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. 3, Issue 3, March 2015

A Comparative Study about Region Based and Model Based Using Segmentation Techniques

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ABSTRACT: In recently innovative technologies are emerging trends in the field of Image processing, mainly min the domain knowledge segmentation techniques. A comparative study in Image region based and model based segmentation is the most uncertain functions in image processing and analysis. Segmentation is the process of simplifying and/or changing the representation of any image either region based and model based segmentation into something that is more meaningful and easier to analyze. Image region based segmentation is typically used to locate objects and boundaries in images. Basically image segmentation consequences influence all the subsequent processes of image analysis such as object description and illustration, characteristic dimension, This paper present a brief outline about the some common segmentation techniques used in image processing techniques like region based, Model based, Edge based, Clustering etc., mentioning its advantages as well as drawbacks.

KEYWORDS: Image processing techniques, Model based, Region based, clustering, Markov Random Fields, watershed algorithm.

I. INTRODUCTION

An image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels , also known as super pixels). The main objective of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. An Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. Segmentation is the most important part in image processing and analysis concepts. Fence off an entire image into several parts which is something more meaningful and easier for further process. These several parts that are rejoined will cover the entire image. Segmentation may also depend on 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.

II. CATEGORIZATION OF SEGMENTATION TECHNIQUES

Segmentation can be classified as three different techniques follows:

- Region Based
- Thresholding Based
- Histogram-based method:
- Edge Based
- Region-growing
- Graph partitioning methods:
- Model Based

Region Based: In this technique pixels that are related to an object are grouped for segmentation. This 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”.There won’t be any gap due to missing edge pixels in this region based segmentation. The boundaries are identified for segmentation. In each and every step at least one

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pixel is related to the region and is taken into consideration .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.
Thresholding Based : The simplest method of image segmentation is called the thresholding method. This method is based on a clip-level (or a threshold value) to turn a gray-scale image into a binary image.The key of this method is to select the threshold value (or values when multiple-levels are selected). Several popular methods are used in industry including the maximum entropy method, and k-means clustering. Recently, methods have been developed for thresholding computed tomography (CT) images. The K-means algorithm is an iterative technique that is used to partition an image into *K* clusters.

Histogram-based method: Histogram based methods are very efficient compared to other image segmentation methods because they typically require only one pass through the pixels. In this technique, a histogram is computed from all of the pixels in the image, and the peaks and valleys in the histogram are used to locate the cluster in the image.color or intensity can be used as the measure. One disadvantage of the histogram-seeking method is that it may be difficult to identify significant peaks and valleys in the image. Histogram-based approaches can also be quickly adapted to apply to multiple frames, while maintaining their single pass efficiency. The histogram can be done in multiple fashions when multiple frames are considered. The same approach that is taken with one frame can be applied to multiple, and after the results are merged, peaks and valleys that were previously difficult to identify are more likely to be distinguishable. The histogram can also be applied on a per-pixel basis where the resulting information is used to determine the most frequent color for the pixel location.

Edge Based is a well-developed field on its own within image processing. Region boundaries and edges are closely related, since there is often a sharp adjustment in intensity at the region boundaries. Edge detection techniques have therefore been used as the base of another segmentation technique. The edges identified by edge detection are often disconnected. To segment an object from an image however, one needs closed region boundaries.
Region-growing method is mainly on the assumption that the neighboring pixels within one region have similar values. The common procedure is to compare one pixel with its neighbors. If a similarity criterion is satisfied, the pixel can be set to belong to the cluster as one or more of its neighbors. The selection of the similarity criterion is significant and the results are influenced by noise in all instances.

Graph partitioning methods: Graph partitioning methods are an effective tools for image segmentation since they model the impact of pixel neighborhoods on a given cluster of pixels or pixel, under the assumption of homogeneity in images. In these methods, the image is modeled as a weighted, undirected graph. Usually a pixel or a group of pixels are associated with nodes and edge weights define the (dis)similarity between the neighborhood pixels. The graph (image) is then partitioned according to a criterion designed to model "good" clusters. Each partition of the nodes (pixels) output from these algorithms are considered an object segment in the image.

Markov Random Fields:- Their strong mathematical foundation and ability to provide a global optima even when defined on local features proved to be the foundation for novel research in the domain of image analysis, de-noising and segmentation. MRFs are completely characterized by their prior probability distributions. The criterion for image segmentation using MRFs is restated as finding the labelling scheme which has maximum probability for a given set of features. The broad categories of image segmentation using MRFs are supervised and unsupervised segmentation.Markov Random Field (MRF) based segmentation is known as Model based segmentation An inbuilt region smoothness constraint is presented in MRF which is used for color segmentation Components of the color pixel tuples are considered as independent random variables for further processing. MRF is combined with edge detection for identifying the edges accurately.MRF has spatial region smoothness constraint and there are correlations among the color components. Expectation-Maximization (EM) algorithm values the parameter is based on unsupervised operation. Multi resolution based segmented technique named as “Narrow Band”. It is faster than the traditional approach. The initial segmentation is performed at coarse resolution and then at finer resolution. The process moves on in an iterative fashion. The resolution based segmentation is done only to the part of the image. So, it is fast. The segmentation may also be done by using Gaussian Markov Random Field (GMRF) where the spatial dependencies between pixels are considered for the process. Gaussian Markov Model (GMM) based segmentation is used for region growing.

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III. EXISTING SYSTEM

The existing system applications is to extract important features from image data, from which a description, interpretation, or understanding of the scene can be provided by Machine. But there is no proper processing can be defined as, the processing or altering an existing image in a desired manner.

IV. PROPOSED SYSTEM

The system receives, enhances and stores images at enormous rates of speed. Image processing for ultra sonic image works with BMP (bit map pattern File Format) gray scale images. The user will send images and according to the specification they will be modified by passing through watershed algorithms for further accuracy.

V.IMPLEMENTATION OF THE WATERSHED ALGORITHM

The watershed algorithm is more representative in the application of mathematical morphology theory for image segmentation. Watershed algorithm is a region based segmentation techniques image that uses image morphology. Watershed algorithm is an iterative adaptive threshold algorithm. The idea of watershed algorithm is from geography, it see gradient magnitude image as a topographic map, the gradient magnitude in correspond with altitude, the different gradient in correspond with the peak and basin in valley in the image. It sees every object of image (including background) as a separate part and requested there must have one tag at least in the each object (or seed points). Marker is knowledge about the object based on application-oriented; it is selected by the operator manually or by automatic process. The objects can use watershed algorithm to transform and develop regional growth after maker.

V. CONCLUSION

The comparative study result of region based and model based followed by segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image .Each of the pixels in a region are similar with respect to some characteristic or computed property, such as colour, intensity, or texture. Due to the importance of image segmentation, a different number of segmentation have been proposed. Image segmentation has become a very important task in recent scenario. In the present day world computer vision has become an interdisciplinary field and its applications can be found in any area be it medical , remote sensing ,electronics and so on . Thus, to find a appropriate segmentation algorithm based on your application and the type of inputted image is very important.

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