

A Review of different method of Medical Image Segmentation

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Abstract—Image Segmentation is a most important task of image analysis. Number of method used for image segmentation. Image segmentation mainly used in different field like medical image analysis, character re-congestion etc. A segmentation method finds the sets that are different structure from each other and completion of segmentation process that cover entire image.

Key words: Segmentation, Edge detection method, Region based segmentation, Thresholding

I. INTRODUCTION

Segmentation refers to the process of partitioning a digital image into multiple regions (sets of pixels) [2]. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze [2]. Image segmentation is the partitioning of an image into non-overlapping, constituent regions that are homogeneous with respect to some characteristics [3]. A segmentation method finds those sets that correspond to distinct anatomical structures or regions of interest in the image [3]. The result of image segmentation is a set of regions that collectively cover the entire image. Each of the pixels in a region is similar with respect to some characteristic or computed property, such as color, intensity, or texture [2]. Adjacent regions are significantly different with respect to the same characteristics. Several general-purpose algorithms and techniques have been developed for image segmentation [2]. In an initial stage, the segmentation is used to separate the image in parts that represents an interest object that may be used in a specific study [2]. There are several methods that intend to perform such task, but are difficult to find a method that can easily adapt to different type of images, that often are very complex or specific [2]. Medical images play vital role in assisting health care providers to access patients for diagnosis and treatment [1]. Medical image segmentation is an important application of image segmentation in medical research, however there isn't a common and effective segmentation method to meet the command of the entire medical image (CT, MRI and PET) [5]. Based on different technologies, image segmentation approaches are currently divided into following categories, based on two properties of image.

Detecting Discontinuities: It means to partition an image based on abrupt changes in intensity, this includes image segmentation algorithms like edge detection [9].

Detecting Similarities: It means to partition an image into regions that are similar according to a set of predefined criterion; this includes image segmentation algorithms like thresholding, region growing, region splitting and merging [9].

II. CLASSIFICATION OF SEGMENTATION TECHNIQUES

In this section briefly describe various methods used for im-

ge segmentation. Some of those methods are Edge Detection Method, Region Based Segmentation Method, Thresholding Method, and Clustering Method.

A. Edge Detection Method

There are two main edge based segmentation methods- gray histogram and gradient based method [9]. Edge detection is a term in image processing and computer vision, it refers to algorithms which aim at identifying points in a digital image at which there is an abrupt change in image brightness or more formally, has discontinuities or simply where there is a jump in intensity from one pixel to the next [9]. Gradient is the first derivative for image $f(x, y)$, when there is abrupt change in intensity near edge and there is little image noise, gradient based method works well. This method involves convolving gradient operators with the image [1, 9].

B. Region Based Segmentation Method

For image segmentation region growing method is a well-developed technique [6]. The basic idea of region growing method is a collection of pixels with similar properties to form a region [9]. For region growing, seeds can be automatically or manually selected [10]. Their automated selection can be based on finding pixels that are of interest, e.g. the brightest pixel in an image can serve as a seed pixel [10]. An operator manually selects a seed point and extracts all pixels that are connected to the initial seed based on some predefined criteria [6]. Region growing can also be sensitive to noise, causing extracted regions to have holes or even become disconnected [6]. In Region Splitting and Merging, the image Subdivided into a set of arbitrary disjoints regions and then merge and/or split the region according to the given condition for segmentation [9]. The main purpose of image segmentation is to segment an image into the homogenous regions [9].

C. Thresholding Method

Threshold is one of the widely methods used for image segmentation [4]. Image segmentation by Thresholding is a simple but powerful approach for segmenting images having light objects on dark background [1]. The segmentation is done by grouping all pixels with intensity between two such thresholds into one class [6]. A process to determinate more than one threshold value is called multi-thresholding [6]. Thresholding operation convert a multilevel image into a binary image i.e., it choose a proper threshold T , to divide image pixels into several regions and separate objects from background [1]. Any pixel (x, y) is considered as a part of object if its intensity is greater than or equal to threshold value i.e., $f(x, y) \geq T$, else pixel belong to background [1, 7]. As per the selection of Thresholding value, two types of Thresholding methods are in existence [1, 8], global and local Thresholding. When T is constant, the approach is called global Thresholding otherwise it is called local Thresholding [1].

D. Clustering Method

Clustering can be termed here as a grouping of similar images in the database [9]. Clustering is done based on different attributes of an image such as size, color, texture etc [9]. Clustering use no training stages rather train themselves using available data [1]. Two methods mainly used for clustering based segmentation.

K-Means is one of the simplest unsupervised learning algorithms. In K means objects are classified as belonging to one of k groups exclusively, k is chosen priori [11]. The main idea is to define k centroids, one for each cluster [13]. These centroids should be placed in a cunning way because of different location causes different result [13].

Fuzzy C-Mean (FCM) is an unsupervised clustering algorithm that has been applied to wide range of problems involving feature analysis, clustering and classifier design [12, 13]. FCM has a wide domain of applications such as agricultural engineering, astronomy, chemistry, geology, image analysis, medical diagnosis, shape analysis, and target recognition [12, 13]. Fuzzy C-means (FCM) algorithm is one of the most popular fuzzy clustering methods widely used in various tasks of pattern recognition, data mining, image processing, expression data Recognition etc.

III. CONCLUSION

In this paper Describe number of method describe that used for image segmentation. Image segmentation has a promising future as the universal segmentation algorithm and has become the focus of contemporary research. In medical image analysis used method of image segmentation like Region based segmentation; Level set method, Thresholding method and Edge detection method etc.

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