

# COMPARATIVE STUDY OF IMAGE SEGMENTATION TECHNIQUE

Vanshika Bhatnagar<sup>1</sup>, Mr. Deepak Kumar<sup>2</sup>

[Vanshikabhatnagartmu@gmail.com](mailto:Vanshikabhatnagartmu@gmail.com)<sup>1</sup>

[Deepak.computers@tmu.ac.in](mailto:Deepak.computers@tmu.ac.in)<sup>2</sup>

**Abstract-** The process of partitioning the digital image into various or multiple segments is known as image segmentation. Segmentation is also a operation in the image processing. The word image comes from the Latin word 'Imago'. Analysis of image is very useful in many fields, such as medical field, video surveillance etc. An image is categorized in two parts:

- (a) Raster type image
- (b) Vector type image

Till now so many image segmentation techniques are invented but still no any perfect image segmentation process is invented without any drawback. So in this paper we will do the comparative analysis of various image segmentation techniques.

**Keywords**— Pixels, colour, clustering

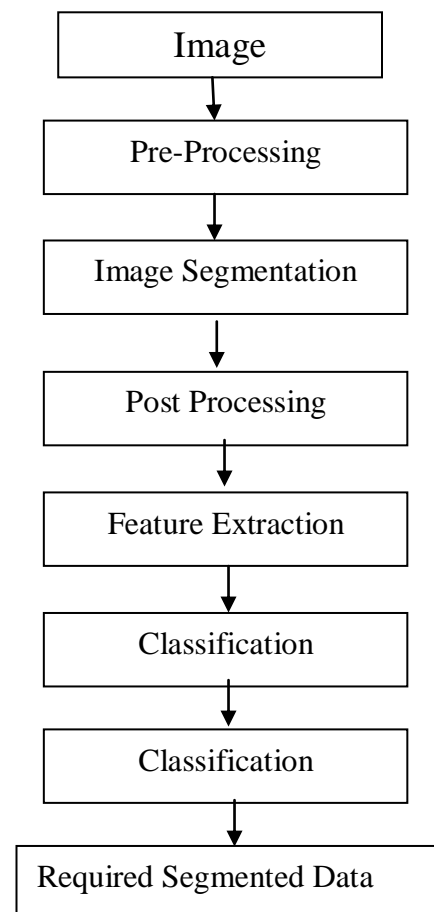
## I. Introduction

The assumption done by the Multichannel information processing has great importance because of the evolution of some fields like remote sensing, GIS etc. The examples of Multichannel information processing are Colour Image Preprocessing and Segmentation. These two are the classical example of the Multichannel Information Processing. We can define the Image Processing as the conversion of image into digital form and then performing some operation on it, so that useful information can be extracted. Multiple segments of the segmented image are also known as set of pixels or super pixels. The main motive of segmenting an image is to make the image more understandable and easier to analyze. The objects and boundaries (lines, curves etc. ) are located in the image with the help of image segmentation. A set of segments that

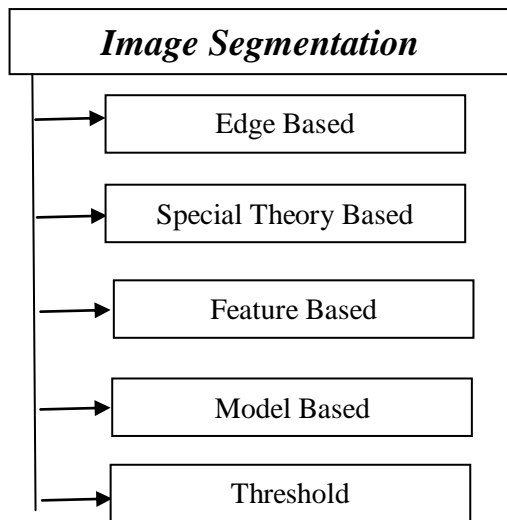
collectively covers the description of the entire image is known as the result of the image segmentation. In the whole region, each of the pixels are similar with respect to characteristics such as colour or intensity etc.

There are some fundamental steps involved in image segmentation which are shown as follows:

- 1.) Pre-Processing
- 2.) Image Segmentation
- 3.) Post processing
- 4.) Feature
- 5.) Classification



## II. Classification of Image Segmentation Technique



Fig(a). Classification of Image Segmentation

As we have discussed above, the process of dividing a particular image into homogenous segments is known as image segmentation. The image segmentation is further divide into following categories:

1. Edge Based Segmentation
2. Special theory based segmentation
3. Feature based segmentation
4. Model Based Segmentation
5. Thresholding

There are 2 characters of pixel gray level on which most of the image segmentation algorithms are based. The 2 characters of pixel gray level are:

- (a) Discontinuity around edges
- (b) Similarity in the same region or around edges.

Now we will discuss all the categories of image segmentation which we haveld stated above:

1. Edge based Segmentation- This category basically represents a large group of methods which are based on information about edges present in an image. After detecting an edge, the resulting image which we will get,that

will not be considered or cannot be used as segmentation result. There are three most commonly used gradient based methods:

- (i) Laplacian of Gaussian
- (ii) Canny Technique
- (iii) and, Differential Coefficient Technique.

There are also some common problems which ouccrs in edge based segmentation,like

(i) where the real border exists,there is no edge present.

(ii) where there is no border, an edge is present in locations.

2. Special Theory Based Segmentation- Special theory based segmentation algorithms are derived from other fields of knowledge, such as fuzzy mathematics, artificial intelligence and so on. This method also consists of some categories like,(i) Clustering based segmentation (ii) Neural based image segmentation etc.
3. Feature Based Segmentation- Features Based Segmentation is based on feature which are able to split into clusters or in clustering methods and histogram thresholding. In histogram based technique clusters are identified via the peaks of frequency is also fined out in a histogram. The problem which occurs in clustering technique is that when we define a certain number of patterns and set of regions the every pattern should belong to one of these region which is already defined.
4. Model Based Segmentation- In the model based segmentation, the image segmentation process can be useful if, repitition occurs in the structure in the input image.Model Based Segmentation is basically have application in medical field.
5. Thresholding- In image segmentation we further divide an image into multiple segments and these multiple segments contains set of pixels. After segmenting an image, each pixel is provided a fixed value

and that fixed value is known as 'Threshold'. By this fixed value, we decide the type of the pixel. There are two types of pixels: Object Pixel and Background Pixel. When the value of the pixel is greater than the threshold value of that pixel then that pixel will be considered as 'Object Pixel'. When the value of certain pixel is less than the threshold value of that pixel then that pixel is known as the 'Background Pixel'.

Thresholding technique is categorized as follows:

- (a) Local Thresholding
- (b) Dynamic Thresholding
- (c) Adaptive Thresholding
- (d) Global Thresholding

## II. The Segmentation Algorithms

There are three segmentation techniques:

- (a) Mean shift based segmentation algorithm
- (b) Efficient graph based segmentation algorithm
- (c) A hybrid of two

Mean shift based segmentation algorithm is used in the vision community as it is generally effective. It is comprised basically in two steps:

- (1.) Mean shift filtering of the original image data.
- (2.) Subsequent clustering of the filtered data points.

The mean shift filtering step consists of finding the modes of underlying PDF. After the process of mean shift filtering, each data point in space will get replaced by its corresponding mode.

## IV. Applications of Image Segmentation

There are various applications of image segmentation which are as follows:

- 1. Facial Imaging
- 2. Iris recognition
- 3. Fingerprint Recognition
- 4. Medical Imaging
- 5. Video Surveillance

- 6. Machine Vision
- 7. Pedestrian Detection

Some of them can be explained as:

- 1. Facial Recognition- The Facial recognition system is a computer application capable which identifies or verify a person from digital image. It has become so popular these days.
- 2. Fingerprint Recognition- Fingerprint authentication can be stated as, it is the method of verifying a match between two or more than two human fingerprint. It is basically used to verify the identity.
- 3. Video Surveillance- Other name of Video Surveillance is Closed Circuit Television(CCTV). This is used in several places like Airports, Banks etc. These are generally video cameras which are used to capture the live video of a particular moment.

## V. Conclusion

In this paper, we have discussed about the various image segmentation techniques. Applications of the image segmentation and the classification of the image segmentation are also discussed in this review paper. From the discussion we came to know that there are various different methods which are useful for different fields. There is no any specific method which can be applied for any type of image. So the work on introducing a specific one method which can be applied globally going on. From this review paper we also came to know that, most gray level image segmentation techniques could be extended to color image such as histogram, thresholding, edge detection, region growing and the fuzzy based approaches. They can be directly applied to each component of a color space, then the results can be combined in some way to obtain final segmentation result.

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