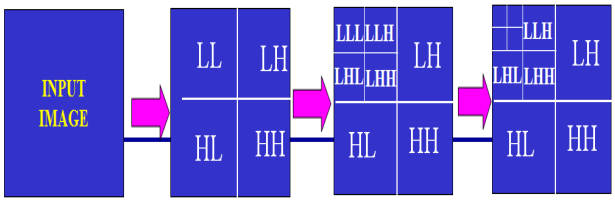

Fig.5: implement 2-D DWT

This is followed by some steps to extract the text from the complex image background,such that, input image from video, preprocessing of on image,2D-DWT decomposition, Extract text edges, Remove Non-text regions, text extraction. DWT provides information enough for analysis and synthesis with an important reduction of computation time. Effective algorithm for text detection and extraction by applying DWT to the images

PROCESS WORK FLOW:

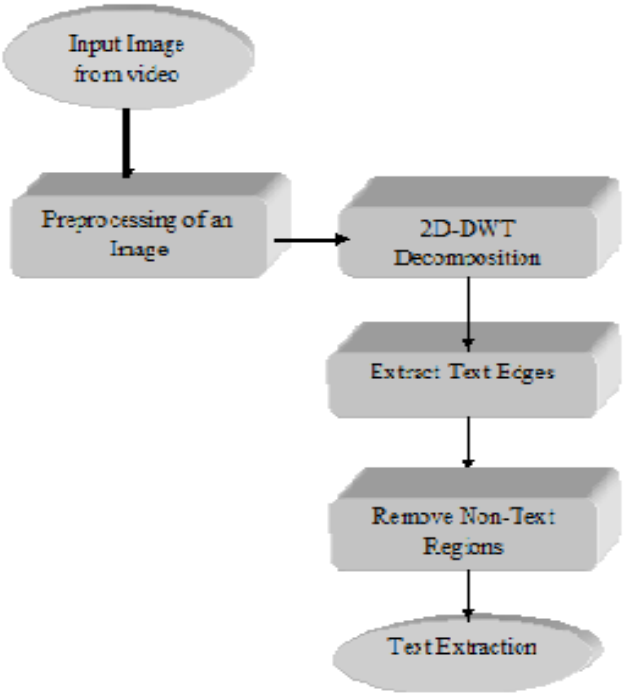

Fig.6: Text extraction in video image.

Above diagram represent the following steps:

a) Input Image from Video

The store and play some video files in from your workspace, from that take frames and give the frames as input image by using pushbutton. Using mat lab command to read the image but does not store the image data in the MATLAB workspace.

b) Preprocessing of an Image

Preprocessing is the method of include smoothing, sampling, and filtering. In this method we are going to do reduce the noises by using filters. Filtering is used to remove the unwanted noises in an image. A common image processing task is to apply an image processing algorithm to a series of files.

Filtering is a technique for modifying or an image enhancing. For example, filter an image to emphasize certain features or ignore other features. Operations of Image processing implemented with a filtering include sharpening, smoothing, and also edge enhancement. *A* neighborhood operation is filtering, the value of any given pixel is determined in the output image by applying some algorithm to the values of the pixels in the neighborhood of the corresponding a input pixel. A pixel's neighborhood is set of some pixels, and defines the location of text.

Wavelet analysis consists of decomposing the image into a hierarchical set of approximations and summarizes. The levels in the hierarchy often correspond to those in a dyadic scale. From that the signal views of analyst's point, wavelet analysis is a decomposition of the image on a family of analyzing images, basically which is usually an orthogonal function process. From the point of view, wavelet analysis offers a harmonious compromise between decomposition and smoothing techniques.

C) 2D-DWT Decomposition

2D-DWT decomposition is four equal sized square of blocks divides a square image , and then tests each block to see if it meets some criterion of homogeneity and block meets the criterion, it is further of no division . it's does not meet the criterion of homogeneity, it is subdivided again into four blocks, and the test criterion is applied to all blocks. This process is repeated continuously until each block meets the criterion.

The orthogonal wavelet decomposition condition, the generic step to splits the approximation of coefficients into two parts. After splitting a vector of approximation of coefficients and a vector of detail the coefficients, both are a coarser scale. The information lost in successive approximations to be captured in the detail coefficients. Then the splitting the new approximation coefficient vector, successive solutions are never reanalyzed.

D) Extract Text Edges

There are three detail sub-bands are used to detect dense edges of the text blocks which are the distinct characteristics of the text blocks. By finding the edges in the three sub images namely horizontal sub image, vertical sub image and diagonal sub image. In an image, a curve of edges on the image, that follows a path of rapid modification in image intensity. The edges are often associated with the objects of boundaries in a scene. Identify the edges in an image for Edge detection. To find edges and use the edge function. This function looks for the places in image rapidly where the intensity changes, using one of these two criteria: Places where the first derivative of the intensity is larger in magnitude than some threshold and another one is Places where the second derivative of the intensity has a zero crossing.

E) Remove Non-Text Regions

In order to improve the performance of the system, non text regions are removed using some rules. To do so, we first summarize the common attributes related to the horizontal text as:

a. Text is bounded in size.
b. Text has special texture property.
c. Text is some blocks whose widths are larger than their heights.
d. Text always contain edges

The characterization of regions in an image for Texture analysis by their texture content. Its attempts to intuitive qualities quantify to describe by terms such as rough, silky, or bumpy in the context of an image. In the bumpiness or roughness refers to variations in the gray levels or brightness values. The rectangle of Pixel Region defines the area of the target image that is shoened in the Pixel Region tool.

Image to define more than one ROI. The regions can be a geographic in nature, that encompass contiguous pixels are such as polygons, or it can be defined by a intensities range. In the further case, the pixels are not a necessarily contiguous

.f) Text Extraction

There is proper localization of text regions in the image is found. Finally, a threshold is applied which result in the segmented text in a black background. This method successfully detects 100% of the text regions. the lower beam to extract the edge , pick a column in the image and inspect it until a transition from a background pixel to the object pixel occurs.

IV. CONCLUSIONS

In this paper, we present a relatively simple and effective algorithm for text detection and extraction. This new text extraction algorithm automatically detects and extracts text from complex background images by applying DWT to the images. This algorithm is robust with respect to different languages, font size, style, orientation, color and alignment of text and can be used in large variety of application fields such as vehicle license plate detection to detect number plate of vehicle, mobile robot navigation to detect text based land marks, object identification etc. Most of the previous methods fail when the characters are not aligned well or when the characters are too small. They also result in some missing characters when the characters have very poor contrast with respect to the background.

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