NavaJyoti, International Journal of Multi-Disciplinary Research Volume 2, Issue 1, August 2017

# Image Segmentation and its Implications

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## ABSTRACT:

Image Segmentation does separating the image into different components known as segments. It plays essential role in object detection and recognition. Processing the whole image will cause more computation time. Segmentation methods are applied to retrieve only the targeted object with the better efficiency.Segmenation can be done on various factors like color,intensity,shape,texture and higher facts about the object. This paper gives the review of various image segmentation techniques and its applications in various fields briefly

Keywords:Image Processing, Segmentation, Thresholding ,Object detection.

## INTRODUCTION

Image processing technique has spread into wide area of applications.The Objects of interest can be detected by segmentation by considering various features. The image can be partitioned based on Similarity and Discontinuity. The first approach is to collect the objects which are similar in their characteristics. The Later approach divides the image depends on any unexpected change in the intensity. The success of the object detection or recognition is purely based on the success of Segmentation techniques applied.

There are various existing techniques are available in the literature. Each method has its own unique design structure to detect the object from the image.Salem[3] have proposed a method to detect fire and flame with phases i.e global contrast identification and local fuzzy method. Lowe[1] proposed a method for face recognition by merging scale invariant region method and gradient distribution . Romen Singh et al.[8]proposed a method for object detection by suppressing the background and by using masks to improve the accuracy. Kamini and Goyal[11] compared existing methods for vehicle detection and concluded that template matching methods performs well than the other methods

This Paper gives overview of different image segmentation methods in its applications and the conclusion.

## IMAGE SEGMENTATION METHODS

There are various segmentation techniques are existing .Some of the segmentation methods are briefly overviewed here. It can be classified into groups as

**a) Thresholding**

Thresholding algorithm segments the image into various classes by setting the threshold values T , based on features . Thresholding undergoes less computation than the other techniques[3].But choosing the inappropriate threshold value leads to incorrect results. Any point at (x,y) in image can be separated with f(x,y)>T ,detected as

foreground objects and f(x,y)<=T as background image. Different categories of thresholding are a) Global thesholding b)Local thresholding c)Adaptive thresholding .

In global thresholding the threshold value will be picked up for the entire image to separate the regions. In Local thresholding, different thresholds will be chosen for each segment. Adaptive technique each pixel will be chosen with respect to its local neighbourhood This method is well suited in contrast intensity variations environment. Some popular thresholding techniques are Otsu's, entropy thresholding. Figure 1 shows the ouput results of thresholding results.

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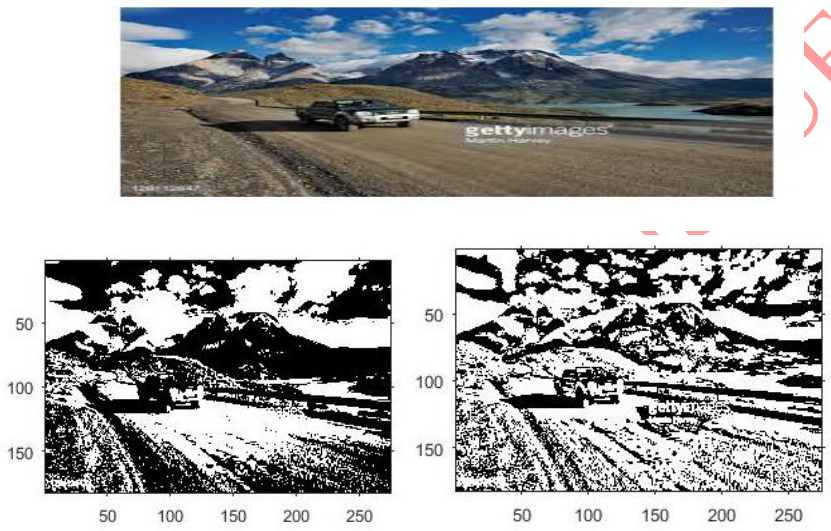


*Figure 1. a)original image of Image I b)using global thresholding with T=105 c) using adaptive thresholding technique with window size =20 and mean=0.02*

**b) Edge Based**

Edge represents outer margins of an object.The variation of the intensity usually gives rise to the edges. It filters the data which is not needed but preserves the structural properties. There are five different criteria to check the feature of edges [2][10].

a) False Positives-Detecting the other objects as edges which actually is not an edge
b) False Negatives-Failed to detect the original edges
c) c)Estimation errors in measuring edge angle
d) d) Missing the edges at corners and intersections.
e) A promising method can satisfy all the criteria to detect the edges prominently

Various edge detectors are existing to detect the boundaries of the object like canny edge detector, prewitt, sobel. Figure 2 shows the segmented results by using edge detection techniques

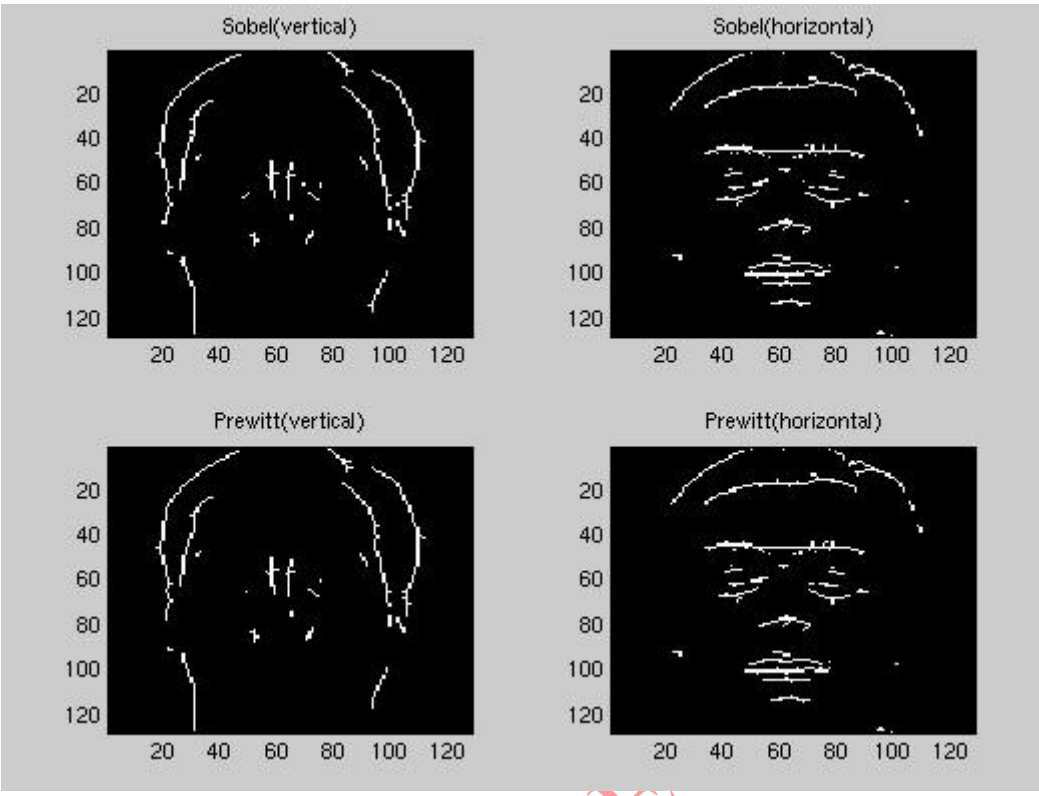


*Figure 2:Detecting the edges of face a) Sobel-vertical b)Sobel horizontal c) Prewitt-vertical d)Prewitt-horizontal*

**c) Region Based segmentation**

Partitioning the image into regions based on similarities. The pixels in a region are clustered together to reflect the homogeneous characteristics [9].Some of the region based methods are discussed here.

***Clustering***: Elements which are related to similar characteristics are grouped to form a cluster.
K-mean clustering: This method groups the pixels into K clusters where K< m where m is the total number of pixels in the image[7].Hard Clustering groups the pixels into clusters such that each pixel belongs to only one cluster. Fuzzy Clustering refers to soft-clustering technique which allows a pixel can belong to more than one cluster.

***Split and Merge*:** Split the image into homogenous regions and merge the regions later

***Region Growing*:** This method chooses a seed pixel and adds the pixel based on similar characteristics to a region. This process is continued until all the pixels are added to the regions. It is time consuming and less effective when there is noisier and intensity variations .Figure 3 shows the image is segmented into different regions

*Figure 3:shows the segmented regions*

### c) Histogram Based Method

It is simple and efficient method to group the similar pixels. From the histogram the clusters can be identified by the peaks and valleys. Based on the color and intensity the pixels can be grouped. This method can be easily adopted to multiple frames[6] .We can segment the image based on color easily by using this technique.Figure 4 shows histogram of an image

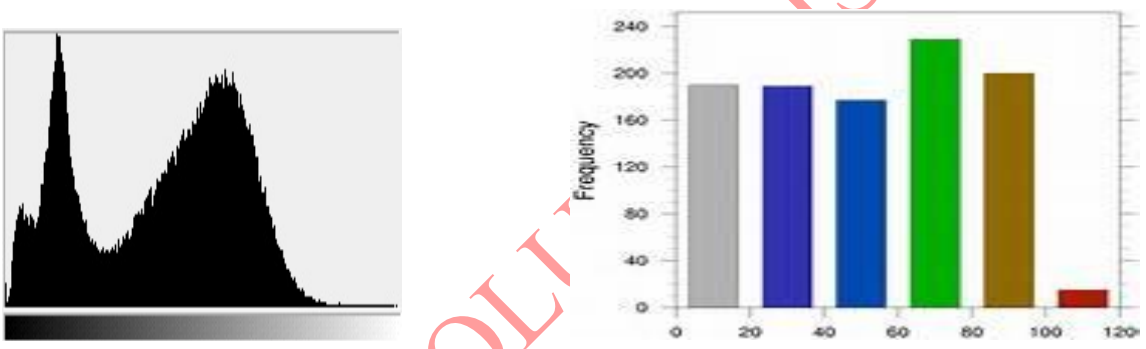


*Figure 4: a) and b) shows the histogram of the image*

### APPLICATIONS

1.***Face Detection***

Image processing techniques are used to detect facial features to recognize a person .Intially face will be captured by a camera. Features like iris, eyebrows, the mouth corners, outline structure, nose will be generated by using a feature extraction method [1]. By using those features face will be identified techniques. Genitic algorithm and eigen-face

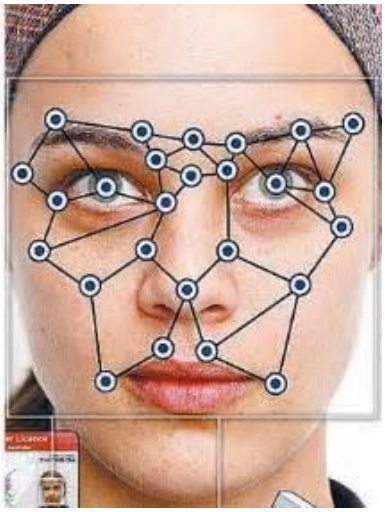

Figure 5:Shows the various features of face

2. ***Buildings and Machine Designs***

The egdes shows the outline structure of the machine and a building .By using Edge detection techniques the foreground object can be differentiated from background with edges and boundaries .Some of the existing algorithms are Roberts , Sobel, Canny edge detectors[4][9].

3. ***Fire Detection***

Fire is a dangerous hazard to the Environment. Segmentation can be applied to detect fire in a image or video .Fire can be identified with different characteristics like color, dynamic shape,t exture, smoke, etc. Fire can be detected by different techniques using color models-RGB,HSV,HSI,CIE Lab[5]

## CONCLUSION

This paper gives the overview of image segmentation methods. Each method is applied in different fields. Choosing the optimal method gives the better segmentation for object detection. There is no single method which provides optimal solution for all the issues .Each has its own advantages and disadvantes .There is a scope for researcher to develop a new segmentation with better results

## REFERENCES


[1] D. G. Lowe , “Distinctive Image Features from Scale-Invariant Keypoints ,” Int’l J. Computer Vision , vol. 2, no. 60, pp. 91-110, 2004.

[2] Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing." , Prentice Hall, 2nd edition, 2002.

[3] Salem Saleh Al-amri,N.V.Kalyankar and Khamitkar S.D,"Image Segmentation by Using Thershod Techniques',Journal of computing,Vol 2, Issues 5, pp 83-87,MAY 2010.

[4] Sivanantham, S; Paul, N Nitin; Iyer, R Suraj ,"Object Tracking Algorithm Implementation for security applications " , Far East Journal of Electronics and Communications , Vol 16, Number 1 ,pp 1-13,Mar 2016

[5] Jie Zhang , Xikang Wang and Ming Lv, " Flame image segmentation algorithm based on background subtraction ", Proc. SPIE 8761, PIAGENG 2013: Image Processing and Photonics for Agricultural Engineering, 876112 ,March 4, 2013

[6] N. Dalal, B. Triggs, “ Histograms of Oriented Gradients for Human Detection”, In: Proc. of the IEEE Computer SocietyConference on Computer Vision and Pattern Recognition (CVPR 2005), vol. 1, pp. 886-893, 2005.

[7] Ming-Ming Cheng, " Global Contrast Based Salient Region Detection ", IEEE Transactions on Pattern Analysis and Machine Intelligence,Vol 37 , Issue: 3 , pp:569 - 582,2014

[8] T.Romen Singh, Sudipta Roy, "New Local Adaptive Thresholding Technique in Binarization" ,IJCSI-International Journal of Computer science Issues,Vol.8,Issue 6, No 2,2011,pp 271-277.

[9] Su, Ching-Liang. "Car plate recognition by whole 2-D image." Expert Systems with Applications 38, no. 6:pp.7195-7200. 2011

[10] M. Thakkar, H. Shah, “ Edge detection techniques using Fuzzy thresholding .”Information and Communication Technologies (WICT), 2011. pp. 307-312

[11] Kamini Goyal and Dapinder Kaur," Performance Evaluation of Vehicle Detection Methods", IJSTM,presented on 26-27th March 2015.