

Chapter 1

Study of Various Image Segmentation Methodologies: An Overview

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ABSTRACT

In day-to-day life, new technologies are emerging in the field of Image processing, especially in the domain of segmentation. Image segmentation is the most important part in digital image processing. Segmentation is nothing but a portion of any image and object. In image segmentation, the digital image is divided into multiple set of pixels. Image segmentation is generally required to cut out region of interest (ROI) from an image. Currently there are many different algorithms available for image segmentation. This chapter presents a brief outline of some of the most common segmentation techniques (e.g. Segmentation based on thresholding, Model based segmentation, Segmentation based on edge detection, Segmentation based on clustering, etc.,) mentioning its advantages as well as the drawbacks. The Matlab simulated results of different available image segmentation techniques are also given for better understanding of image segmentation. Simply, different image segmentation algorithms with their prospects are reviewed in this chapter to reduce the time of literature survey of the future researchers.

OBJECTIVE

Segmentation is the most important part in image processing. Fence off an entire image into several parts which is something more meaningful and easier to further process. These several parts that are rejoined will cover the entire image. Segmentation may also depend on the various features that are contained in the image. It may be either color or texture. Before denoising an image, it is segmented to recover the original image. The main motto of segmentation is to reduce the information for easy analysis. Segmentation is also useful in Image Analysis and Image Compression.

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INTRODUCTION

Images are primarily used in the field of computer vision for tasks such as navigation of robots, disease identifications from MR images, identification of number plates of moving vehicles, etc. (Somasundaram & Alli, 2012). The primary objective of computer vision and digital image processing is to automate different tasks and image segmentation is an important step in it.

Image Segmentation is a process of dividing an image into different parts. This helps to simplify or change the overall presentation of an image into such data which is more meaningful and easier for a system to analyze. In segmentation, value is assigned to every pixel of an image in such a way that the pixels which share certain characteristics, such as color, intensity or texture in a particular region are grouped together. Adjacent regions which are not grouped together must be significantly different with respect to the same characteristics. Purpose of dividing an image is to further analyze each of these subparts or sub-images so that some high level information can be extracted. Sometimes image denoising is done before the segmentation to enhance the image and improve the quality of the segmentation process (Dass & Devi, 2012). A novel method is proposed to find the contours of Hippocampus brain cell using microscopic image analysis (Hore, Chakroborty, Ashour et al., 2015). An algorithm is proposed for segmentation of blood vessels (Dey, Roy, Pal et al., 2012). Rough-set based image segmentation methods are reviewed in (Roy, Goswami, Chakroborty et al., 2014) and classification is done. A new algorithm is proposed to detect the shot boundary by using the minimum ratio similarity measurement between the characteristic features of two consecutive frames (Pal, Acharjee, Rudrapaul et al., 2015).

The chapter is organized as follows:

- Introduction is presented in Section 1.
- Section 2 discusses the background to the proposed study.
- Section 3 deals with available different segmentation methods.
- Matlab implemented results are discussed in Section 4 for better understanding.
- Finally, Section 5 concludes the chapter.

BACKGROUNDS

The details literature survey associated with different available image segmentation techniques are briefly discuss.

In region based technique pixels that are related to an object are grouped for segmentation (Kaganami & Beiji, 2009). The thresholding technique is bound with region based segmentation. The area that is detected for segmentation should be closed. Region based segmentation is also termed as “Similarity Based Segmentation” (Canny, 1986). There won’t be any gap due to missing edge pixels in this region based segmentation (Chen & Chen, 2009). The boundaries are identified for segmentation. In each and every step, at least one pixel is related to the region and is taken into consideration (Shafait, Keysers & Breuel, 2008). After identifying the change in the color and texture, the edge flow is converted into a vector. From this the edges are detected for further segmentation (Ma & Manjunath, 1997).

Segmentation can also be done by using edge detection techniques. In this technique the boundary is identified to segment. Edges are detected to identify the discontinuities in the image. The edges of the region are traced by identifying the pixel value and it is compared with the neighboring pixels. For

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