Natural Scene Text Extraction

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ABSTRACT - Text embedded in natural scene images contain large amount of useful information. Extracting text from natural scene images is a well known problem in image processing area. Data which appear as text in natural scene images may differ from each other in its size, style, font, orientation, contrast, background which makes it an extremely challenging task to extract the information with higher accuracy. Many methods have been suggested in the past but the problem is still the challenging one. This paper presents an approach to extract the text in scene images with higher precision rate and recall rate.

KEYWORDS: Text, Images, Data, Extract, ICDAR 2003

1. INTRODUCTION

Today, most of the useful information is available into the text which is present into the natural images. For eg. Name of the brand embedded into clothes, text written on the nameplates, signboards etc. Extracting the text from these images is still a difficult task. There should be some mechanism to extract the text from natural images. Recent studies show some methods to extract text from images but the approach didn't worked fine for characters which are small in size. In this paper we have presented an approach which will extract the small sized characters and the approach works well with the text which is present into the noisy images also. Data from ICDAR dataset 2003 is being tested.

2. PREVIOUS WORK

[1] Kim K.C, Byun, H.R ., Song Y.W, Chi, S.Y, Kim, K.K, Chung Y.K presented method that extracts text regions in natural scene images using low-level image features and that verifies the extracted regions through a high-level text stroke feature. Then the two level features are combined hierarchically. The low-level features are color continuity, gray-level variation and color variance. [2] Shivananda V Seeri, Ranjana B Battur, Basavaraj S Sannakashappanavar presented a method to extract characters from natural scene images. Algorithm works well with the medium sized characters. [3] Xiaoqing Liu et al. proposed "Multiscale edge based text extraction from complex images", method which automatically detects and extracts text present in the complex images using the multi scale edge information. This method is robust with respect to the font size, color, orientation and alignment and has good performance of character extraction. [4] Nobuo Ezaki and Marius Bulacu, Lambert Schomaker presented a text extraction method for blind persons. [5] Xu-Cheng Yin, Xuwang Yin, Kaizhu Huang, Hong-Wei Hao presented robust text detection in natural scene images. A fast and effective pruning algorithm is designed to extract Maximally Stable Extremal Regions (MSERs) as character candidates using the strategy of minimizing regularized variations.[6] Yang, presented the problem of recognizing and translating automatic signatures.

3. PROPOSED METHOD

Text extraction method which is being used in our algorithm is edge based method and reverses edge based method. Our method presents an approach which will extract the characters from noisy images and it will extract the small sized characters also. Method is based upon Converting RGB Image into HSI Plane and removing noise if there is any.

3.1 Extracting Characters from Edge Image

In this method edges are detected using sobel operator on each edge. Image after detection is binarized using Otsu's Binarization and then the dilation and extraction of connected component is done. The method works well with the characters which are small in size

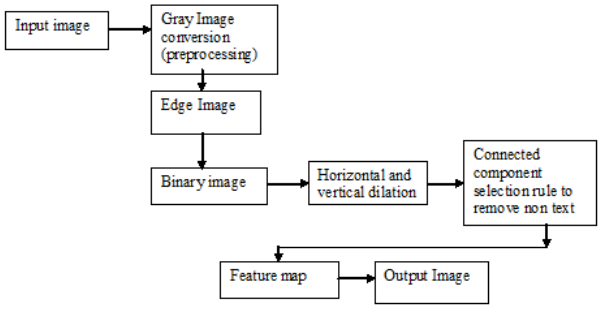


Figure 1

3.2 Extracting Characters from Reverse Edge Image

Image is reversed before dilation and extraction of connected components.

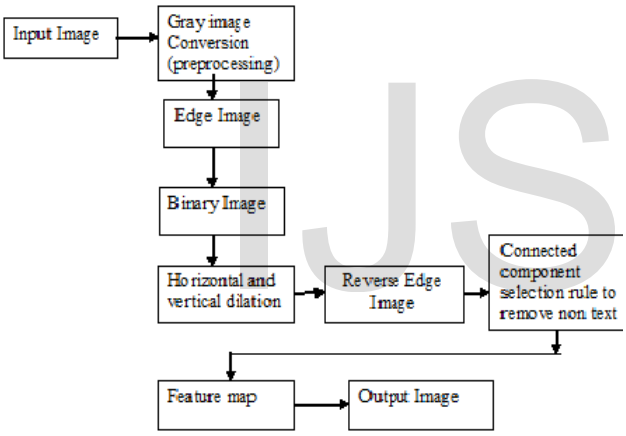


Figure 2

3.3 Combined Approach

OR operation is applied into the image obtained from edge image and reverse edge to remove the noise from the image

3.4 Implementation

3.4.1 Conversion and Edge Detection

Input image is converted into RGB image. Corresponding RGB image is converted into HSI image. The conversion is done using MATLAB operation which takes the RGB image as an input and returns the HSI image. Edges of the image are detected by applying sobel operator on the image.

Image being converted into HSI

Image after edge detection

3.4.2 Binarization:

Image obtained after edge detection is binarized using Otsu's Binarization and thresholding method.

3.4.3 Dilation and Extraction of Connected Component of Edge Image

Horizontal and Vertical dilations are done to extract the connected components from edge image.

3.4.4 Dilation and Extraction of Connected component of Reverse Edge Image

Connected components are extracted from reverse edge Image.

3.4.5 Removal of Noise by combining both the Methods

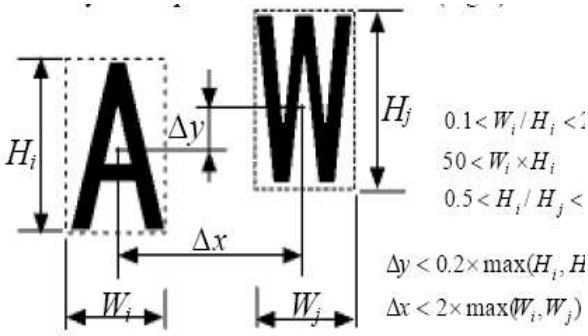
After extracting connected from edge image and reverse edge image, OR operation is applied on both the method

to remove the noise from the characters and final image is obtained after removing the noise and precision and recall rate are calculated.

Final Image

4. CONNECTED-COMPONENT SELECTION RULES

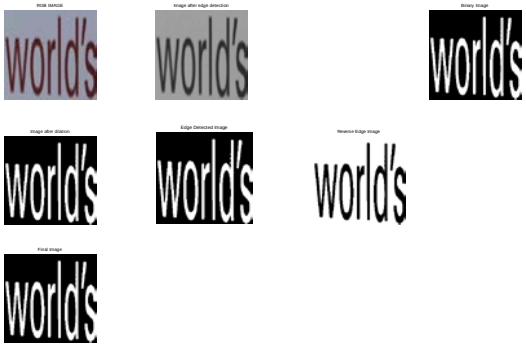
It can be noticed that, up to now, the proposed methods are very general in nature and not specific to text detection. At this point simple rules are used to filter out the false detections. We impose constraints on the aspect ratio and area size to decrease the number of non-character candidates. In Fig. 3, *Wi* and *Hi* are the width and height of an extracted area; Δx and Δy are the distances between the centers of gravity of each area. Aspect ratio is computed as width / height. Following rules are used to further eliminate from all the detected connected components which do not actually correspond to text characters.



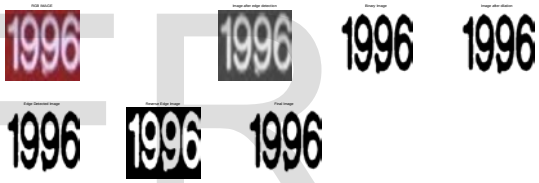
5. EXPERIMENTAL RESULTS

We have conducted the following test and after conducting the test, precision and recall rate were calculated.

Test 1



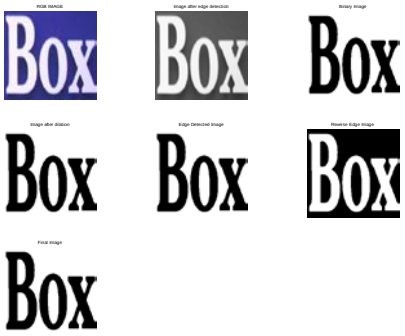
Test2



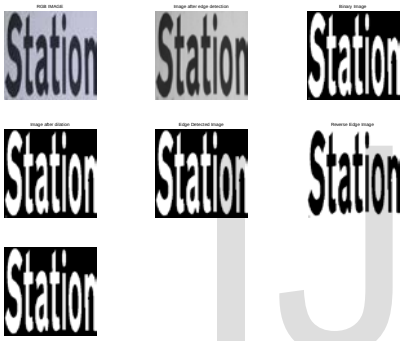
Test 3

Test4

Test5



Test 6



5.1 Test Results

Test	Precision Rate	Recall Rate
Test 1	100	100
Test 2	98.0769	98.0769
Test 3	100	100
Test 4	100	100
Test 5	100	100
Test 6	98.1818	98.0769
Overall Precision Rate	99.38	
Overall recall Rate	99.34	

5.2 Comparison with other Methods

Method which is proposed into the paper is compared with the existing text extraction Algorithms and the following results were obtained.

Method	Precision Rate (%)	Recall Rate (%)
Proposed Algorithm	99.38	99.34
Shivanand S. Seeri	98.46	97.83
Samarabandu	91.8	96.6
J. Gllavata	83.9	88.7
Wang	89.8	92.1
K.C. Kim	63.7	82.8
J. Yang	84.90	90.0

After Comparing with the other methods, proposed method is better than the existing one and it extracts small sized characters with higher accuracy.

6. CONCLUSION AND FUTURE SCOPE

In this paper we have tried to present an approach which will extract characters from natural scene Images with higher accuracy, precision and recall rate. Algorithm is implemented on small sized characters also and it works well with the small sized characters. Limitation of the algorithm is that it did not work well with the character images which are blurred in nature. Future work involves extraction of text characters from blurred images with higher accuracy.

7. REFERENCES

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