



# Study of Various Image Segmentation Techniques

Samandeep Kaur

Assistant Professor, Dept. of Computer Science, S.D. Kanya Mahavidyalaya, Mansa (Punjab) India

**ABSTRACT:** The problems of digital image segmentation represent great challenges for computer vision. The wide range of the problems of computer vision may make good use of image segmentation. The Image segmentation is referred to as one of the most important processes of image processing. Image segmentation is the technique of dividing or partitioning an image into regions, called segments. Segmentation should generate the regions, that regions contains objects, parts of objects or group of objects which appear in the image There exist several image segmentation techniques like pixel based, edge based, model based and region based which partition the image into several parts based on certain image features like pixel intensity value, color, texture, etc Each technique follows its own approach and each has their own advantages and purpose. In this paper the various image segmentation techniques are reviewed, discussed.

**KEYWORDS:** Image segmentation; computer vision; Pixel-based; Edge –based; Model-based; Region –based.

## I. INTRODUCTION

Digital Image Processing is a important field of research in the areas of electronics and communication engineering, consumer and entertainment electronics, control and instrumentation, biomedical instrumentation, remote sensing, robotics and computer vision and computer aided manufacturing (CAM). In order to obtain a good visual display in applications like television, photo-phone, etc. and for meaningful and useful processing such as image segmentation and object recognition. Image segmentation is an important part of digital image processing. Main goal of the image Segmentation is to find regions that represent objects or meaningful parts of objects. Major problem of image segmentation are result of noise in the image.

This paper is arranged in four parts. Part II provides introduction to image segmentation. Part III covers related work. Part IV explains the current image segmentation techniques. Part V shows the conclusion and future scope of this paper.

## II. IMAGE SEGMENTATION

Segmentation is a partition of image into regions in which region satisfy the specified criteria. Regions homogeneous with respect to some property such as colour, texture[5]. Segmentation should generate the regions, that regions contains objects, parts of objects or group of objects which appear in the image[8]. Image segmentation is domain independent partitioning of an image into a set of disjoint regions. Someone looking at an image, he easily identifies the regions which are contained in a picture. This is because human visual system has an inherent quality to segment the image shown to it. [1]. Using image segmentation we separate the desired objects from the background. Colour and texture features in the images are very complex, so that separate the object from the background is very hard [4]. Objective of image segmentation extract attributes of interest from an image such as points, lines, regions etc. Image Segmentation is the key behind image understanding [3]. Basically there are two types of segmentation: Local segmentation and Global segmentation. Two basic properties of Segmentation is :

- Discontinuity
- Similarity

Discontinuity-based approach: In this approach, the subdivision of an image based on some abrupt changes in the intensity level of images. In this approach, identify isolated points, line, edges in an image [3]. In similarity-based approach, segmentation is based on similarities in the given image. Segmentation is ill-defined problem. It is

# International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 11, November 2016

impossible to define a single perfect segmentation for every image. For the best segmentation, we need the information to be obtained from the image [5].

## III. RELATED WORK

Ghule A.G.1, Deshmukh P.R. (2012) proposes the region based segmentation, some important issues, advantages and disadvantages of region growing [1]. Angeline Lydia (2011) proposed region splitting method provides the possibility of building a hierarchical representation of the image content and allows various region features and even domain knowledge to be incorporated in the segmentation process. The algorithm has been successfully tested on several artificial images [2]. M.arthanari and M.shivkumar (2011) proposed that Image segmentation is the prime area of research in computer vision. This paper explains the discontinuity based segmentation [3]. Jifeng Ning and Lei Zhang (2009) presents a new region merging based interactive image segmentation method.[4] Benjamin wah (2008) proposed that segmentation is an ill-defined problem, as its impossible to define a single perfect segmentation for every image. The best segmentation is usually dependent on the application and the information to be obtained from the image [5]. A.B.M. Faruquzzaman and Nafize Rabbani Paiker (2008) gives the basic idea about region based segmentation. This paper proposed the union of all the regions cover whole image [6]. Shu-Yen Wan (2003) proposed image-segmentation methods; region growing has been one of the most popular. Research on region growing, however, has focused primarily on the design of feature measures and on growing and merging criteria [7]. D.Raj Reddy (1978) discussed the region splitting method takes a region of image and using histograms of the feature value in this region determines a threshold in one feature to be used to split the region into sub regions. These regions are then further segmented if needed [8].

## IV. TECHNIQUES OF IMAGE SEGMENTATION

There are different techniques of image segmentation:

- Pixel-based Segmentation
- Edge-based Segmentation
- Model-based Segmentation
- Region-based Segmentation

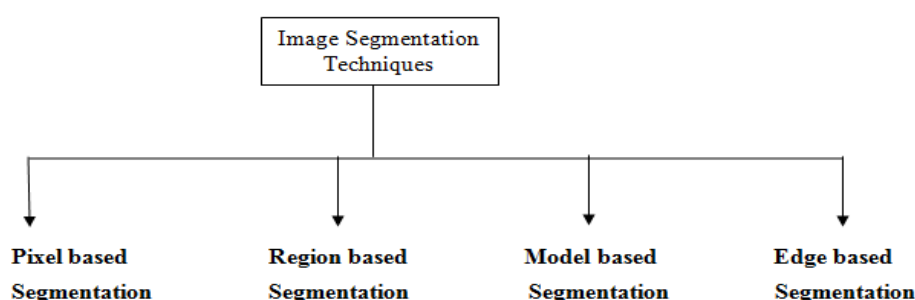


Fig.1. Image Segmentation techniques

### A. *PIXED BASED SEGMENTATION:*

Pixel-based segmentation is the simplest technique of the image segmentation. Pixel-based segmentation is technique in which segmentation is carried out based on discontinuities in intensity. To find the discontinuities run the mask ( $n*n$ ) over each point in the image [9].

# International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 11, November 2016

-1	-1	-1
-1	8	-1
-1	-1	-1

Fig.2. Pixed based segmentation

## B. EDGE BASED SEGMENTATION:

Edge-based segmentation is a most common approach of the discontinuity segmentation. An edge is a boundary between two regions. It is used when the image changes from dark to white. It defines the location of pixels in the images that belongs to the boundaries of the object in the image[3]. But this method does not work well with images in which the edge are ill defined or there are too many edges.

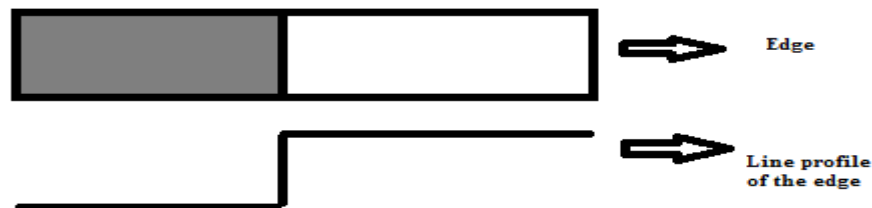


Fig.3. Edge Detection

## C. MODEL BASED SEGMENTATION:

Model-based Segmentation is a segmentation technique in which use motion as a cue to distinguish moving objects in an image sequence. Regions that moves are of interesta than still backgrounds.

## D. REGION BASED SEGMENTATION:

Region-based segmentation is a technique in which segmentation is carried out based on similarities in the given image. Region-based segmentation partition an image into regions. This technique for determining the region directly[1]. The homogeneity criterion can be used to add the pixels to region for which the criterion is satisfied. Split regions that do not satisfy the homogeneity criterion[5]. This criterion cab be based on the image feature such as gray scale, color, texture, shape. Region can be built either by grouping the pixels to form the region or by starting with single region and split the region. Splitting is continous until all the regions satisfy the homogeneity property. Similarity criterion can be tested on any region or group of region of an image[5].

Region that are formed using the Region Based Segmentation have the following properties: Let R represent the entire image.

# International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 11, November 2016

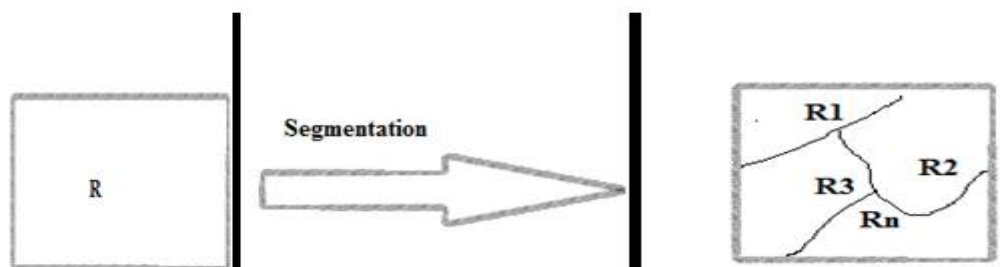


Fig.4. Region Based Segmentation

1. Union of all the regions equals the whole image [6].
2. Each region is continuous and connected [6].
3. The interaction of any pair of adjacent regions equals the empty set [6].
4. For each region, the uniformity predicate is true [6].
5. For any two adjacent regions, the uniformity predicate is false [6].

Region-based segmentation provide the following advantages:

1. It is very simple in nature.
2. It evaluate all the spatial properties of the image.
3. Data structure representation is easier than discontinuity-based approach.
4. It gives the dynamic solutions to image segmenations.

Region-based segmentation provide the following disadvantages:

1. It is more expensive and sequential both in computation at all time and memory.

## V. CONCLUSION AND FUTURE WORK

Image segmentation is an important part of digital image processing. Main goal of the image Segmentation is to find regions that represent objects or meaningful parts of objects. In this paper, a survey on various image segmentation techniques has been done. We discuss and evaluate main image segmentation techniques used for the purpose of image analysis. It is observed that there is no perfect method for image segmentation because the result of image segmentation is depends on many factors, i.e., pixel color, texture, intensity, similarity of images, image content, and problem domain. From the study it is clear that no single method is sufficient for every image type and no all methods are suitable for a particular image type. Due to the need of image segmentation in many applications, it has a challenging future.

## REFERENCES

- [1] Ghule A.G.I and Deshmukh P.R "Image Segmentation Available techniques, Open Issues and Region Growing Algorithm" Journal of Signal and Image Processing, 2012:71-75.
- [2] Angeline Lydia "An Accurate Image Segmentation Using Region Splitting Technique" Computer Science and Telecommunications, 2011.
- [3] M.Arthanari and M. Shivkumar "Image Segmentation using Discontinuity-based Approach" International Journal multimedia and image processing, 2011.
- [4] Jifeng Ning and Lei Zhang "Interactive image segmentation by maximal similarity based region merging" Pattern Recognition, 2009:445-456.
- [5] Benjamin Wah "Image segmentation by region based and watershed algorithms" Wiley encyclopedia of computer science and Engineering, 2008.



ISSN(Online): 2320-9801  
ISSN (Print): 2320-9798

# International Journal of Innovative Research in Computer and Communication Engineering

*(An ISO 3297: 2007 Certified Organization)*

**Vol. 4, Issue 11, November 2016**

- [6] A.B.M. Faruquzzaman and Nafize Rabbani Paiker "A Survey Report on the images segmentation based on split and merge algorithm" IETECH Journal of advanced computations, 2008:86-101.
- [7] Shu Yen Wan "Symmetric region Growing" IEEE Transaction on image processing, 2003.
- [8] Keith Price and D.Raj Reddy "Picture segmentation using a recursive region splitting method" Computer graphics and image processing, 1978:313-333.
- [9] M. Jogendra Kumar," Review On Image Segmentation Techniques" International Journal of Scientific Research Engineering & Technology (Ijsret), Issn 2278 – 0882 Volume 3, Issue 6, September 2014.
- [10] Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 2nd ed., Beijing: Publishing House of Electronics Industry, 2007.
- [11] T. Shraddha, K. Krishna, B.K.Singh and R. P. Singh, "Image Segmentation: A Review", International Journal of Computer Science and Management Research Vol. 1 Issue. 4 November 2012.
- [12] V. Dey, Y. Zhang and M. Zhong, "a review on image segmentation techniques with Remote sensing perspective", ISPRS, Vienna, Austria, Vol. XXXVIII, July 2010.

## BIOGRAPHY



**Samandeep Kaur** received her B.Tech from Punjabi University Regional Campus Yadavindra College of Engineering, Talwandi Sabo in 2013. She received her M.tech degree from Punjabi University Regional Campus Yadavindra College of Engineering, Talwandi Sabo. Her research interests include image denoising and image segmentation.