Research article Available online www.ijsrr.org ISSN: 2279–0543

International Journal of Scientific Research and Reviews

Wavelet Based Video Text Extraction For Character Recognition

M. A. Archana

Department of Electronics and Communication Engineering Sri Chandrasekharendra Saraswathi Viswa MahaVidyalaya, [SCSVMV] Kanchipuram, Tamilnadu, India
Email maarchaname@gmail.com

ABSTRACT

In this paper, an efficient and computationally fast method to extract text regions from video sequences is developed. The proposed Haar discrete wavelet transform (DWT) is used to detect edges of candidate text regions. Dynamic Thresholding is used to remove the non-text edges in the detail component of DWT sub-bands. Finally morphological operators are used further to remove the non-text regions.

***Corresponding author**

M. A. Archana

Research Scholar

Department of Electronics and Communication Engineering

Sri Chandrasekharendra Saraswathi Viswa MahaVidyalaya, [SCSVMV]

Kanchipuram, Tamilnadu, India

Email maarchaname@gmail.com

INTRODUCTION

A video Text extraction from images has attracted considerable attention because it contains meaningful information about video contents and finds many useful applications in detection of vehicle license plate, document processing[1], Technical analysis of papers with tables, charts and circuit diagrams[2]. Parts identification in industrial automation[3] and content based image retrieval from image database[4-5].

In the conventional method, grey level binarization process[1] with a given threshold is employed to extract high intensity video character regions .A video has a complex background with various kinds of intensity so that appropriate thresholds are not always obtained. Then text extraction may employ directly process the original image[4,8-9]. In this proposed method an algorithm for text extraction from images for character recognition is developed. The method describes the flow of character segmentation from the image in terms of the intensity distribution of characters in an image to extract only character regions from the background. An example has been presented to illustrate the different stages of involved in the proposed model. The proposed technique has been successfully tested on many colour and grey scale images.

DISCRETE WAVELET TRANSFORM

The first DWT was invented by the Hungarian mathematician Alfréd Haar. For an input represented by a list of 2^n numbers, the Haar wavelet transform may be considered to simply pair up input values, storing the difference and passing the sum. This process is repeated recursively, pairing up the sums to provide the next scale: finally resulting in $2^n - 1$ differences and one final sum.The Haar DWT illustrates the desirable properties of wavelets in general. First, it can be performed in $O(n)$ operations; second, it captures not only a notion of the frequency content of the input, by examining it at different scales, but also temporal content, i.e. the times at which these frequencies occur. Combined, these two properties make the Fast wavelet transform (FWT) an alternative to the conventional Fast Fourier Transform (FFT).

ALGORITHM

The block diagram of the proposed model is shown in fig 1, and the different stages involved in the proposed model are summarized as follows.

Step 1: This step checks for the given input image is color image or originally a gray level image.

Step 2: If the input image is color image then color components are combined together to get an intensity image by using expression.

Y = 0.299R + 0.587G + 0.1 14B

Where R, G, B are red, green and blue components of the input colour image respectively. The colour components may differ in a text region and its surrounding background. But having an almost constant intensity .So, the intensity image is processed in the next steps of the algorithm rather than the colour components. If the input image is originally a grey level image, the image is processed directly starting at step 2.

Step3: The morphological edge detection scheme using open-close and close-open filters[8] are employed to the intensity image in order to reduce falls edge and over segmentation.

Step 4: A sobel filter for edge detection is applied to the blurred image to enhance of edges located on character counter and extracted by applying the suitable value of threshold.

Step 5: The extracted edges are dilated using eight connected structuring elements. Then small-connected components in the dilated image are filtered using Erosion. The output of binary image that contains to roughly estimate character regions.

Step6: The dilated edge area mainly consists of character regions, contours, and a part of the background. To get only character regions, AND operation is applied with the dilated edge image and binaries intensity image.

Step7: Each text candidate region is uniquely labelled by assigning the same unique number for all connected pixels by 8- connected neighbourhood labelling algorithm for binary image [11].

Step 8: For each labelled text candidate region, the corresponding region in the intensity image Y is found. Every grey level region in intensity image corresponds to a labelled characters region.

The threshold value "T" is determined by

$$T = \frac{\sum (E_S . S)}{\sum S}$$

Where "." Denotes pixel wise multiplication and S is given by

$$S = \max(|g_1 ** Es|, |g_2 ** Es|)$$

Where g, = [-1 0 1], g2 = [-1 0 1] t, "**" denotes two dimensional linear convolution and Es is given by

$$E_S = (Y_B \oplus B) - (Y_B \ \Theta \ B)$$

$$Y_B = \frac{(Y \text{ o } B).B + (Y.B) \text{ o } B}{2}$$

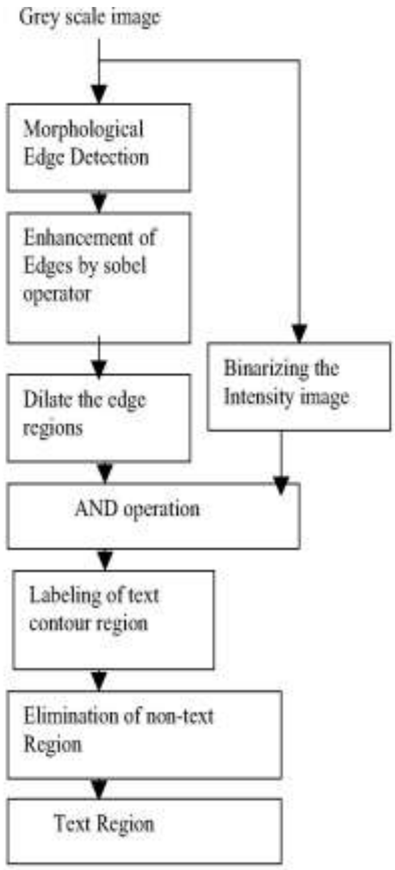

Fig 1. The block diagram of proposed Model

Where B denotes 3x3 eight connected structuring element, "4o0, "e*", " "and "CF) " are opening, closing, dilation and erosion operators respectively. In this case "'Es" is replaced by considered text candidate gray level region.

Step 9: Finally segment character by finding the co-ordinates of each character by horizontal and vertical projection vectors.

PROPOSED ALGORITHM

The previous section describes the flow and different stages of videotext extraction from images. The intensity distribution of character in an image is precisely estimated to extract only character regions from the background. The first process is to eliminate the background and roughly estimate the character regions by image processing. In this process, if the input image is colour image then colour components are combined together to get intensity image. If the input image is blurred grey scale image then filtered by morphological open-close and close-open filters in order to smoothen the image. Then sobel filter for edge detection is applied to videotext region to emphasize edges located on character contours. The edges are extracted and dilated to roughly estimate character regions. The dilated edge area mainly consists of character regions, continues and part of the background. To get only character regions AND operation is applied with the dilated edge image and binarized intensity image. Each text candidate region is uniquely labelled by assigning the same unique number for all connected pixels. 8- Connected neighbourhood labelling algorithm accomplishes the labeling of the character region with the other background regions in the binarized image. For each labeled text candidate region, the corresponding region in original intensity image is determined by a global non-histogram based adaptive threshold technique as explained in step 8.This adaptive threshold technique is less sensitive to illumination candidates and reflection. Finally the task of segmenting each character is accomplished by employing horizontal and vertical projection vectors that creates the bounding rectangle co-ordinates of each character in the image.

RESULTS

A series of experiments have been carried out on images to extract the character regions. The algorithm has applied to extract the character regions from background, the different stages of algorithm out put are as shown in fig. 2.The proposed algorithm is insensitive to skew and text orientation and free from artifacts that are introduced by both global and fixed size block based local threshold method and robust to noise. The proposed technique has been successfully tested on many colour and grey scale images and videos. The main objective of the text extraction algorithm is to reduce the number of false text extraction region that may be fed to the OCR. Incorporating an OCR algorithm with the proposed text extraction method yields a useful system for text analysis in images.

Fig 2(a) Input image

Fig 2 (b) Preprocessed image

Fig 2 (c) Binary image

Fig 2 (d) Binary Dilated image

Fig 2 (e) Sobel Dilated image

Fig 2 (f) AND operated image

Fig 2 (g) Labeled image

Fig 2 (h) Character region

CONCLUSIONS

In this paper a method to segment only character regions from images for Optical Character Reader (OCR) data entry is presented. The main objective of this algorithm is to reduce the number of false text candidate regions that may be fed to OCR Incorporating an OCR algorithm with the proposed method yields a useful system for text analysis in images.

REFERENCES

1. K. Fan, L. Wang, and Wang. Y, Page segmentation and identification for Intelligent Signal Processing, Signal Processing; 1995; 45:329-345.
2. Z Lu, Detection of text region from digital engineering drawing, IEEE Transactions on Pattern Analysis and Machine Intelligence 1998;20:431-439.
3. Ham Y. K., Kang M. S., Chung H. K., and Park R. H., “Recognition of Raised Characters for Automatic Classification of Rubber Tires”, Opt. Eng.1995; 34:102-108.
4. Lien hart R., Indexing and retrieval of digital video sequences based on automatic text recognition” In Proc., ACM Multimedia International conference; Boston, MA:1996.
5. Jain A.K. and Yu B., Document representation and its application to page decomposition, IEEE Transactions on Pattern Analysis and Machine Intelligence; 1998; 20(3): 294-308.

6. Ohya J., Shio A. and Akamatsu S., Recognizing characters in scene images, IEEE Transactions on Pattern Analysis and Machine Intelligence; 1994;16(2):215-220.
7. Suen H.M. and Wang J.F., Text string extraction from images of colour printed Documents, IEE Proc.-Vis. Image Signal Process.; 1996; 143(4):210- 216.
8. Chin K.K. and Saniie J., Morphological processing for feature extraction, Proc. SPIE; 1993; 2030: 228- 302.
9. Gonzalez R.C. and Richard E.W., Digital image processing, Addison-Wesely publishing company Inc; 2003.
10. Osamu Hori, A Video text extraction method for character recognition, ICDAR-Fifth international conference on document Analysis and Recognition;1999.
11. Chanda B., Dutta Majumder, Digital image processing and analysis, Prentice Hall of India Pvt. Limited: New Delhi; 2002.