Dual Moving Text Line Detection and Selective Masking

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***Abstract*— In this paper we are proposing a technique to extract a moving text-line in a video and split if there are dual moving text-line in it. In second stage we mask the one or both moving text-line to secure the information or to avoid the unnecessary information. In third stage the extracted moving text-line is inserted at different location of the video-frame if required. This simulation work is done using Matlab Software. The experiment is conducted for different videos having different languages with different speeds in moving text lines.**

Keywords- moving text, detection, extraction, masking.

I. INTRODUCTION

With ever increase in development of information technology there is a lot of demand in advertising in television and other multimedia devices. The simultaneous transmission of video along with one or more text messages on the same video leads to an effective utilization of the present technology. According to observers view point multiple information at a same time may disturb the concentration or it may divert the attention of the observer. So to give more option to the observer we planned to develop a module which can help the user. On the other hand the content based video indexing concept is also developing several methods based on the text in videos frames. In this regard, there is a requirement to protect our video file from this type of indexing technique to give more security. Our proposed method is best suited to protect from content based video indexing.

Text in a video can be broadly categorized into two kinds: scene text and artificial text. Scene text is part of the environment and is captured by the camera along with the rest of the scene. In our paper we are only concentrating on artificial text which is moving in nature. Rainer at al [1,2] proposed an automatic text region localization, text segmentation and text recognition method for video indexing. D. Chen et al [3] proposed a method for detection and recognizing text in complex images and video frames. Video text extraction and recognition task comprises of obtaining image/frame, segmenting the image and extracting the regions containing text only and finally recognizing the characters using character recognition systems to output the text strings in the image/frame. G.H. Kumar et al [5] proposed a novel and simple method to mosaic two split images of large document based on pixel value matching. H. Miyazaki et al [6] proposed a Mosaicking-by-Recognition technique where video mosaicking and text recognition are simultaneously and collaboratively optimized in one step manner. We discussed the concept of single moving text-line detection and extraction in [7].

II. PROPOSED METHOD

Our proposed method mainly consists of two stages first one is detection of moving text and separation of dual lines. Generally, there are two kinds of text in video. One is artificial text superimposed on video and another one is scene text showing naturally in scenes like text on a cloth. In the reminder of this paper, text will be considered as artificial text. From observation of TV programs, the direction of motion of text may be from left to right or right to left. In some cases multiple moving text lines in single-direction with constant speed and in some other cases there may be multiple moving text lines in dual-direction with multiple speeds.

III. DETECTION FO MOVING TEXT LINE

Consider a video clip inclusive of single moving text line.

Now find out the difference frames by using the equation (1) **Dj = fi+1 - fi** **(1)**

Where i = 1,2,3,……n-1.

J= 1,2,3,……n-1. where n is number of frames in video clip.

Dj – indicates jth difference frame and

fi – indicates ith regular video frame.

Now find out the sum of few (at least 10 frames) consecutive Dj frames by using equation (2) given below.

$$S(x,y) = \sum_{j=n1}^{n2} D_j(x,y) \quad (2)$$

where n1< j < n2

Where n2 > n1 and total number of frames to find S are in between 10 to 20.

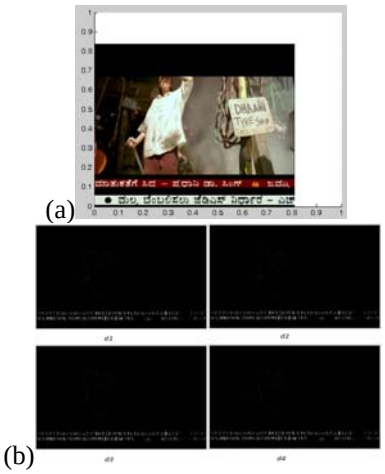
$$T(x,y) = \begin{cases} 0, & S(x,y) < t \\ 1, & S(x,y) \geq t \end{cases} \quad (3)$$

Where T is a logical image obtained after applying threshold **t**.

Temporal redundancy occurs in a sequence of consecutive images/frames contains similarities. Maximum video compression technique is based on this temporal redundancy concept. Very small changes will occur between the consecutive frames due to temporal redundancy. Hence difference frames contains very less information. At the region of moving text we may observe the maximum information as compared to other regions of entire video frame because of the motion or change in positions of pixels of moving text line. In S(x,y) image (sum of few consecutive difference frames/images) we get blurred background and high density pixel region corresponding to the moving text line in the video clip. With the help of threshold technique, a logical image T is created and it is used to detect region of moving text.

IV. EXTRACTION AND SEPARATION OF MOVING TEXT LINES

By knowing region of moving text-line in the video, extract and construct a an another video file having only moving text line. To separate the two moving video text lines construct an array in which holds the sum of all values in each row of a sum image matrix. This array consists of zero and non-zero values, a group of non-zero values indicate the position of each line and zeros indicates the remaining region of the video frame. To split two-lines now detect the starting and ending point of each line by finding cross-over points in an array **I**. Cross-over points refer to the point moving from zero value to non-zero value and from non-zero value to zero value in an array. From these cross-over points, split and store the moving text lines separately. According to the requirement of the observer either one or more lines can be masked with the help of a white strap (where all the pixels values of that region made as 255) or black strap(where all the pixels values of that region made as 0). If required we can also define another location to place this moving video text line in the same video frame. All experimental results are discussed the figure 1.



(a)

(b)

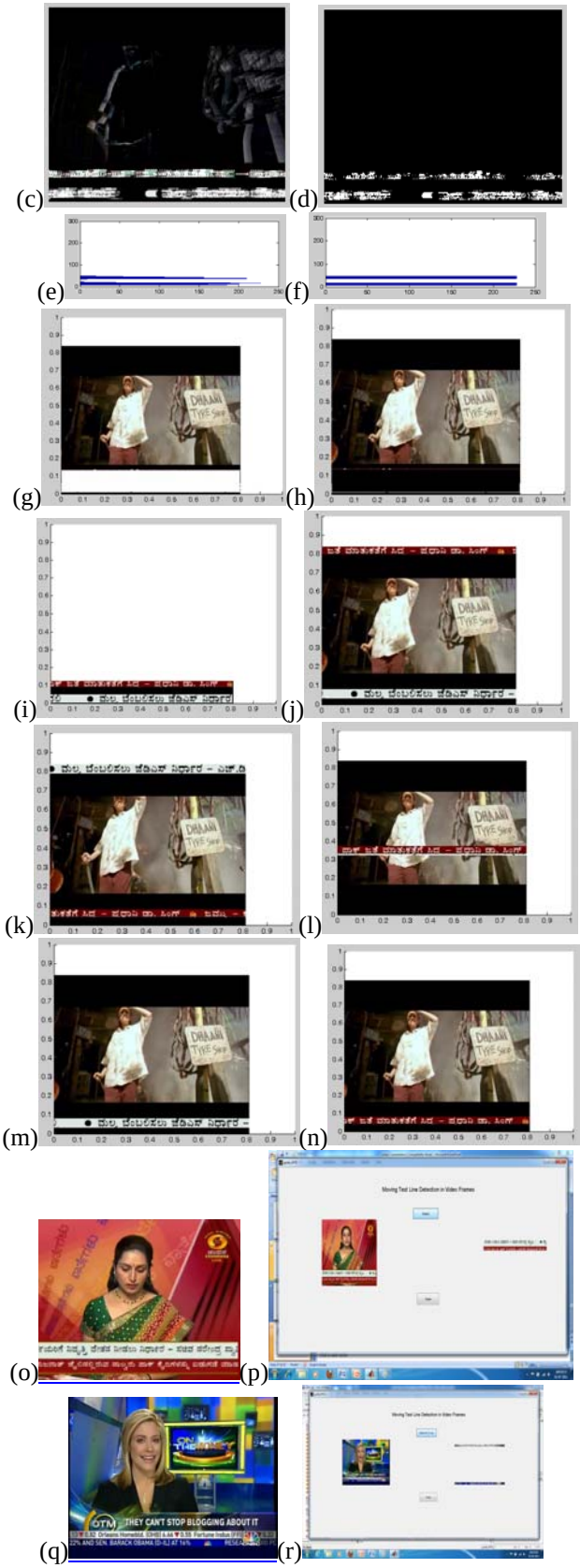


Fig. 1. (a) Ith frame of input video (b) Differences of consecutive frames (c) Sum of Difference images (d) Threshold Binary Image (e) Horizontal bar-chart of row-sum array of threshold image (f) e - fixed to maximum value (g) text-line region of video frame is filled with white strip (h) text-line region of video frame is filled with black strip (i) extracted moving text-line region (j-n) the extracted moving text-lines are inserted at different locations of the frame.(o and q) videos with two moving text-lines (p and q) results of moving text-line extraction and separation respectively.

V. CONCLUSION

In this paper we proposed a method to extract and separate the dual moving text-line in video frames and also insert these text-lines in user defined location if required. Masking is an option to the user. From the experiment we come to know that this proposed method is working for all types of videos containing dual moving text-lines with various speed and also works for the video containing moving text-line of different languages. This method can be extended to detect and extract inclined video-text lines.

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