

Survey on Image Segmentation Methods

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Abstract: Image Segmentation is one of the emerging trends in the field of image processing. It has found applications in the field of satellite imagery, medical applications etc. Image segmentation helps in the segment the images into sub-regions which are of our interest which can be analyzed individually. Mechanically detecting buildings from satellite images has a lot of potential applications, from monitoring movements of populations in remote areas to evaluating the available surface to implant solar panels on roofs. Image segmentation is the basic step to analyze images and extract data from them. Along with the various image processing techniques in the image, segmentation is edge detection, Thresholding, region growing, and clustering is used to segment the images. The image Segmentation algorithms are based on two properties similarity and discontinuity. These papers focuses on the various methods that are K-means Clustering, Back Propagation Algorithm of ANN, U-net algorithm, Thresholding technique and active Contours for satellite image segmentation and evaluate the best method in satellite image segmentation using various performance parameters like Correlation Ratio and segmentation accuracy widely used to segment the image.

Keywords: Segmentation, Edge detection, Thresholding, Back Propagation, Clustering, Region Growing

I. INTRODUCTION

The recent applications of Digital image processing used in medicine, photography, remote sensing film, video production, and security monitoring. New modern technologies are emerging in the fields of image processing, especially in image segmentation domain.

II. IMAGE SEGMENTATION

Image segmentation is early or front stage processing of image compression. The efficiency of the segmentation process is its speed, good shape matching and best shape connectivity with it is segmenting result. The Segmentation refers to the process of identifying and isolating the surface and regions of the digital image which corresponds to the structural units. Segmentation may moreover depend on various features that are contained in the image it may be either color or texture.

III. SEGMENTATION ALGORITHMS

Segmentation Algorithms have been developed to segment the images from segmentation; they are predicated on the two fundamental properties, discontinuity, and similarity attribute. In discontinuity predicated partition and subdivision is carried out predicated on abrupt in intensity levels or grey levels of an image. In this method, our interest mainly fixates on identification of isolated points, lines, and edges. In homogeneous attribute predicated group those pixels which are homogeneous in some sense, it includes approaches like thresholding, region growing, and region splitting and merging.

IV. CLASSIFICATION OF SEGMENTATION TECHNIQUES

Segmentation can be classified into the following categories.

- Segmentation by Edge Detection
- Segmentation by Thresholding
- Segmentation by Region based
- Segmentation by Feature-based Clustering

4.1 Segmentation by Edge Detection

Edge detection method is a basic step of image segmentation process. The image divides into the object and its background. Divides the image on edge detection method by observing the change in intensity or pixels of an image. In the Gray histogram and Gradient are two main methods for detecting edge detection that are contained in the segmentation. Divided into two categories edge detection operators as first-order derivative operators and second order derivative operators. The canny edge detector is a second order derivative operator. The Second-order derivative operators to give reliable results.

a) Canny edge detector: Initially, the image is taken and it is to segment utilizing canny edge detection technique. The image is converted from RGB to gray. The first step is to filter out any noise in the pristine image before endeavoring to locate and detect any edges. The Gaussian filter is utilized in the canny algorithm it can be computed utilizing a simple mask. After smoothing the image and eliminating the noise, the next step is to find the edge vigor by taking the gradient of the image. Then, the approximate absolute gradient magnitude edge strength at each point convolution masks one estimating the gradient in the x-direction columns and the other estimating the gradient in the y-direction rows. After Finding the edge vigor, edge direction utilizing the gradient of x and y directions is found. Non-maximum suppression is utilized to trace along the edge in the edge direction and suppress any pixel value sets it identically tantamount to 0 that is not considered to be an edge. This will give a thin line in the output image in image segmentation. Hysteresis is utilized as an expedient of eliminating streaking. The Technique of Streaking is the breaking up of an edge contour caused by the operator output fluctuating above and below the threshold. To eschew edge look akin to a dashed line, hysteresis uses two thresholds, a high and a low. Thus an image is segmented utilizing edge detection.

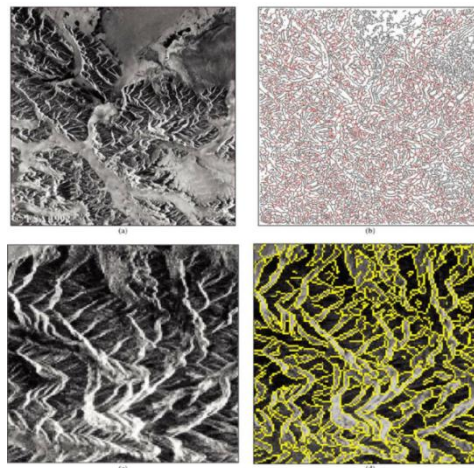


Figure 4.1.1 Edge detection of a satellite image. (a) Original image. (b) Detected step edges in black and recovered junction sides in red. (c) Enlarged details from image (a). (d) Detected step edges and recovered junctions in yellow superimposed to the images in (c).

4.2 Segmentation by Thresholding

Image segmentation is segmented image One of the simplest approaches to the image is based on the intensity levels and is called as threshold based. Thresholding can be implemented either globally or locally. Global thresholding distinguishes object and background pixels by comparing with threshold value chosen and use a binary partition to segment the image. Local thresholding technique is also called adaptive thresholding. Adaptive thresholding technique, are threshold value varies the image depending on the local characteristic of the sub separated regions in the image. Histogram thresholding is used to segment the given image; there are certain preprocessing and post-processing techniques required for threshold segmentation. Major thresholding techniques proposed by different researchers are the Mean method, P-tile method, Histogram dependent technique, Edge Maximization technique, and visual technique.



b) Segmenting Using Adaptive: Thresholding technique is the original image to segmented by adaptive thresholding. First, the image is converted from RGB to gray color. The local adaptive segmentation is based on the maximum and

minimum of the mean method is used to set threshold values. The size of rows and columns of this image are to find then the initial threshold value is set by obtaining the mean of the maximum pixel size of the image and the minimum pixel size of the image. This resultant value is the initial threshold value. Then using this threshold value image is segmented by basic thresholding technique, as the pixels within threshold follows one segment and other follows another segment. Similarly, the process is repeated until the threshold value becomes unmatched with the pixel value. The threshold values is repeatedly obtain for each segment. Thus an image is segmented using an adaptive thresholding technique.



Figure 4.2.1 shows the result of thresholding, it segments the exact features from the image. It segments the image into two, one in foreground and another in background. Mostly the results of thresholding are reasonable

4.3 Segmentation by Region based

In this technique pixels that are associated with same object are sorted for segmentation. The thresholding technique is sure with region primarily based segmentation. The area that's detected for segmentation ought to be closed. Region primarily based segmentation is additionally termed as Similarity primarily based Segmentation. There won't be any gap thanks to missing edge pixels during this region primarily based segmentation the boundaries are known for segmentation. After distinctive the modification within the color and texture, the sting flow is regenerate into a vector. From this the sides are detected for more segmentation.

c) Single Seeded Region Growing: Again the given input image is metameric victimization single seeded region growing technique. This technique is achieved using single seed. A single seed or picture element is taken and victimization this seed all the pixels associated with this seed forms the region. Input image is read using image reading function. The position of the seed point is given, if it is not given, it is selected randomly. In this implementation the most intensity distance is defaults to zero.2. The region is iteratively mature by comparison all unallocated neighboring pixels to the region. The distinction between a pixel's intensity worth and also the region's mean is employed as a live of similarity. The picture element with the littlest distinction measured is allotted to the individual region. This method stops once the intensity distinction between region mean and new picture element become larger than a definite threshold (t). Finally output image is given by combining each the regions. Thus meta-meric image victimization single seed region growing is created.

4.4 Segmentation by Feature

d) Based Clustering: Clustering a method of organizing the team supported its attributes. A cluster usually contains a group of similar pixels that belongs to a specific region and completely from other regions. The term information clump as synonyms like cluster analysis, automatic classification, numerical taxonomy, botrology and typological analysis. Images can be grouped based on its content. The clump ways are sometimes divided as hierarchical algorithms and partition algorithms. In content based mostly clump, grouping is finished betting on the genetic characteristics of the pixels like form, texture etc. There are numerous clump techniques used, the foremost wide used are K-means algorithmic rule and fuzzy C-means algorithmic rule.

e) Segmenting By K Means Clustering: The fourth segmentation technique employed in this work is k suggests that clump algorithmic program. In this technique initial, the image is scan mistreatment image reading operate and displayed. Then a color transformation is finished from original image to make check image. Again the image values are typological analysis. Images can be grouped based on its content. The bunch strategies ar sometimes divided as gradable algorithms and partitional algorithms. In content primarily based bunch, grouping is done depending on the inherited characteristics of the pixels like shape, texture etc. There are varied bunch techniques utilized, the foremost wide used ar K-means algorithmic program and fuzzy C-means algorithmic program regenerate to double values. Using this, row and

column values are obtained. Then the amount of clusters to be created is appointed to 5. Resizing and displaying are done in image values. The index creates 5 elementary arrays to store the cluster values and tiles are created for 5 completely different colors'. The elementary array contains clusters. Finally the different clusters are displayed.

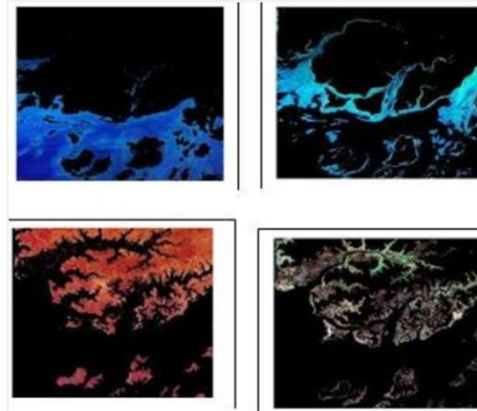


Figure 4.4.1 shows the result of edge detection it segments the very fine features from the image.

V. ANALYSIS AND DISCUSSION

On perceptive these techniques, edge detection yields higher result with pictures that are having fine options like flower, watercourse and satellite pictures. Thresholding technique is best with pictures that are having fewer options like face and fruit pictures. Single seeded region growing separate the image into components in keeping with options within the image. Clustering technique segments the image in keeping with color options within the image. Thus by analyzing the results of those segmentation techniques with some pictures, region growing and thresholding offers higher results than clump and edge detection.

CONCLUSION

Image segmentation encompasses a promising future because the universal segmentation algorithmic program and has become the main focus of up to date analysis. As the result, image segmentation is littered with various factors, like homogeneity of pictures, special characteristics of the image continuity, texture and image content. In this work, varied techniques of image segmentation has been mentioned, an outline of some connected image segmentation techniques has been bestowed. The main image segmentation algorithms and classification of image segmentation area unit mentioned. In this study, the summary of assorted segmentation methodologies applied for digital image process is make a case for in short.

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