

# A Survey on Various Segmentation Techniques in Image Processing

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Received: March 05, 2019

Accepted: April 10, 2019

**ABSTRACT:** : In image processing, segmentation is considered as a much wider term as it's far the bottom for producing favored output statistics. Image segmentation is the method of partitioning images in to regions which consist of object or components of objects. Image is consisting of foreground and background. Isolating these features helps in the analysis of images. Segmentation is used to locate these objects and boundaries. Numerous segmentation techniques are advanced presently which allows in evaluation pixels with utmost accuracy. Three processes to segmentation, termed thresholding, edge-based methods and region-based strategies. This paper presents a comparative work on diverse present segmentation techniques/approaches in image processing.

**Key Words:** image segmentation, watershed algorithm, thresholding, edge-based methods and region-based.

## 1. Introduction

Image segmentation is a pre-processing techniques used for partitioning images into regions which consist of object or components of objects .It is used to distinguish foreground and background images i.e., to locate objects and components of objects in images. Images consist of pixels with varying intensities. Every pixel in the image is assigned with label and comparable pixels have equal labels. As a result of segmentation a set of objects or regions and boundaries comprises the total image. Isolating these features is critical in the analysis of images. Normally segmentation can be executed using three processes namely thresholding, edge-based methods and region-based strategies. In thresholding, pixels are classified based on the range of values wherein a pixel lies. In edge-based segmentation, an edge filter is applied and pixels are classified as edge or non-edge depending at the filter output, and pixels which are not separated are allotted to the equal category. In region based method, object with comparable features are categorized into a region.

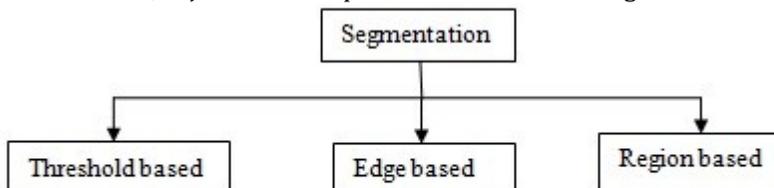


Fig 1 Classification of segmentation techniques

There is no general solution for image segmentation. Along with domain knowledge, various techniques have to be applied to solve the segmentation problem. In this paper each medical image and non medical segmentation techniques are analyzed. Additionally results of the comparisons of various algorithms are provided at the end of this paper.

## 2. RELATED WORKS

[1] Presented new algorithm for 3D volumetric CT liver segmentation. It makes use of hybrid techniques which mixes morphological, region and histogram based totally strategies. Because of the pixel similarity between neighboring abdominal organs over segmentation can take place. To avoid over segmentation Histogram tail threshold is used. Left and right threshold values are calculated to remove unnecessary pixels. Morphological filtering is applied to the resultant section to reap biggest contour to achieve the very last segmentation. [2] Proposed a quick and hybrid algorithm for image segmentation. The method used in this paper is targeted on the technology of correct and rapid segmentation of medical images with inseparable boundaries. Here multi-thresholding, similarity segmentation and template matching

techniques are used. Region splitting along with correlation matching is used within the first level and it uses edge based segmentation on the second level for finding region boundaries. As a preliminary phase they have got worked on the extraction of tumor, and in close by future they'll enlarge this work to 2nd phase as detection of size of tumor. In [3], a histogram based image enhancement and segmentation of scientific images are recommended. Here multi step technique is used to extract the image feature. The various steps proposed are enrichment, segmentation, hollow filling, and removal of branches.

For segmentation of color pixels a technique based on the GAC segmentation is applied in [4]. It extends the theory of gradient from one channel to a few channels. Here [4] color images are expressed as gradients. Researches display that the new version has higher performance than the GAC technique, specifically in segmentation of color images. [5] This paper recommended a technique to segment high resolution objects based on the graph. To identify high resolution objects, minimum Span Tree (MST) is used and to segment a multi-scale image, edge based threshold technique is used by converting the dimensions parameters. Suggested methods in [5] answers many remote sensing image segmentation problems. [6] Suggested the segmentation approach for lossless compression of light-field photos. Here a sophisticated model of Context Modeling of Sub-aperture image is proposed. The Adaptive Predictive Coding (APC) block is changed and a brand new set of rules for image segmentation (IS) block is developed. It defines contexts with advanced coding properties for the context modeling-based entropy coder. The consequences display round 2% development in comparison with CMS, and 4 - 5% development as compared with AVC.

For threshold based segmentation, determining the best possible threshold and values are challenging. This paper [7] proposed a technique to discover finest threshold values using firefly algorithm, which makes use of Ostu's objective function. It is beneficial in image retrieval, clinical images and many others. [8] Proposed an entropy based threshold techniques for segmentation. Images using those entropy techniques are refined and incorporate information than Ostu's technique. Entropy measures along with maximum entropy sum, Tsallis entropy and Renyi's entropy are compared in this. For MRI image segmentations [9] recommended Fuzzy C-mean based 3 level thresholding methods. A FCM can discover the degree of similarity among pixels and it can maintain extra facts about the segment. As in line with the notion CLAHE enhancement technique previous to segmentation will improve contrast. Additionally [9] proposes to use initial membership function as Gaussian pseudo random distribution in FCM set of rules for quicker and efficient segmentation. An image with noise has signal components. Noise within the image is varying. To segment noisy images, [10] proposed an ICA (Independent Component Analysis) method together with watershed algorithm for medical image segmentation. An ICA method eliminates noise and the effects are better than or just like wavelet de-noising results. It separate images into independent signal components and watershed algorithm to detect the watershed lines in image for segmentation. Through this approach, over segmentation imposed by watershed algorithm can be avoided.

### 3. Results OF FEW BASIC SEGMENTATION Techniques

Resultant of Ostu's thresholding and Watershed algorithm is given below. Sample images are taken from [11] and algorithms are mentioned in [12].

#### 1. Ostu's algorithm:

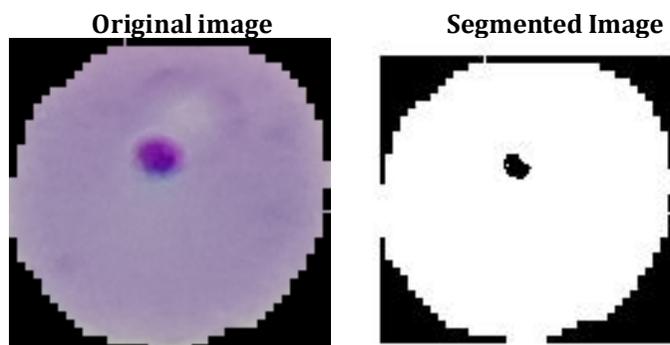
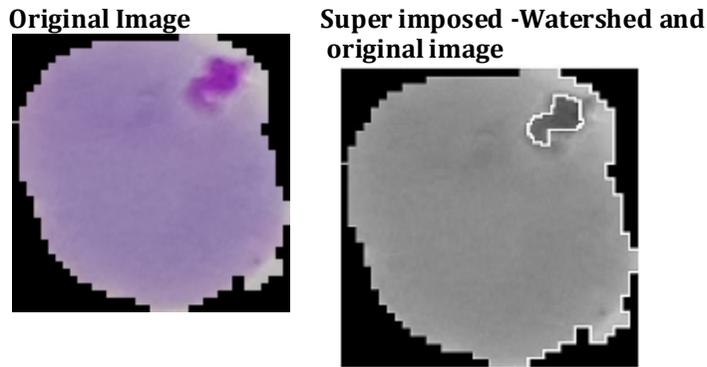


Fig 2

Ostu's algorithm is applied to malaria parasite image (Fig-1) and its corresponding output is shown in Fig-2. Ostu's thresholding method is one of the successful method for segmentation using thresholding.

## 2. Watershed Algorithm:



**Fig3**

Malaria parasite image is used as the input to obtain the output for watershed algorithm. Watershed algorithm is a commonly used segmentation technique.

## 4. Conclusion

In this paper numerous segmentation techniques have been analyzed. Each approach has its own advantages and disadvantages. Images are dissimilar in phrases of color, intensity, and pattern. So each approach on same image generates different level of output. It is not viable to use a particular technique on all image or all strategies on a sort of image. The selection of a segmentation technique over some other and the degree of segmentation are determined by the kind of image and type of the problem being considered. Due to this, segmentation is still a primary concern in digital image processing.

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