

# Improved Text Detection from Images using MSER Algorithm

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## ABSTRACT

In this paper the text is detected from image using MSER based method along with the image enhancement which results in the improved performance in terms of text detection. In addition, we improve current MSERs by developing a contrast enhancement mechanism that enhances region stability of text patterns to remove the blurring caused during the capture of image Lucy Richardson de blurring Algorithm is used. Finally the accuracy and performance of detected image is improved due to the use of MSER and Lucy Richardson de blurring Algorithm.

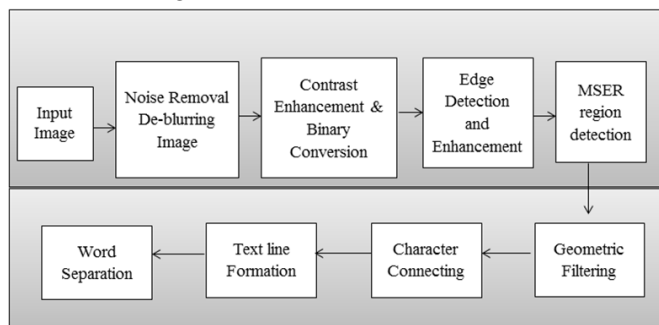
**Keywords :** MSER, CC, Binary Image, De-blurring Image

## I. INTRODUCTION

A novel Connecting Character based content acknowledgment and extraction calculation is composed which utilizes Maximally Stable Extremely Regions (MSER) for text applicant acknowledgment and extraction from activity signs [1-3]. In spite of their favorable properties, MSER has been passed on to be fragile towards obscured Image [4-7]. To take into account recognizing little letters in pictures of restricted determination or obscured Image, the complimentary properties of Lucy-Richardson Algorithm and watchful edge Algorithm is utilized [8-13]. Further geometric separating and matching is connected to proficiently get more dependable results [13-15]. At long last, messages are bunched into lines and extra checks are performed to dispense with false positives.

## II. TEXT DETECTION

We propose a novel CC-based text detection algorithm as shown in Figure.1



**Figure 1:** Proposed model of Text Detection

### 2.1 Text Recognition Phase

It consists of following steps as given below:

#### Step 1: Load Image

In this step firstly load the input image in which we have to detect text. Before proceeding towards next step first of all the algorithm crop that portion of image that contains text, Further the text can be rotated in plane, if required.

#### Step 2: Noise Removal and De-blurring Image

Because of defects in the imaging and catching procedure, be that as it may, the recorded picture constantly speaks to a degraded adaptation of the first scene. The corruption results in picture blur, affecting identification and extraction of the helpful data in the pictures. It can be brought about by relative movement between the camera and the first scene, by an out of center of optical framework, environmental turbulences and deviations in the optical framework.

#### Step 3: Contrast Adjustment and Conversion RGB image to Binary Image

Picture upgrade strategies are utilized to enhance a picture, where "enhance" is now and again characterized dispassionately (e.g., build the sign to-commotion proportion), and once in a while subjectively (e.g., make certain elements less demanding to see by altering the hues or intensities)

Further in this progression RGB Image is changed over into dim scale Image

#### Step 4: Edge Enhancement

In this progression, canny edge identification calculation is utilized for picture edge discovery. The calculation keeps running in 5 separate strides: Smoothing: Blurring of the picture to evacuate clamor. Discovering slopes: The edges ought to be checked where the inclinations of the picture has extensive extents.

Non-most extreme concealment: Only nearby maxima ought to be set apart as edges. Twofold thresholding: Potential edges are controlled by thresholding. Edge following by hysteresis: Final edges are dictated by smothering all edges that are not associated with an exceptionally certain (solid) edge.

To adapt to obscured pictures the propose calculation utilized the properties of Canny edges.

#### Step 5: MSER region detection

As the power complexity of content to its experience is regularly critical and a uniform force or shading inside each letter can be expected, MSER is a characteristic decision for content recognition. While MSER has been distinguished as one of the best area identifiers because of its vigor against perspective point, scale, and lighting transforms, it is delicate to picture obscure. Along these lines, little letters can't be recognized or recognized in the event of movement or defocus obscure by applying plain MSER to pictures of constrained determination[12].

### 2.2 Text Extraction Phase

It is consist of following steps as given below:

#### Step 1 and 2: Geometric Filtering and Character Connecting

With the extraction of edge-improved MSER, we get a paired picture where the forefront CCs are considered as letter hopefuls. As in most best in class content identification frameworks, we play out an arrangement of basic and adaptable geometric minds every CC to sift through non- content items. As a matter of first importance, substantial and little protests are rejected.

At that point, subsequent to most letters have angle proportion being near 1, we dismiss CCs with extensive and little viewpoint proportion. A moderate limit on the angle proportion is chosen to ensure that some extended letters, for example, "i" and "l" are not disposed of.

#### Step 3 & 4: Text line formation and Word separation

Content lines are imperative signs for the presence of content, as content quite often show up as straight lines or slight bends. To detect these lines, we first pair wise bunch the letter competitors utilizing the accompanying principles. The following phase of the calculation finds lines of content inside the distinguished competitor districts. This permits the aggregate number of CCs to be lessened, evacuating non-character CCs and thus enhancing the odds for higher exactness.

### III. METHOD OF TEXT DETECTION

#### 3.1. Lucy Richardson de blurring Algorithm

Because of the expansive utilization of handheld camera and savvy phone, image obscuring turns into a vital problem. There are two sorts of picture movement obscuring watched i.e. because of the movement of camera or because of the movement of item. The obscuring, or corruption, of a picture can be created by numerous variables[12].

Development amid the picture catch process, by the camera or, when long introduction times are utilized, by the subject, Out-of-center optics, utilization of a wide-point lens, air turbulence, or a short presentation time, which lessens the quantity of photons caught , Scattered light bending in confocal microscopy[17].

When all is said in done a Blurred picture can be displayed as

$$I = L \otimes k + n \quad ..(1)$$

In which I represent the blurred image; L is latent unblurred image; K is point spread function; and N is noise and the operator represent the convolution. Richardson-lucy algorithm [20] is well known iterative deconvolution method for image deblurring.

A more clearly deblurred image is generated for each time of iteration. After several iterations, a sharp and unblurred result image can be obtained. According to Baye's theorem, (1) can be transform into

$$L = \arg \max P(L/I) \alpha(I/L) (L) \quad \dots (2)$$

Then the formulation of Richardson-Lucy algorithm can be defined as

$$L^{t+1} = (k * I / L \otimes k) L^t \quad \dots (3)$$

The above formula is used for the deblurring of the image in Richardson-Lucy Algorithm [13].

### 3.2. MSER Algorithm

MSER is a technique for blob location in pictures. The MSER calculation separates from a picture various co-variation locales, called MSERs: a MSER is a stable associated part of some dark level arrangements of the picture . • MSER depends on taking areas which stay almost the same through an extensive variety of limits. – All the pixels underneath a given edge are white and every one of those above or equivalent is dark. – If we are demonstrated a grouping of threshold images with casing t relating to limit t, we would see initial a dark picture, then white spots comparing to nearby power minima will seem then become bigger[12-15]

$$\text{Image } I \text{ is a mapping } :D \subset Z^2 \rightarrow S \quad (4)$$

Extremal regions are well defined on images if:

1. S is totally ordered i.e. reflexive, antisymmetric and transitive binary relation exists .In this paper only  $S=(0,1,2,\dots,255)$  is considered ,but extremal regions can be defined on real valued images( $S=R$ )
2. An adjacency (neighborhood) relation  $A \subset D \times D$  is defined in this paper 4-neighborhood are used i.e  $p, q \in D$  are adjacent  $(p, Aq)$  if

$$\sum_{i=1}^d |p - q| \leq 1. \quad (5)$$

**Region Q** is a contiguous subset of D i.e. for each  $p, q \in Q$  there is a sequence  $p_1, a_1, a_2, \dots, a_n, q$  and  $p A a_1, a_1 A a_2, \dots, a_n A q$ .

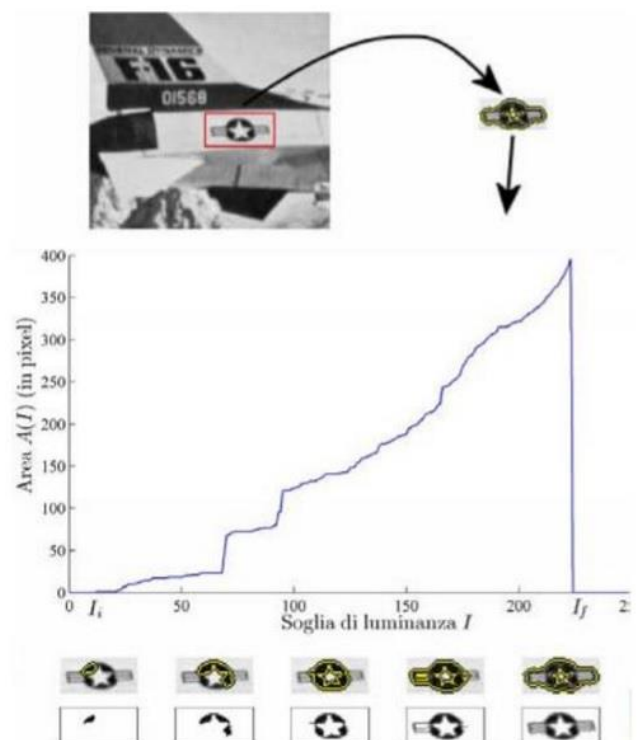
**Region boundary**  $dQ = \{q \in \frac{D}{Q} : p \in Q : qAp\}$  ,i.e, the boundary  $dQ$  of Q is the set of pixels being adjacent to atleast one pixel of Q but not belonging to Q.

**Extremal Region**  $Q \subset D$  is aregion such that for all  $p \in Q, q \in dQ : I(p) > I(q)$  (maximum intensity region) or  $I(p) < I(q)$  (minimum intensity region)

**Maximally Stable Extremal Region (MSER).** Let  $Q_1, \dots, Q_{i-1}, Q_i, \dots$  be a sequence of nested extremal regions ,i.e.

$Q_i \subset Q_{i+1}$ .Extremal region  $Q_i$  maximally stable if  $q(i) = Q_{i+d} / Q_{i-d} / Q_i$

These white spots will in the long run converge, until the entire picture is white. – The arrangement of every associated segment in the succession is the arrangement of all extremal locales [18].Optionally; circular edges are appended to the MSERs by fitting ovals to the districts [20].Those areas descriptors are kept as elements .The word extremal alludes to the property that all pixels inside the MSER have either higher (brilliant extremal districts) or lower (dim extremal locales) power than every one of the pixels on its external limit [12]



**Figure 2:** Region detected for different threshold area detected is different in MSER

## IV. RESULT AND ANALYSIS

In the result part the performance of the algorithm used is assessed experimentally. Here we also check the accuracy of the method for different test images. Here we use 4 different pattern images and the performance of system when applied to that image.

Let us consider the test image as shown in Figure 3:

### Test image



Figure 3: Traffic Image for text detection

Now separate out the text portion from image for text detection as shown in Figure 4:



Figure 4: Portion of Image that contains text

Now apply Deblurring LR algorithm in image shown in Figure 4 and we get image which shown in Figure 5:



Figure 5: De-burring of Image using LR algorithm

Now apply Contrast Enhancement to image in Figure 5 and we get the enhanced image shown in Figure 6.



Figure 6: Contrast Enhancement

After that apply the MSER method to image shown in Figure 6 and we get image as shown in Figure 7.

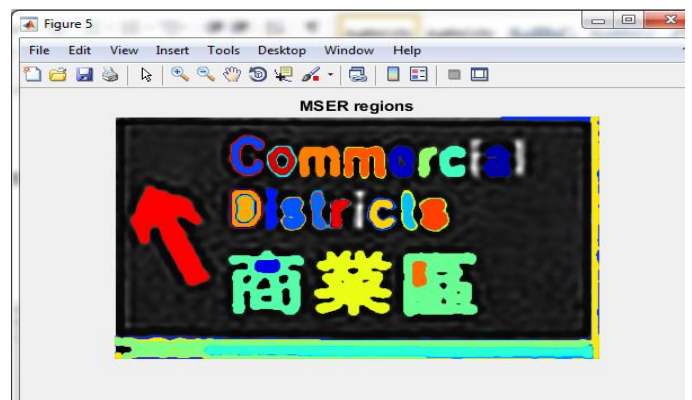
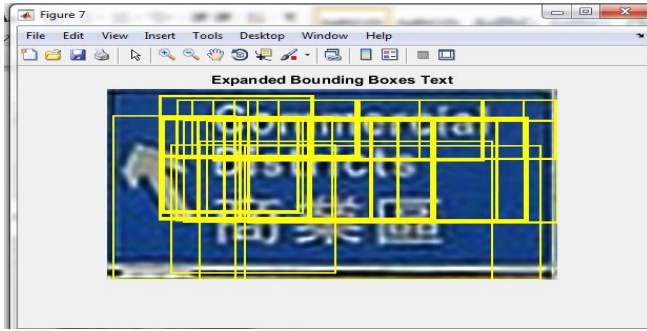


Figure 7: MSER region detection

Now create the Bounding Box in image shown in Figure 7 and get the image shown in Figure 8.



**Figure 8:** Bounding Box

Now after applying the bounding boz we get the detected text form image



**Figure 9:** Detected Output

**OUTPUT**



**Figure 10:** Detected Output



**Figure 11:** Output in command window

Above both images are the output or detected text from test images.

**V. PERFORMANCE**

By applying the MSER method we get the highly accurate text and whose accuracy are shown below.

**Test image**



OUTPUT TEXT =Commercial Districts  
ACCURACY = 19/19 = 100%

**VI. CONCLUSION**

This paper presents MSER based text recognition method. Here the image which is to be processed is first applied to as a input to the Lucy Richardson de blurring Algorithm which remove the blurring if present in the image after this image enhancement is done so that the intensity levels of the edges is increased the output from the image enhancement system is then feed to the canny edge detection system which detect the edges and then MSER region is used to separate the text from the background. After this various filters and text line method is used to make it easy for the user or system to identify the text part easily. The method using MSER Algorithm gives 100% accuracy when it comes to even background but when the intensity difference between text and the background reduces the accuracy of the

system also reduces still when you compare it with the previous algorithm it gives you far better results.

## VII. FUTURE WORK

As the algorithm is design for the recognition of text from the images and traffic signal it is needed that the accuracy of the system is maximum but apart from the many research still we are unable to design a system that can provide 100% accuracy. But for the text detection module a better performing labeling system is needed.

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