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Characters Strings are Extracted Exhibit Morphology Method of an Image

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ABSTRACT

In understanding an image, extraction of characters existing in the image is considered to be important. Scene images are different from document images, which are composed of characters and complicated background i.e. photo, picture, or painting etc. instead of white one that makes it difficult to be dealt with. Extraction and localization of scene text are used in many applications. In this paper, we have proposed a connected component based method to extract text from natural images. The proposed method uses colour space processing. Character recognition is done through OCR that accepts the input in form of text boxes, which are generated through text detection and localization stages. The Proposed method is robust with respect to font size, colour, orientation, and style. Results of the proposed algorithm, by taking the real scenes, including indoor and outdoor images, shows that proposed method efficiently extracts and localizes the scene text. In this paper, we have introduced a new method to extract characters from scene images using mathematical morphology.

KEYWORDS

Text extraction, Morphology based algorithm, OCR, scene image.

Indexing terms

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Academic Discipline And Sub-Disciplines

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1. INTRODUCTION

A variety of approaches to text information extraction (TIE) from images have been proposed for specific applications including page segmentation [1, 2], address block location [3], license plate location [4, 5], and content based image indexing [6, 7]. There are many possible sources of variation when extracting text from a shaded or textured background, from low-contrast or from images, or complex images having variations in style, font size, color, alignment and orientation. To use the term 'graphics text' for scene text, and 'superimposed text' or 'artificial text' for caption text [8, 9]. It has been observed that to detect scene text is more difficult and not much work has been.In distinction to caption text, scene text will have any orientation and will be distorted by the attitude projection. Moreover, it's usually full of variations in scene and camera parameters like before we tend to plan to classify the assorted techniques employed in TIE.

1.1.Text in images will exhibit several variations with relevancy the subsequent properties

1.1.1. Geometry Size

The text size will vary a lot; assumptions may be created looking on the applying domain. The characters within the caption text seem in clusters and typically lie horizontally, though generally they will seem as non-planar texts as a results of tricks. This doesn't apply to scene text, which might have numerous perspective distortions.

1.1.2. Color

The characters in a very text line tend to own an equivalent or similar colours. This property makes it doable to use a connected component-based approach for text detection. Most of the analysis rumored until date has focused on finding 'text strings of one color (monochrome)'.

1.1.3. Motion

The same characters sometimes exist in consecutive frames in an exceedingly video with or while not movement. Caption text sometimes moves in an exceedingly uniform way: horizontally or vertically. Scene text will have capricious motion attributable to camera or object movement.

1.1.4. Edge

Most caption and scene texts are designed to be easily read, thereby resulting in strong edges at the boundaries of text and background.

1.1.5. Compression

Many digital pictures area unit recorded, transferred, and processed in an exceedingly compressed format. Thus, a quicker TIE system is achieved if one will extract text while not decompression.

1.2.Text information extraction (TIE)

A TIE system receives an input in the form of a still image or a sequence of images. The images can be in gray scale or color, compressed or un-compressed, and the text in the images may or may not move. In real life situations, text data embedded in images contain useful information for automatic annotation, indexing and structuring of images, document analysis, vehicle license plate extraction, technical paper analysis, and object oriented data compression. Furthermore, text printed on the cover of signs, billboards, magazine, indicators etc. always mixes with photos and designs [10].TheTIE problem can be divided into the following sub problems

1.2.1. Detection

Text detection refers to the determination of the presence of text in a given frame (normally text detection is used for a sequence of images).

1.2.2. Localization

Text localization is that the method of determinative the situation of text within the image and generating bounding boxes round the text.

1.2.3. Tracking

Text tracking is performed to scale back the interval for text localization and to keep up the integrity of position across adjacent frames. though the precise location of text in a image will be indicated by bounding boxes, the text still must be divided from the background to facilitate its recognition. this suggests that the extracted text image must be regenerate to a binary image associated increased before it's fed into an OCR engine.

1.2.4. Extraction and Enhancement

Text extraction is the stage where the text components are segmented from the background. Enhancement of the extracted text components is required because the text region usually has low-resolution and is prone to noise.

1.2.5. Recognition (OCR)

Thereafter, the extracted text images can be transformed into plain text using OCR technology. OCR software enables us to successfully extract the text from an image and convert it into an editable text document. Extraction of texts is important in form processing, map interpretation, bank cheque processing, postal address sorting and engineering drawing interpretation.

Hence, our main objective is to extract text from scene image. In this paper, we discuss an effective approach for detecting and extracting text from scene image based on morphological features.

2. RELATED WORK

NirmalaShivananda and Nagabhushan[10] proposed a hybrid method for separating text from color document images. But this method can't extract text from complex graphics. ParthaPratim Roy, JosepLlad´os and UmapadaPal[11] proposed a method for separating text from color map based on connected component analysis and grouping of characters in a string. This approach can detect the characters connected to graphics and can separate them. But some of the characters can't be separated through connected component analysis. The algorithm of Fletcher and Kasturi[12] works well for text string separation from mixed text/graphics image, but it makes an impractical assumption that character components in a string are aligned straight and does not touch or overlap with graphics. Coleman and Andrews[13] developed a method, which operates in an unsupervised mode with connected component analysis. But some text regions are vanished using connected component analysis.Recently LixuGu[14] proposed a mathematical morphology based approach for separation texts from scene. However, it has some limitations. Hence, we focus on the limitations of Gu's approach and then propose a modified morphological filter. As text strings are of different shapes and sizes, we use an automatic clustering technique to cope with this issue.

3. PRINCIPLE OF TEXT EXTRACTION

Extraction of text from scene image is much difficult than extraction from simple document image. A lot of researches succeeded in extracting single text string from image, but cannot deal with image including many text strings. Meanwhile, the result may be mixed with noises be similar to text. This paper describes an algorithm that uses mathematical morphology to extract text effectively, and edge border ratio is utilized to differentiate text region from noise region, using the edge contrast feature of the text region in real scene. Text extraction from images is one of the most useful and difficult applications of pattern recognition and computer vision. For example current methods of Morphological filters are unable to read letters of textured backgrounds and can only properly recognize characters from a monochrome background. However if we had some way of localizing text regions in images and placing them against a monochrome background, we could use OCR to extract the data from all kinds of images. Taking a step further we could create a standardized method of running a character isolation program and then using OCR to extract the text regions and the method would be applicable to all kinds of images.

Algorithm

The algorithm to extract the text regions is based on the edge connections between letters and text regions.

• Develop a Gaussian pyramid of four levels.

• Develop directional kernels to detect edges at 0, 45, 90 and 135 degree orientations.

• Convolve each image in the Gaussian pyramid with each orientation filter.

• Combine the results of step 3 to create the Feature Map.

• Develop the resultant image using a sufficiently large structuring element 7x7 to cluster candidate text regions together.

• Develop the output image with text in white pixels against a black background.

Comparing to the documentary texts, extraction of the texts in scene images is much more challenging. A lot of researchers succeeded in extracting single text string from images, but cannot deal with images including many text strings [15] due to several problems listed below [16]:

• Different types of objects such as structural bars, company logos and smears may be mixed with characters.

• Difference between background and text color.

• The font, style, and size of the characters may vary.

• Uneven lighting conditions in scene images. Uses mathematical morphology to extract text effectively. Mathematical morphology provides usthe theory and tools to capture geodesic information.

4. MORPHOLOGY BASED TEXT LOCALIZATION

A morphological technique is used for text extraction from images. Morphology based text localization and extraction scheme has been proposed. In that, edges are detected first. Using the edges the algorithm has tried to find out text candidate connected components. These components have been labeled to identify different components of the image. Once the components have been identified, the variance is found for each component and using these information

text/background components is separated. First of all, when using Morphological methods, choice and shape of the structuring elements is very important since they control the shape of the shape of the output image.

In this paper, A new approach to extract characters from scene image is proposed. For a scene image, there are many complicated information on it. The information carried through characters is considered to be most important among them. therefore, the extraction of characters from scene image in order to recognize them become increasingly concerned.[l7]-[19] The characters on the scene images are difficult to be extracted, because they are intricate with complicated background, and show various size, shape, direction and situation. Although the importance of this field have led a number of researchers to pay attentions to it and there have been several studies in the character extraction, they are proposed to be optimal ideas for extraction characters, but are limited to simpler background or other restrictive conditions. Morphology provides us the theory and the tools to analyze shapes, while the decomposition of shapes plays an important role in the implementation of morphological operation. This effect has been noticed by many researchers in the shape based processing and several optimal algorithms [20]-[24] have been proposed. This characteristic underlines the basic idea of our new method. The process includes two distinct stages:

Extraction processing

- Feature emphasis
- Character extraction
- Noise reduction

Morphological filters have been widely used in text localization problems. It has been proposed a scheme based on morphological filtering to extract candidates with high contrast in order to localize possible text region. It has been used morphological filters to extract candidates of TRs and, then, non-text regions are filtered by heuristics. Some elementary aspects of morphology relevant to the application being considered in this work are reviewed[25].

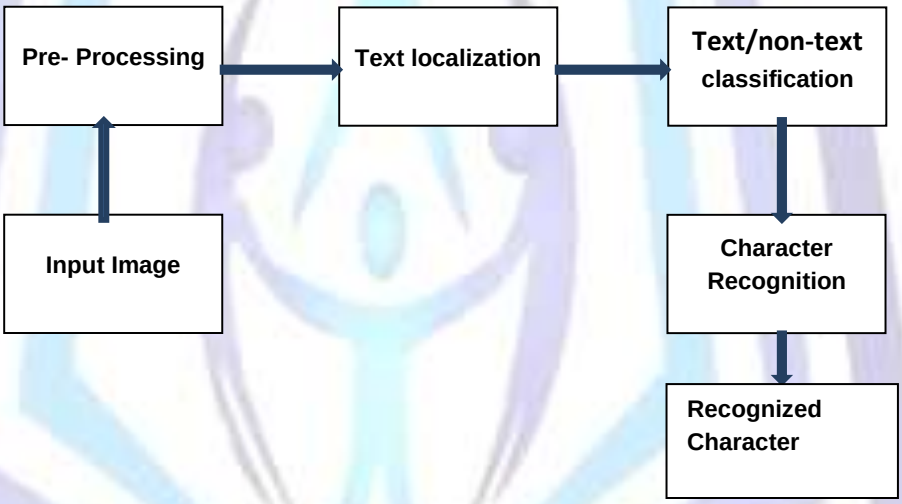

Figure 1:Morphological Filters Diagram

4.1. Preprocessing

In the preprocessing step, first the input RGB image is converted to gray-scale image. This conversion is done in order to reduce the processing overload. Median filtering is then applied to the Gray-scale image to remove any noises present in that. Next edges are extracted from the resultant Image using LOG edge detection algorithm.

4.2. Text localization and Extraction

In text localization and extraction the edge image obtained from the previous step is binarised. Then the Morphological dilation operation is performed on this edge map.

Support Vector machine

SVM is basically a classifier that performs the classification tasks by constructing hyper planes in amulyi dimensional space that separates cases of different class labels

Feature extraction

The following are the features extracted from the Components.

- Standard deviation
- Energy of edge pixels.
- Mean absolute deviation

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5. RESULT

In order to evaluate the performance of the proposed method, we used 25 test images with variable font sizes, perspective and alignment under different lighting conditions. Figure 2 shows some of the results, from which we can see that our proposed method can extract text with various font sizes, perspective, alignment, any number of characters in a text string under different lighting conditions. Although there is no generally accepted method that can be used to evaluate the performance of the text localization and extraction method, we use several metrics used by others to facilitate a meaningful comparison. In our proposed number of correctly located characters, which are regarded as ground-truth, precision rate and recall rate, quantified to evaluate the performance are given by (1) and (2). The area in the image which is not text but is recognized as text, by mistake, by the proposed method, is defined as false positive. The area in the image which is text but could not be recognized by the method is defined as false negative. Our proposed method shows a clear improvement over existing method.

Precision Rate = Correctly Located / Correctly Located + False Positive * 100% (1)

Recall Rate = Correctly Located / Correctly Located + False Negative * 100% (2)

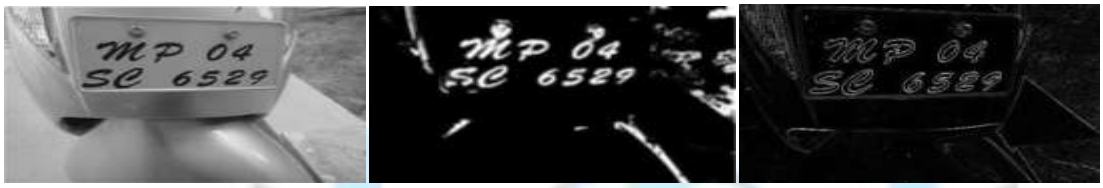

Figure 2:*Images with variable font sizes, angles, perspective distortion, colors, scaling and resolutions (a) Original images (b) Extracted text by edge based text detection method (c) Extracted text by proposed method.*

6. CONCLUSION AND FUTURE WORK

In this paper, nearest-neighbors based approach for localizing text from images is proposed. Results show that the proposed method is effective in localizing the text areas from natural scenes. A modified method based on morphological approach for extraction of texts from scene images is discussed. Proposed algorithm is respect to aspect to font sizes and styles, orientations, alignment, uneven illumination, and reflection effects. Binary output can be directly be used as an input to an existing OCR engine for character recognition without any further processing. This method distinguishes text areas from texture-like areas, such as window frames, wall patterns, etc., by using the histogram thresholds. To reduce the false positive rate, morphological operations can be used. This could increase precision rate also. This method is useful for extracting texts from scene images. Our future concentration will be on the recognition of text characters using vertical and horizontal projections and converting text images into editable form.

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