International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249 – 8958 (Online), Volume-9 Issue-4, April 2020

Text Extraction from Hoardings by Hybrid Model

D. Jayaram, J. Shiva Sai, CRK Reddy, V. Kamakshi Prasad

***Abstract**: There are various techniques available to detect and extract the text from hoardings. Still it is a challenging task to detect text from images of various sizes, orientation, illuminations and color. With a view to improve on these, a hybrid method of text extraction and detection is proposed. The proposed method uses a symmetry features like Mutual Magnitude Symmetry (MMS), Mutual Direction Symmetry (MDS) and Gradient Vector Symmetry (GVS) to identify text pixel candidates from natural scenes.*

The proposed method is tested on different datasets like ICDAR, CUTE 80 and also images from mobile phones. Implementation of MMS, MDS, and GVS methods on above datasets has been carried out. Text extraction from hoardings in ICDAR is giving 74% accuracy, CUTE80 is giving 76% and on mobile images 83% of accuracy is achieved.

Keywords: MDS, MMS, GVS, edge detection, segmentation.

I. INTRODUCTION

Content location of text from natural common scene pictures or images is a difficult assignment by the fame of various vision frameworks. The greater part of the current techniques concentrated on distinguishing level content in an image. Generally message location strategies can be delegated edge-based, associated segment based and district based techniques. Distinguish and restrict content areas with the assistance of district based strategy.

Present days, content of text data assumes a noteworthy job in numerous functions like assistive route, picture based hunt, object acknowledgment, scene understanding, and geocoding, and so on., on the grounds that it gives progressively conceptual data past various impression of different items. Be that as it may, removing content from common scene pictures must take care of testing issues like foresee the textual styles, sizes, hues, content characters and strings from a picture or image.

II. PROBLEM SPECIFICATION AND MODEL

There are various techniques available to detect and extract the text from hoardings. It is a challenging task to detect text from images of various sizes, orientation, illuminations and color.With a view to improve on these, a hybrid method of text extraction and detectionis proposed. The proposed method uses a symmetry features like mutual magnitude symmetry, mutual direction symmetry and gradient vector symmetry to identify text pixel candidates from natural scenes.

Existing System:

The present system can adequately identify content strings in self-assertive areas, sizes, directions, hues and slight varieties of brightening or state of connection surface. Present framework centers around free investigation of single characters. The content string structure is progressively powerful to recognize foundation obstructions from content data. It is likewise used to decide if the associated segments have a place with content characters or unforeseen clamors.

Proposed System:

In proposed structure, expanding exactness of text or content mining is a significant errand task. Accuracy (Exactness) is built by methods for on the increase robust framework dependent on the ideas of MMS, Mutual Direction Symmetry (MDS), and GVS. These properties used to distinguish content pixel up-and-comers from common scene pictures which contain bends, circles, circular segment shapes etc., Proposed strategy works dependent on the way that info pictures contains content examples in both Sober and Canny edge identification techniques put on displays a comparable performance.

For every content pixel up-and-comers decide if the associated parts have a place with content characters or unforeseen clamors. Chiefly we concentrated on bended content to separate the content segments dependent on a closest neighbor measure. Right now heading and spatial investigation of pixel appropriation of parts used to sift through non-content segments in the picture. The proposed technique utilized ICDAR 2005 and ICDAR 2011datasets for level content assessment and CUTE 80 dataset for bended content assessment to show its adequacy and prevalence over other existing strategies. Figure1 is the square chart of the cross breed strategy, this technique accepts pictures with various foundations as the information and afterward extricates content from the info picture.

Revised Manuscript Received on April 25, 2020.
* Correspondence Author
D. Jayaram*, Dept. of MCA CBIT, Hyderabad, India Email Id: jayaramcbit1974@gmail.com
J. Shiva Sai, Dept. of CSE, CBIT, Hyderabad, India
Dr. CRK Reddy, Dept. of CSE, CBIT, Hyderabad, India
Dr. V. Kamakshi , Prasad, Dept. of CSE, JNTUH, Hyderabad, India

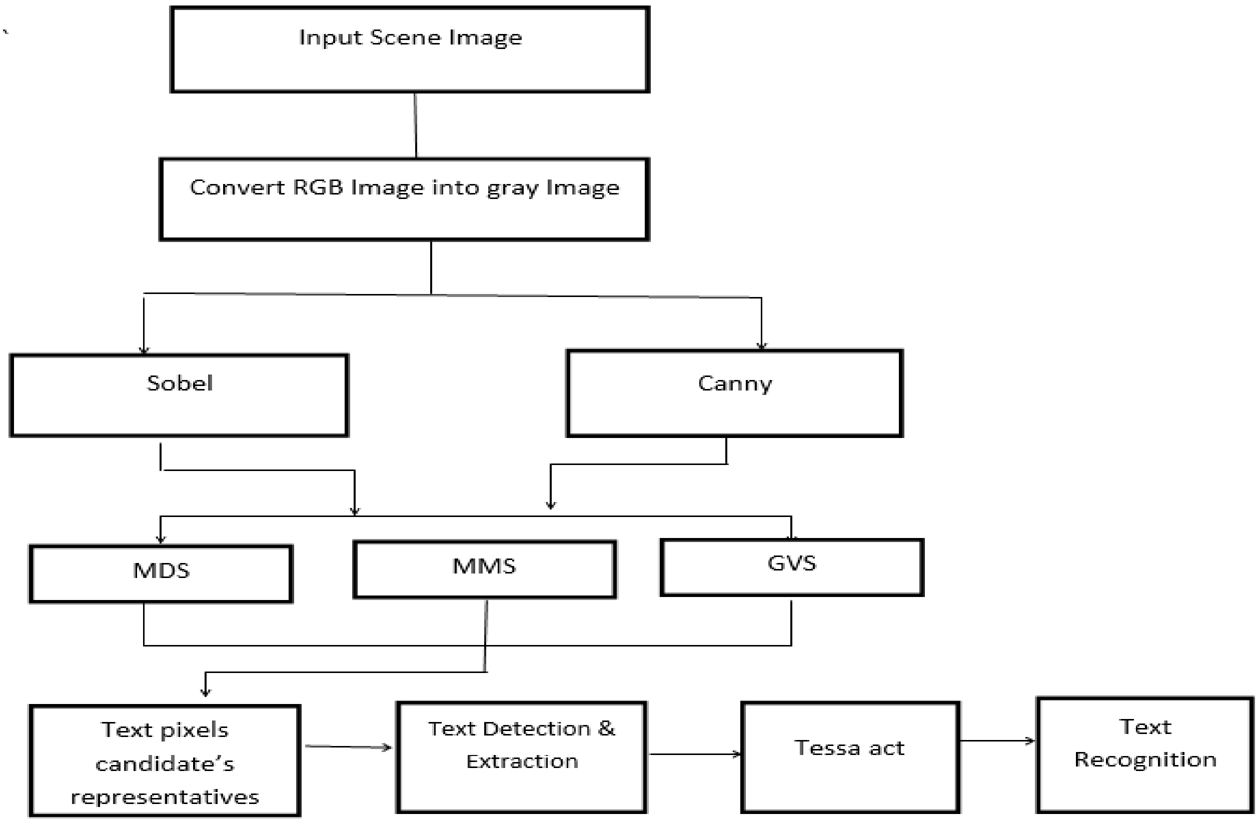


Figure 1: Block diagram of hybrid method

III. FEATURES EXTRACTION:

The proposed method uses MDS, MMS and GVSto identify text pixel candidates from natural scenes.

MDS Feature:

The MDS figures the separation between various pixels(like Pi,Pj). Experimentally, in the event that the separation is under three pixels, at that point it is said to be the pair of pixels that fulfill this property. In any case, this property is applied to both content and non-content states.

The followings algorithm works in 4 steps as given below.

Algorithm Direction (abs, dist)

//Input is edge detected image

//Output is image with pair of pixels

//abs is the absolute value of the target

//dist is the distance between two different points

{

1. Initializing input from edge detection

2. If (input contains negative pixel) then

Convert that pixel into positive pixel by using absolute.

Else if (input contains positive pixel) then shift & Compare pixel by pixel.

3. Find the direction by estimating distance between pixels.

4. If (distance is less than three pixel) then it is said to be pair of pixels.

}

Algorithm 1: **Mutual Direction Symmetry**

Retrieval Number: D6650049420/2020©BEIESP
DOI: 10.35940/ijeat.D6650.049420
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

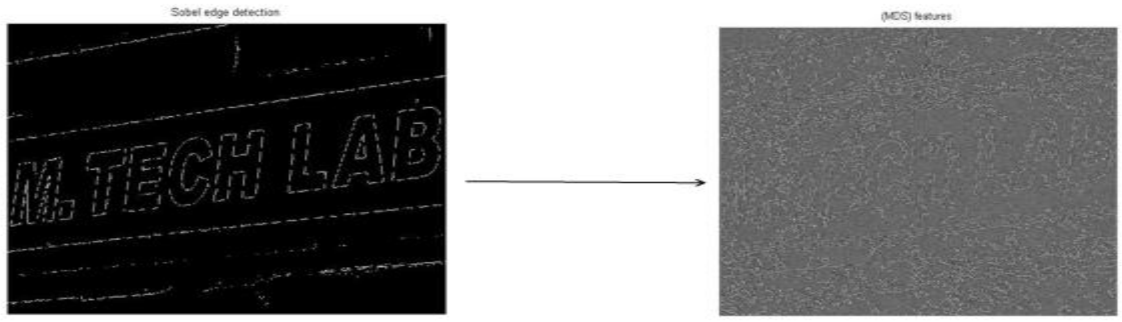


Figure 2: MDS features extracted image

MMS Feature:

The MMS which chooses content pixels and their inclination size qualities for both content area and non-content district of a picture. The inclination size qualities in the rectangular district are amplified. One can see the great contrasts among a large portion of the content pixels (green shading) are not exactly an edge (set at 0.15) while the extent contrasts among the majority of the non-content pixels are more prominent than the 0.15 edge. This is legitimate in light of the fact that when a couple of content pixels speak to their extent must be near one another. Note that we have standardized the pixels angle extent before taking the distinction and the limit esteem 0.15 is chosen experimentally and it is close as well.

The MMS which chooses content pixels and their inclination size qualities for both content area and non-content district of a picture. The inclination size qualities in the rectangular district are amplified. One can see the great contrasts among a large portion of the content pixels (green shading) are not exactly an edge (set at 0.15) while the extent contrasts among the majority of the non-content pixels are more prominent than the 0.15 edge. This is legitimate in light of the fact that when a couple of content pixels speak to their extent must be near one another. Note that we have standardized the pixels angle extent before taking the distinction and the limit esteem 0.15 is chosen experimentally and it is close as well.

$$Mean(\mu) = \sum_{i=0}^{n} \frac{x_i}{n} \quad (1)$$

$$Standard\ Deviation(\sigma) = \sqrt{\frac{\sum_{i=0}^{n} (x_i - \mu)^2}{N}} \quad (2)$$

Where μ is average of total pixels, xi isthe sum of individual pixels,N is total number of values and n is the total no. of pixels.

The following MMS algorithm works in 4 steps to extract actual text pixels as follows

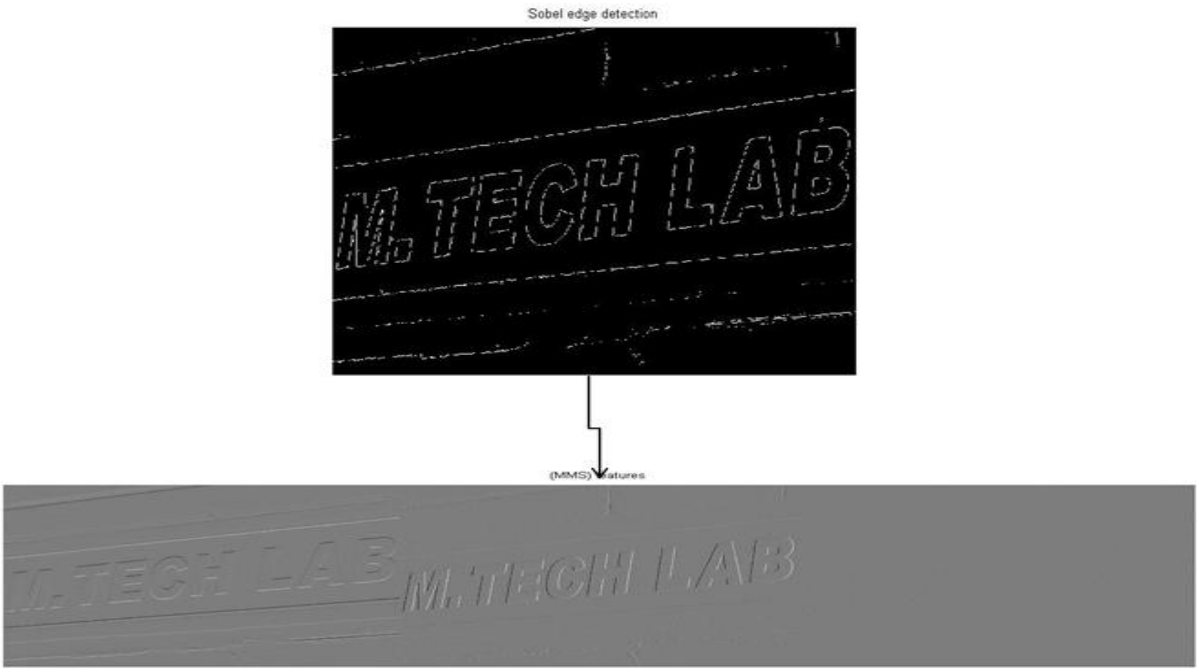


Figure 3: MMS features extracted image

From figure3, we can observe only text pixels are highlighted due to mean (μ), standard deviation (σ) calculation.

GVS Feature:

The GVS works by choosing pixels that fulfill evenness property utilizing the slope vector stream of pixels pair. In which, the bearing is generally inverse and characterization of content pixels for both content and non-content districts. The pixels in the content and non-content areas might be miss characterized.

Retrieval Number: D6650049420/2020©BEIESP
DOI: 10.35940/ijeat.D6650.049420
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

With the assistance of this property, the determination of content pixels is precise. The two MMS and MDS utilize the ordinary slope to process, yet GVS utilizes the GVF field.The following GVS algorithm contains 5 steps as shown below.

From figure 4, we can observe maximum text pixels of the image taken from the edge detection.

Algorithm GVS (Iteration, Step size)
//Input is Edge detected Image
//Output is Image with maximum text pixels
//Iterations is the no. of iterations
//Step size is the interval in between 0 to 1
{

1. *Select input image from edge detection.*
2. *Initializing rows & Columns of image.*
3. *Select the number of iterations.*
4. *Step Size is fixed in between 0 and 1.*
5. *Find the maximum text pixels from the image and extracting them.*

Algorithm 3: Gradient Vector Symmetry

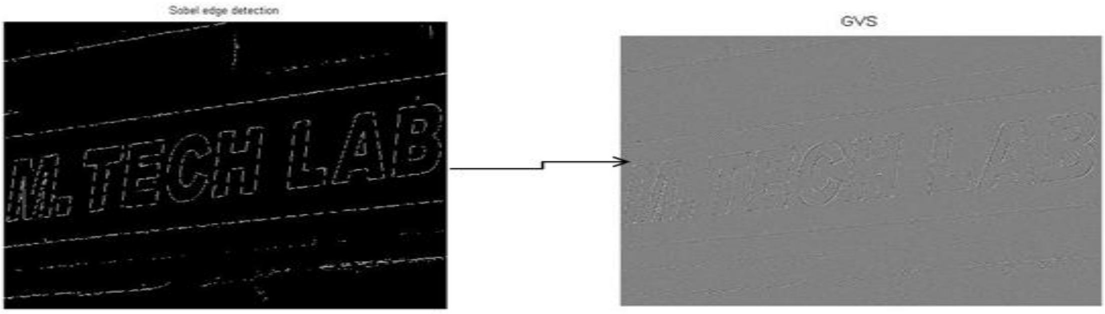


Figure 4: GVS features extracted image

IV. RESULTS AND DISCUSSIONS

We have considered a 200different images (irrespective of size, font, and style) in which there are display boards, number plates, posters etc. The following figures explain the process of implementation of the system. Consider the following figure5 as the input image.

Now rgb2grey conversion is done on the input image. The grey image is shown below in the figure 6. Now the grey image in figure6 is input to the sobel and canny edge detection methods. The edge detected images are shown below in figure 7 and figure 8.

After edge detection we need to extract the features like MDS, MMS, and GVS which are shown below in the figure 9, figure 10 and figure 11. We obtained maximum pixels from figure 11, which are used to detect the text and then apply Gaussian blur filter to find minor information which is used for text detection. After text detection, extract the text from green color box which is shown in figure 12. After extracting all the features, then carried out text detection and segmentation which are shown below in the figure 12 and figure 13

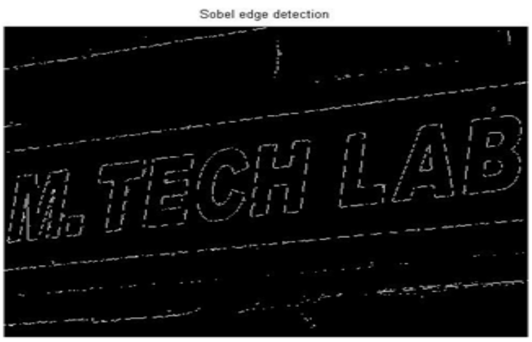


Figure7:Sobel edge image of hoarding

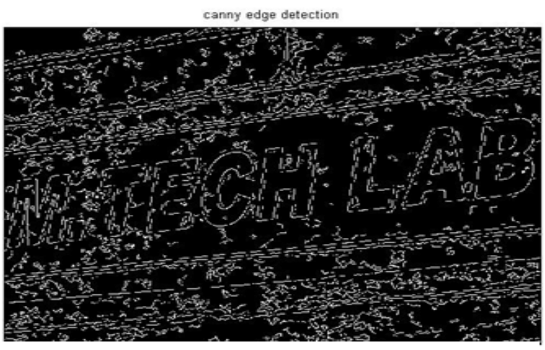


Figure 8:Cany edge image of hoarding

Retrieval Number: D6650049420/2020©BEIESP
DOI: 10.35940/ijeat.D6650.049420
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

Figure 5: Color image of the hording

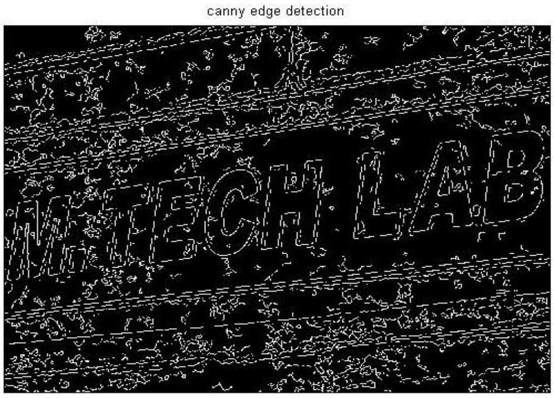


Figure 8: Cany edge image of hoarding

Figure 6: Gray image of the hoarding

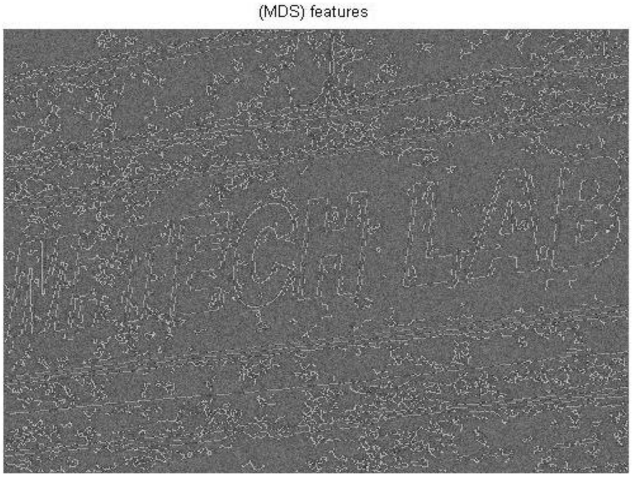


Figure 9: MDS features extracted from the hoarding

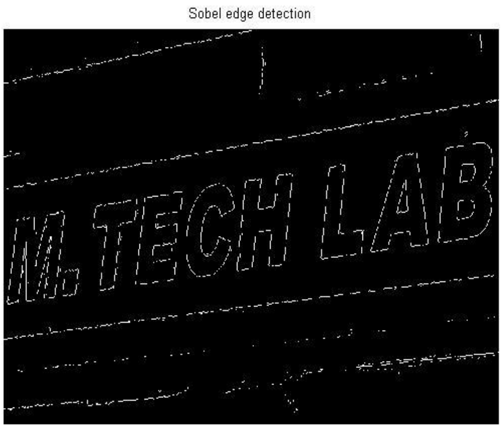


Figure7:Sobel edge image of hoarding

Figure 10: MMS features extracted from the hoarding

Figure 11: GVS features extracted from the hoarding

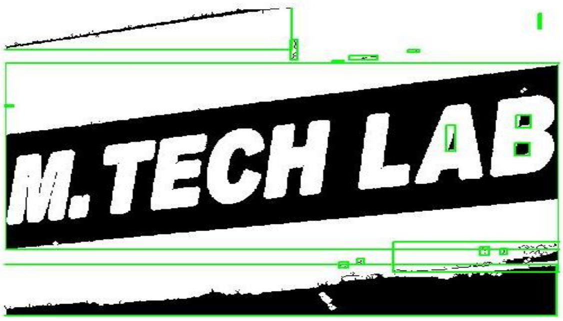


Figure 12: Text detection from the hoarding

The table 1 given belowshows how our proposed system is language independent and extracts different languages like Telugu, Hindi, English, Chinese, and Japanese. Extracted text can be recognized by using Tesseract tool or by using OCR (Optical Character Recognition) commands in MATLAB.

Table 1: Sample inputs and their outputs

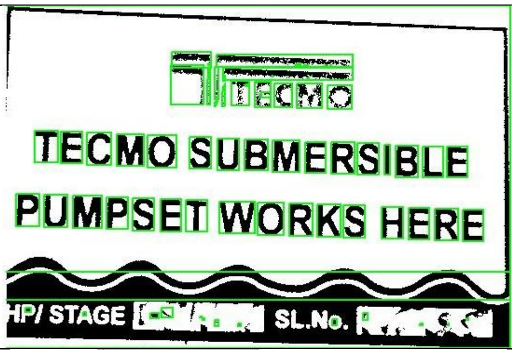
<table>
<tr><th>INPUT</th><th>OUTPUT</th></tr>
<tr><td>

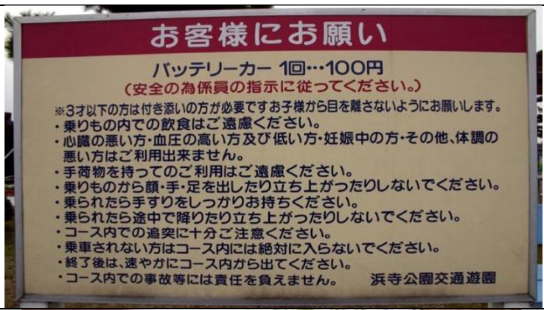

</td><td>

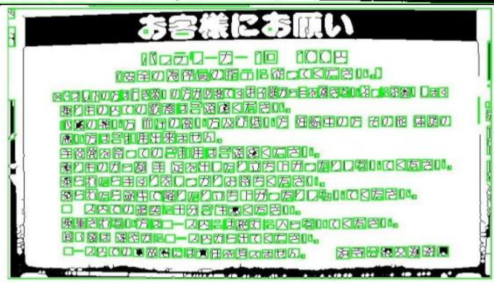

</td></tr>
<tr><td>


</td><td>


</td></tr>
<tr><td>


</td><td>


</td></tr>
<tr><td>


</td><td>


</td></tr>
<tr><td>


</td><td>


</td></tr>
</table>

The following table2 shows the results obtained on the various datasets.

Retrieval Number: D6650049420/2020©BEIESP
DOI: 10.35940/ijeat.D6650.049420
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

Table 2: Analysis of overall images

Datasets	Number of images	Total text characters	Correctly detected characters	Accuracy
CUTE 80	80	1076	861	75%
ICDAR	70	832	615	74%
Mobile Phone	50	678	562	83%

Three novel features(i.e. MDS, MMSand GVS) aim is to extract the common pattern of text on complex background. Time complexity of GVS is O(nlogn) which is higher than MDS and MMS time complexity O(n).Table 3 given below shows the list of failure cases with reasons.

Table 1: Sample inputs and their outputs

Image	Reason for failure
	Text is not recognized due to non-text pixels on round one is more dominant than text pixels. Hand Stitched characters are hard to detect in the image.
	Text onimage is not recognized due to foreground and background which is more cluttered. In this image du Fort is not visible.
	The image is a blur image. The objects in it are not effectively recognized. The edges are detected correctly. But after filtering it has failed to detect the text region.

V. .CONCLUSION

In this work, we can effectively extract text location from complex background. The text in different orientations, different fonts, and sizes can be detected from the curved text boards.We have tested on 200 images in which mobile phone images are giving more accuracy. Main aim is to work on curved text, various sizes and fonts of text. The objective was achieved successfully. Time complexity of GVS bit higher than MDS and MMS. Images which were taken by the mobile phone has given accuracy of 83%, hoardings in CUTE 80 given accuracy of 75 % and obtained accuracy of 77 % on curved text.

However text segmentation is failed on the blur images. Text extraction from hoardings is failed because pixels on the background are more dominant than the pixels on the foreground. Text extraction also failed in the case of image which contains hand stitched characters.

Text in cluttered images is still an unsolved problem because it is difficult to locate text regions on images. It is also hard to extract hand written text from the images. The future work is to remove noise as well as to detect and extract text by applying filters; we can include features like SIFT&SWT (Scale Invariant Feature Transformation and Stroke Width Transformation) to refine the text pixels candidates. For grouping the text pixels,ellipse growing method can be implemented.

REFERENCES

1. AnharRisnumawan , “A robust arbitrary text detection system for natural scene images” Expert Systems with Applications ,Volume 41, Issue 18, 15 December 2014, Pages 8027–8048.
2. PrashantMadavanavar, VinaykumarPatil “Text Region Detection And Extraction from Road Direction Sign Boards” International Journal of Engineering Research

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

&Technology(IJERT) vol. 2 Issue 7, July-2013.
3. ManjulaLamani, Arunkumar G, SrinivasaRaoUdara, Arun Kumar K. M, Spoorti J. Jainar "Detection and Localization of Text from Natural Images with a Hybrid Method" The International Journal Of Science & Techno ledge, 242 Vol 2 Issue 4 April, 2014.
4. FebyAshraf andNurjahan V A "Connected Component Clustering Based Text Detection with Structure Based Partition and Grouping" IOSR Journal of Computer Engineering Volume 16, Issue 5, Ver. III (Sep – Oct. 2014), PP 50-56.
5. Rafael C.Gonzalez ,RichardE.Woods ,Digital Image Processing third edition McGraw Hill.
6. Shehzad Muhammad Hanif and Lionel Prevost,"Texture based Text Detection in Natural Scene Image" : A help to blind and visually impaired persons, Conference & Workshop on Assistive Technologies for People with Vision & Hearing Impairments Assistive Technology for All Ages CVHI 2007, M.A. Hersh (ed.)
7. Machine Learning Models and Neural Network Techniques for Predicting Uddanam CKD
8. P. Shiva kumar, T. Q. Phan, L. Shijian and C. L. Tan, Gradient Vector Flow and Grouping Based for ArbitrarilyOriented Scene Text Detection in Video Images, IEEE Trans. CSVT, 2013, pp 1729-1739.
9. Rashmi, Mukesh Kumar, and RohiniSaxena "ALGORITHM AND TECHNIQUE ON VARIOUS EDGE DETECTION: A SURVEY" International Journal (SIPIJ) Vol.4, No.3, June 2013.
10. TajinderKaur, NirvairNeeru "Text Detection and Extraction from Natural Scene: A Survey" International Journal of advance research in computer science and management studies volume 3, Issue 3, March 2015.
11. Vital, T. P., Shiny, P., Ashish, S. E., & Kumar, T. S. Statistical and Unsupervised MLs Analysis on Parkinson's Disease Data set Acquired from AP India.
12. Huizhong Chen, Sam S. Tsai, Georg Schroth, David M. Chen1, RadekGrzeszczukand Bernd Girod"Robust Text Detection in Natural Images with Edge-Enhanced Maximally Stable Extremal Regions" at nokia research center Germany.
13. X. Chen and A. Yuille, Detecting and reading text in natural scenes, In Proc. CVPR, 2004, 366 - 373.
14. K. Jung, K. I. Kim and A. K. Jain, Text information extraction in images and video: a survey, Pattern Recognition, 2004, 977 - 997.
15. J. Liang, D. Doermann and H. Li, Camera-based analysis of text and documents: a survey, International Journal of Document Analysis and Recognition, IJDAR, 2005, 84 - 104.
16. T. Anusha 'Text extraction from hoardings", International Journal of Innovative and Emerging Research in Engineering Volume 3, Issue 6, 2016.

AUTHORS PROFILE

D. Jayaram completed his MCA in 1998 from Andhra University, Visakhapatnam and M.Tech computer Science in 2007 from Osmania University, Hyderabad, India. Presently working as an Assistant Prof. in the Department of Computer Applications, CBIT (A), hyderabad. His area of interest is Image Processing, web technologies and programming languages. He Published four papers in international journals. He is a life member of ISTE.

J Shiva Sai assistant professor, department of CSE, CBIT(A). He completed B.Tech in CSE from JNTU, Hyderabad in 2014 and M.Tech in CSE from CBIT (Osmania University) in 2016.His area of research interest is image processing, computer networks and machine learning. He published two papers in international journals.

Dr. CRK Reddy completed his B.E in Computer Science and Engineering from University of Hyderabad, India in 1989, M.Tech from JNTU Hyderabad in 1998 and Ph.D in Computer Science and Engineering (Visualization of Program Dynamics through Stochastic L-systems) from University of Hyderabad, his area of interests is Algorithms, Automata Languages &Theory of Computations, Compiler Constructions, Data Communications, Artificial Intelligence, Neural Networks etc. He is presently working as Professor and Head of Computer Science and Engineering Department, MGIT, Hyderabad. He has published around 40 papers in national and International journals and conferences. Under his guidance five scholars completed Ph.D and four scholars pursuing Ph.D. He is a member of ISTE and IETE.

Dr. V. Kamakshi Prasad received Ph.D. from the department of Computer Science & Engineering at IIT Madras. Received M.Tech. and B.Tech. from Andhra University College of Engineering and KL College of Engineering (Nagarjuna University) respectively. Joined in JNT Univerity Hyderabad as Assistant Professor in the year 1992 and has been promoted as Associate Professor and Professor in the years 2003 and 2006 respectively. Served as Head of the Department Computer Science & Engineering JNTUH College of Engineering, Director Innovative Technologies, Controller of Examinations, Additional Controller of Examinations and Coordinator TEQIP-II at JNTUH College of Engineering Hyderabad.Served as Chair CSE Board of Studies JNTU CEH. Presently serving as member of CSE Board of Studies at the JNTUH and as Chair CSE Board of Studies at Mahatma Gandhi University Nalgonda.Guided 13 PhDs and 3 MS thesis works and currently guiding another eight PhD research scholars. The areas of research interest are Speech and Image Processing, Data Mining and Pattern Recognition.Presently a Fellow of Institute of Engineers (FIE) and Member of CSI and ISTE.Visited Czech Republic and USA.

Retrieval Number: D6650049420/2020©BEIESP
DOI: 10.35940/ijeat.D6650.049420
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication