iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4143

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Classification and Recognition of Text in Static Images

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Abstract: ***Text detection in images is an important step to achieve multimedia content retrieval. In this paper, an efficient technique which can automatically detect, localize and extract text in images with complex backgrounds is presented. The proposed approach is based on the application of a colour reduction technique, edge detection technique, the localization and recognition of the text. The recognised text is then converted to speech. The text contains vital and useful information which is embedded in various types of documents and natural scene. The text is detected and is extracted in this way that it is readable by another person without any difficulty. This also helps visually challenged to know the textual information on the images.***
Keywords: Colour reduction, edge detection, text detection, text recognition.

I. INTRODUCTION

Text detection and recognition in natural images have received increasing attention in image understanding due to its numerous potential applications in image retrieval [1], scene understanding [2], visual assistance [3], etc. In spite of the fact that endeavors have as of late been dedicated to enhancing its execution, perusing writings in unconstrained situations is as yet difficult [4]. A content data in pictures fills in as a critical piece of information in various applications. It gives guidelines to assistive perusing and substance based picture recovery and numerous different applications. The fast change in computerized innovations and devices arranged with megapixel cameras and disclosure of most recent touch screen strategy in advanced gadgets like PDA, versatile, and so on., are mindful to expand the interest for data recovery [5] and it drives bunches of new research challenges. It is a testing errand to recognize and section content from caught pictures because of two primary issues: Different assortment of content examples [6] like sizes, textual styles, introductions, hues, and nearness of foundation anomalies like content characters, for example, windows, blocks, and character-like surface. After content location an optical character acknowledgment (OCR) [7] frameworks are intended to change over content pictures to intelligible content codes, however perform ineffectively when content is implanted into complex foundation. Hence in this approach the image is pre-processed, edges are detected, clustered and segmentation of foreground and background, morphological process, detection and recognition of text and text to speech conversion is done.

II. LITERATURE SURVEY

Each pixel of coloured images is denoted by three component values i.e. Red, Green and Blue and as such these are more complex as far as segmentation is concerned, than gray scale images which have a single intensity value for a pixel. Vitorino Ramos et al [16] have proposed a strategy for developing versatile strategies for these issues. They have defined the division issue of such pictures as an improvement issue and embraced transformative procedure of Genetic Algorithms for the grouping of little areas in shading highlighting space utilizing k-Means unsupervised clustering techniques into Genetic Algorithms. M. Gomathi et al [17] have proposed Fuzzy Possibilistic c-means algorithm (FPCM) by modifying FCM for eliminating the limitations of FCM. “The FPCM modifies the distance measurement of the standard FCM algorithm to permit the labelling of a pixel to be influenced by other pixels and to restrain the noise effect during segmentation. Instead of having one term in the objective function, a second term is included, forcing the membership to be as high as possible without a maximum limit constraint of one”. The authors have used the method for medical image segmentation. Numerous focuses in a picture have a non zero esteem for the slope, and not these focuses are edges for a specific application. Along these lines, some technique ought to be utilized to figure out which focuses are edge focuses. Often, thresholding gives the measure used to recognition.

Roberts Edge Detection, [18]According to the this Cross administrator is straightforward, fast to register, 2-D spatial angle estimation on a picture featuring the districts of high spatial recurrence which regularly relate to edges. Contribution to and yield of the administrator is gray scale pictures is explained.

Sobel Edge Detection , [19] Regions of high spatial recurrence that compare to edges are emphasized by Sobel administrator since it plays out a 2-D spatial slope estimation on a picture. For the most part it is utilized to locate the estimated outright inclination extent at each point in a gray scale image.

Amiya Halder et al [20] have described segmentation and clustering as synonyms and expressed that "it is natural to think of image segmentation as image clustering i.e. the representation of an image in terms of clusters of pixels that "belong together". There are several clustering, both supervised and unsupervised clustering algorithms are 12 available, which includes, K-means [11], fuzzy K-means.

According to Li et al.[21], in order to detect the lines of an image, the designer will use certain features in reference image. They have applied elastic contour extraction.

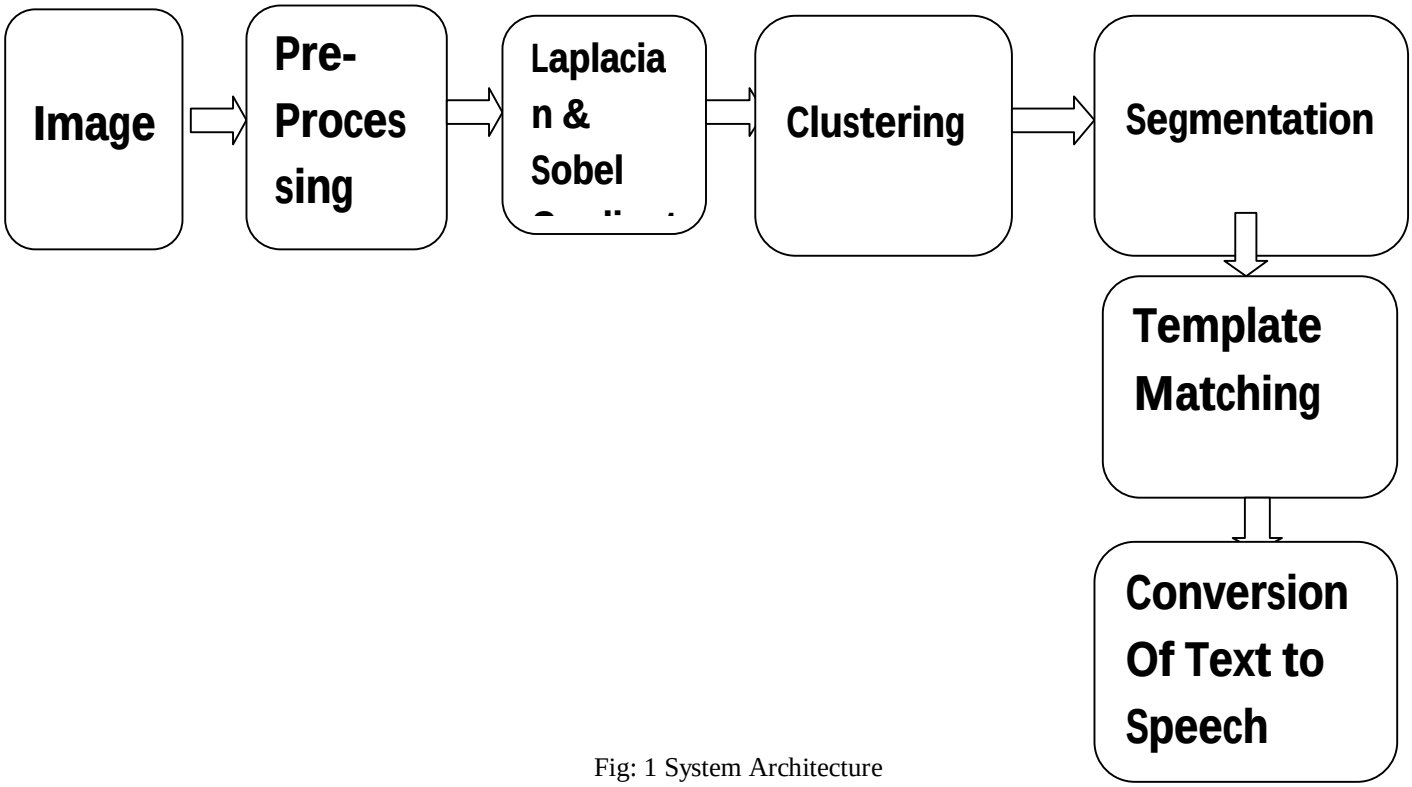

Fig: 1 System Architecture

It is difficult to perceive message in pictures straightforwardly through OCR programming on account of complex background. When the framework checks entire picture for writings, content pixels with non uniform lighting and low contrast could seem to be merged with background due to similar colours. In this approach we extract text regions through clustering and then remove non-text regions through segmentation. A combination of region-based and texture-based method is used for text detection based on character features and properties of colour, gray scale and alignment of text.

III. METHODOLOGY

A. Preprocessing

Image pre-processing for operations on images at the lowest level of abstraction [8]. The point of pre-processing is a change of the picture information that smothers undesired bends or improves some picture highlights pertinent for additionally preparing and examination assignment. Image pre-processing utilizes the excess in images. Neighbouring pixels comparing to one genuine object have the same or comparative brightness value. In the event that a misshaped pixel can be selected from the picture, it can be reestablished as a average value of neighboring pixels. Image pre-processing strategies can be ordered into classifications as indicated by the measure of the pixel neighborhood that is utilized for the computation of new pixel brightness. At the end of the pre-processing stage input image is converted into gray scale image(Fig 3).

Fig 2 Input Image

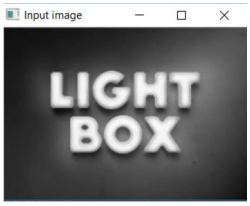

Fig 3 Pre-Processed

B. Log And Sobel Operator

The Sobel operator, once in a while called the Sobel– Feldman administrator or Sobel filter [9], is utilized as a part of inside edge identification where it makes a picture accentuating edges. The edges in the picture is got by applying LOG to the picture, Detection of zero-intersections in the picture, Threshold the zero-intersections to keep just those solid ones (huge contrast between the positive greatest and the negative least) The last advance is expected to smoother the frail zero-intersections probably caused by noise. The edges are detected and shown in (Figure 4 & 5).

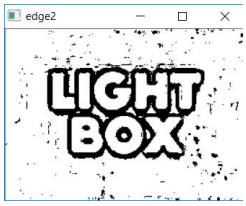

Fig 4&5 Edge Detection Image

C. Clustering

The clusters delivered by the k-means methodology are called "hard" or "crisp" groups [10], since any element vector x either is or isn't an individual from a specific group. This is as opposed to "soft" or "fuzzy" bunches, in which a component vector x can have a level of participation in each group. The fuzzy k-means methodology of Dunn and Bezdek permits each component vector x to have a level of enrollment in n clusters. It has the favorable position that it all the more normally handles circumstances in which subclasses are framed by blending or adding between outrageous cases, so it bodes well to state that x is 40% in Cluster 1 and 60% in Cluster 2, as opposed to assigning x totally to one cluster[11].

Fig 6 Clustered Image

D. Morphological Process

Morphological assignments is associated with gray scale pictures with the ultimate objective that their light exchange capacities are dark and in this way their supreme pixel regards are of no or minor interest [13]. Morphological procedures test a picture with a minute shape or layout called an structuring element. The structuring element is situated at all conceivable areas in the image and it is differentiated and the relating neighbourhood, while others test whether it "hits" or crosses the area [14]. The structuring element is a binary image, i.e., a small grid of pixels, each with an estimation of zero or one:

1) The system estimations decide the degree of the structuring element.
2) The test of ones shows the condition of the structuring element.
3) An initiation of the structuring element is regularly one of its pixels, all things considered the reason can be outside the structuring element.

Fig 7 Extracted Region Image

E. Segmentation

Text image segmentation can be accomplished at three levels. segmentation at any of these levels straightforwardly relies upon the idea of the application [15]. Progressively the points of interest required for the picture, the more is the level of segmentation. Line segmentation is the initial step for content based picture division. It joins level separating of the photo, pixel-push by pixel-push from left to right and completely. At every pixel the force is tried. Contingent upon the estimations of the pixels we gather pixels into numerous districts from the whole picture. The distinctive locale shows diverse substance in the picture document. Accordingly the coveted substance can be removed.

F. Word Segmentation

Word segmentation is the following level of division. It incorporates vertical examining of the picture, pixel-push by pixel-push from left to right and through and through. At every pixel the force is tried. Contingent upon the estimations of the pixels we assemble pixels into numerous districts from the whole picture. The diverse district demonstrates distinctive substance in the picture document. In this manner the coveted substance can be removed.

G. Character Segmentation

Character segmentation is the last level for content based picture division. It is like tasks as word division. A couple of insurances ought to be taken after while performing character division. On the off chance that the content picture contains a cursive sort of textual style at that point while portioning the ligature ought to be isolated for better proficiency.

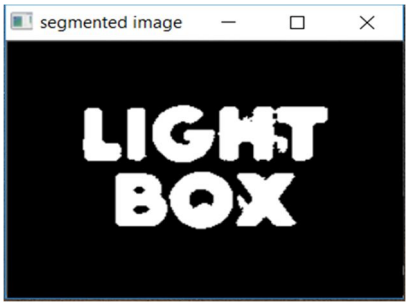

Fig 8 Segmented Image

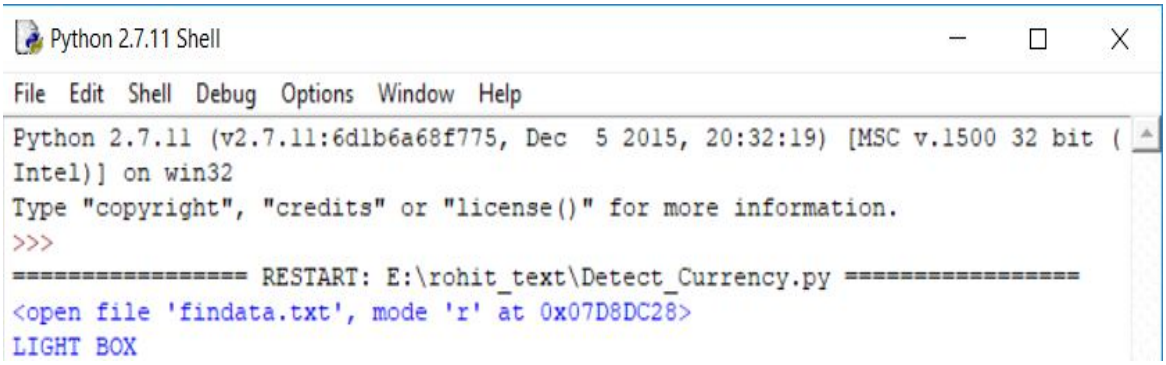

Fig 9 Detected Text

IV. RESULT

It was confirmed that Edge-construct techniques give great execution in light of scene pictures showing strong edges, which is difficult to acquire affected by shadow or extraordinary light however these strategies are exceptionally delicate to the noise of the image. On analysing the system with the test data, accuracy of 80% is obtained. The combination of texture based and region based are better in classification of text and non-text components and detects as well as recognises the text with complex background with better efficiency. This approach helps as an aid to visually impaired people to know the text that is present in the images. This could help them know about the address boards, name plates etc present in their surroundings. It is used for automatic number plate recognition at toll booths as well as for street boards reading purpose in case of unmanned vehicles.

V. CONCLUSION & FUTURE WORK

We have displayed a text detection approach that detects text that distinguishes text in normal pictures. This approach sets up non-specific PC vision strategies on end-to-end content acknowledgment in the picture. The character segmentation must be done carefully to avoid over segmentation. This can lead to recombination of small strokes to form a character.

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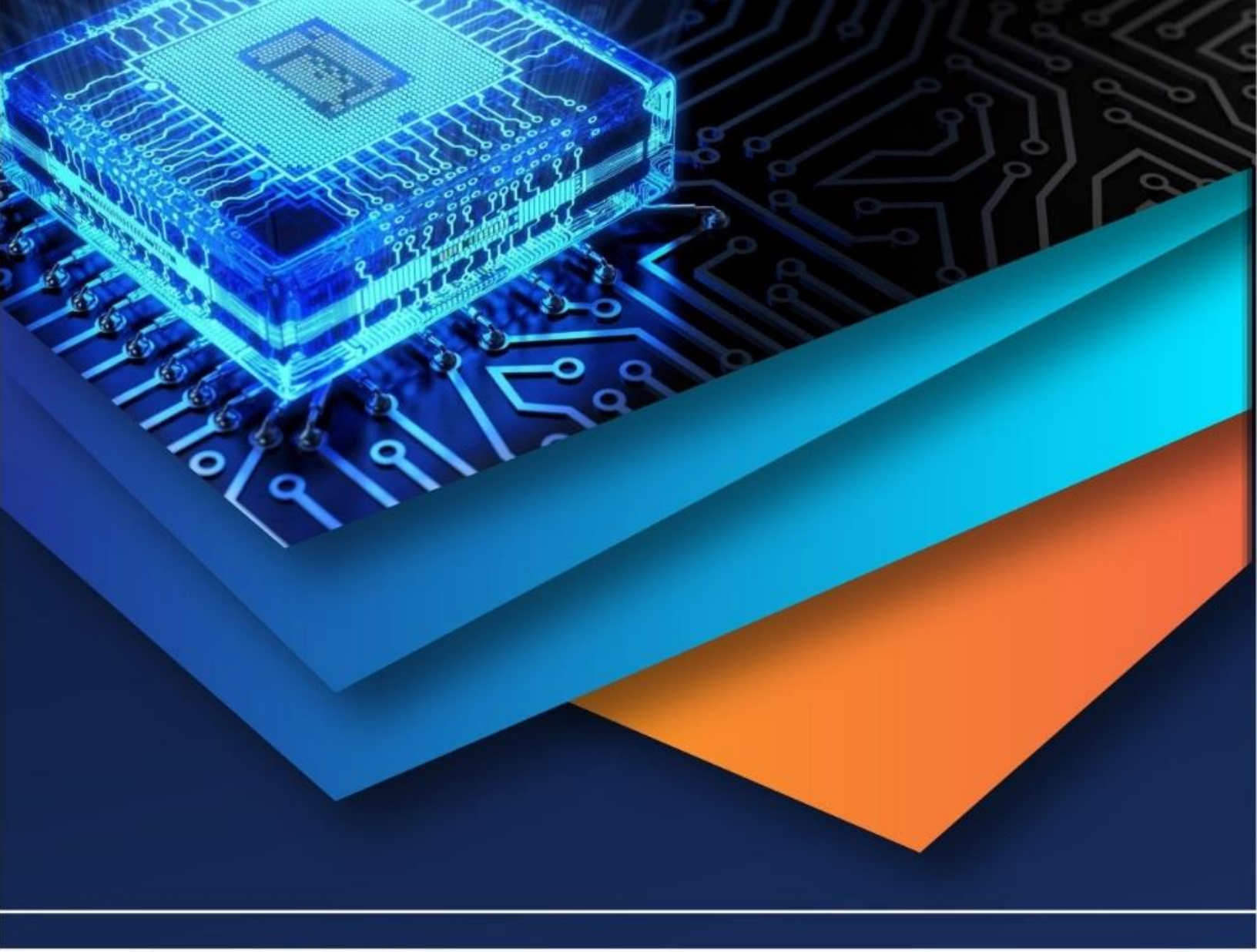

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