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Letters Extraction in Sign Board Using Various Optimization Techniques

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ABSTRACT

Accurate localization of randomly deployed sensor nodes is critically important in wireless sensor networks (WSNs) deployed for monitoring and tracking applications. The localization challenge has been posed as a multidimensional global optimization problem in earlier literature. Many swarm intelligence algorithms have been proposed for accurate localization. The untapped vast potential of the BFO algorithm has inspired the research presented in this paper. The ABC algorithm has been investigated as a tool for anchor-assisted sensor localization in WSNs. Results of Matlab simulation of BFO-based multistage localization has been presented. Further, the results are compared with those of the localization method based on the particle swarm optimization (PSO) algorithm. A comparison of the performances of BFO and PSO algorithms has been presented in terms of the number of nodes localized, localization accuracy and the computation time. The results show that the ABC algorithm delivers higher accuracy of localization than the PSO algorithm does; but, it takes longer to converge. This results in a tradeoff between speed and accuracy of localization in WSNs.

KEYWORDS: ***Text extraction, Text Localization, text recognition, PSO,BFO.***

I. Introduction

The text elements embedded in born-digital images, prevalenton the Web, carry salient semantic information such as advertisements and security-related information. Therefore, extracting text information from born-digital images enhances the semantic relevance of web content for indexing and retrieval. Usually, a text information extraction system consists of three steps: text localization, text segmentation & textrecognition. Text localization is critical to the overall system performance and is suffering from variable image background, text color and layout.

Many methods have been proposed for text localization in images, and they roughly fall into two categories: connected component (CC)-based and texture-based.CC-based methods have achieved state-of-the-art results on several public datasets(Kai Chen, 2016). Extracting candidate text CCs is the most critical step for those methods. On one hand, as many text CCs as possible should be recalled. On the other hand, fewer non-text CCs should be generated so that text CCs are more easily identified and grouped into text lines. Researchers frequently use color, stroke width transform (SWT) and maximally

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stable extremal regions (MSERs) to cluster pixels into CCs. Color clustering based methods (Yuanyuan Feng , 2015 ; Kuntpong Woraratpanya , 2014) adopt strategies such as k-means to segment an image in the hope that pixels belonging to the same text CCs are segmented into the same sub-image. Texture based methods are based on the observation that text regions in images have differenttextural properties in contrast to non-text regions. Some textual based methods (J. Canny,1986 ; H. Chen et.al , 2011) slide a sub-window in multi-scales through all locations of the image using a trained classifier to decide whether the sub window contains text or not. The exhaustive search makes the computation costly. There are also other methods A. (Clavelli et.al, 2010; T. E. de Campos et.al , 2009)which generate text region proposals first and decide whether each region proposal contains text or not. Designing effective features for discriminating textual regions from non-textualregions is the main difficulty of textual based methods.

The proposed method is CC-based. Unlike that many methods have been proposed for scene text detection, few works have been published specifically for born-digital images. Becauseborn-digital images present different characteristics from scene images, it is not necessarily true that methods developed for scene images are appropriate for born-digital images. Text strokes in born-digital images usually have complete contours and pixels on the contours have high divergence compared with the adjacent non-text pixels. This is often not true for text in scene images due to non-ideal camera-capturing environment.

The rest of the paper is organized as follows. Section II outlines literature survey. Proposed Algorithm to analyzed F- Score is discussed in Section III. The Performance parameter is analyzed in Section IV. Section V is concentrated on the simulated result of Viterbi Decoder. The conclusions are given in Section VI.

II. Literature Survey

Kai Chen proposesa new CC based method for text localizationin born-digital images. The proposed method generates character candidates effectively by first detecting text contours and stroke interior regions separately and then combining them. The CCs undergo CC filtering, line grouping and line classification to give the final result. Their method has achieved state-of-the-art performance on the born-digital dataset of ICDAR2013 Competition, convincingly demonstrating the effectiveness.

Yuanyuan Fengpresents a text detection method based on Extremal Regions (ERs) and Corner-HOG feature. Local Histogram of Oriented Gradient extracted through corners is used to effectively prune the non-text components. Experimental results show that the Corner Histogram oriented Gradient based pruning method can discard an average of 73.06% of all ERs in an image while preserving a recall of 80.51% of the text components.

Kuntpong Woraratpanya tells Thai Text localization and extraction in natural scenes is still a major challenge in current applications. However, the efficiency of recognition rates depends on text localization, i.e., the higher purity of text-background decomposition leads to the higher accuracy rate of character recognition. In order to achieve this purpose, the text-background decomposition methods, namely adaptive boundary clustering (ABC) and n-point boundary clustering (n-PBC), are proposed to improve a precision of text localization.

Khalid Iqbaltells about text localization .Text localization in scene images is an essential task to analyze the digital image contents. In this work, a Bayesian network scores using K2 algorithm in conjunction with the features based effective text localization method with the help of maximally stable extremal regions (MSERs).

Lukas Neumann gives an end-to-end real-time text localization and recognition method is

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presented. Its performance is achieved by posing the character detection and localization problem as an efficient sequential selection from the set of Extremal Regions.

Mohammad Shorif Uddin, Madeena Sultana, Tanzila Rahman and Umme Saym 2012 their main objective is to extract text from images. In this method, author discussed approach for detecting and localization text from scene images based on morphological features. Many researchers have been working on the development of techniques to extract texts from ascene images. Nirmala Shivananda and Nagabhushan proposed a hybrid method for separating text from color document images. But this technique can't extract text from difficult graphics. Partha Pratim Roy, JosepLlad' os and Umapada Palproposeda method for differentiate text from colormap based on CC analysis and grouping of characters in a string. These method scan detect hecharacters connected to graphics and separate them. But some of the characters can't be differentiate through connected component analysis. The algorithm of Antani and R. Kasturi works well for text separation from mixedtext/graphics image, but it make sanassumption which is not practical that character component sintexts are aligneds traight and does not touch or overlap with graphics. For improving accuracy they used modified morphological filter and also proposed clustering methods. Moreover, their method reduces noise in there sultant image. Experimental result confirms the dominance of their approach. With this method F-Score of 92.8% is achieved. RM. Chandrase karan ,P. Nataraj animple mented an approach in 2012 In this technique, they have presented aapproach for text localization and recognition in images. First, to remove any noise in theinputimage, the Medianfilteris used. Edges are detect edusing ZCED algorithm Then the morphological dilation operation is applied for object localization.

III. Proposed Algorithm

For Text localization,Particle Swarm optimization & Bacteria Forging optimization are used. These briefly explained as

1. PSO Technique

Particle Swarm Optimization modeled after the social behavior of birds in a flock. PSO is a population based search process where individuals act as particles and grouped act as a swarm. A candidate solution to the optimization problem is represented by swarm particle. In a PSO system, each particle is ‘‘flown’’ through the multidirectional search space&according to its own experience adjusting its position in search space and that of neighborhood particles. Therefore, the best position encountered by particlemake a particular use & their neighbors to position itself toward an optimizesolution. The effect is that still searching a large area around the best solution while particle

s ‘‘fly’’ toward a minimum. Using predefined fitness functions, the performance of each particle is measured which condense the characteristics of the optimization problem.

2. BFO

In order get maximum energy obtained per unit time, Bacteria search for nutrients.In this technique, communication between two bacterium takes place by sending the signals. A bacterium takes foraging decisions after considering previous factors. The process, in which a bacterium searching for nutrients and moves by taking very small steps, is called chemot axis and key idea of BFOA is repeating movement of imaginary bacteria in the problem search space. Since, BFOA has drawn the attention of researchers from diverse fields of knowledge especially due to its biological initiative and elegant structure. Different researchers are trying to hybridize BFOA with different other techniques in order to explore its global and local finding properties separately. This technique has already

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been applied to many problems and proved its power over many variants of Generic Algorithm and PSO. During foraging of the real bacteria, shifting is achieved by a set of tensile flagella. The two basic operations performed by a bacterium are E – coli bacterium to tumble or swim.

IV. Performance Parameter

It can be done on the basis of following parameters.

1) False Positives (FP) / False alarms are those regions in the image which are actually a text, but have been detected by the algorithm as text.

2) False Negatives (FN)/ these are those regions in the image which are actually texts, but have not been detected by the algorithm.

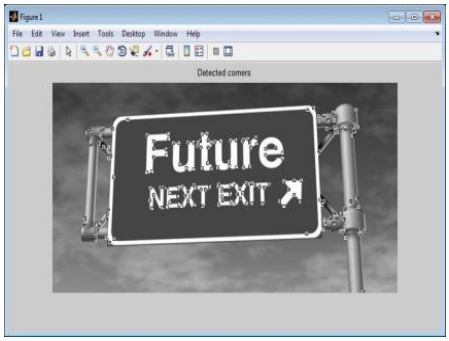
3) Precision rate (p) is defined as the average ratio of correctly detected characters text without image to the sum of correctly detected characters text plus false positives as represented in equation. p = Correctly detected characters/ [Correctly detected characters +FP]

4) RRC (Recall rate) = (No. of extracted characters text in image / No. of characters text in image) x 100.

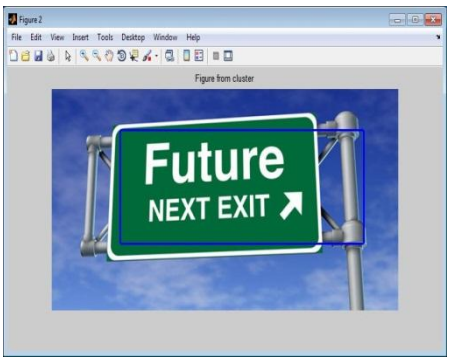
5) F-score is the H.M of the precision rate and recall rates

V. Result & Discussion

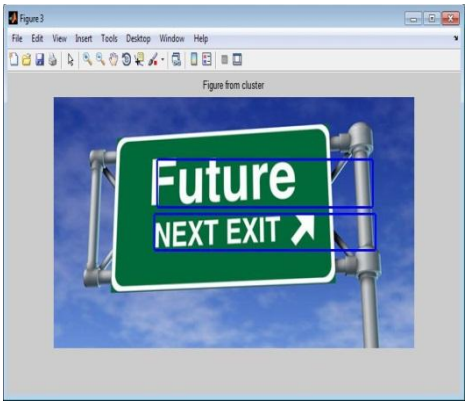
The Final extracted images are as shown in below fig. The comparison result is given as shown in Table 1.



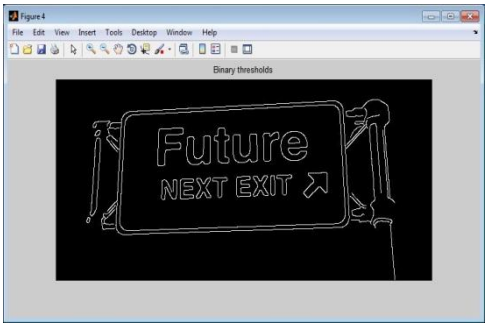
(a)



(b)



(c)



(d)

Fig 1 Final Text Extraction from Different Images.

Fig 1gives final detected text from the image. These texts counts & find the recall rate & precision rate. Hence find F- score.

As more is the F –score, algorithm is more efficient.

In our research, we have taken 10 images for text detection. On the basis of PSO & BFO algorithms

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recall rate and precision rate can be calculated.Table 1 gives Comparison of F- Score of the different images. The 1st Image has more F – Score as compare to others.

.Table 1. Comparison of F- Score of different Images

Sr. No.	Precision Rate	Recall Rate	F score
1.	86	79	82.35
2.	85	74	79.124
3.	71	59	64.45
4.	65	50	56.89
5.	62	45	52.44
6.	54	29	38.31
7.	48	26	33.63
8.	36	23	25.70
9.	35	21	26.18

VI. Conclusion

A method of character text string extraction from scene image is discussed and implemented. It can't only detect single and multiple texts and also detect arbitrary oriented text. It is based on mathematical morphology and OCR technique which can deal with various cases of scene images. Because in mathematical morphology, top-hats transformation (TT) provides an brilliant tools for extracting bright or dark objects from complex background. But for many complicated extraction problems, TT alone can't derive better result. For this reason ,we discuss this method which uses segmentation of images using mathematical morphology and extraction of text using OCR. The experimental results appear encouraging to demonstrate the efficiency of PSOand BFOfor shape analyzinganddetecting.Weintendedtoproceedwithourstudyontextextractionfromimageto improveits accuracy. With this approachF-scoreof83.35 is achieved.Finallya character recognition system on scene image using PSO & BFOis suggested to be constructed.

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