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Image Segmentation with Machine Learning

Shubham Das, Nishant Gautam, Chitra Singh, Anu Tomar, Amar Pal Yadav
Department of Information Technology,
NIET,Greater Noida,India

Abstract- Image segmentation is an important image processing step, and it is used everywhere if we want to analyze what is inside the image. Image segmentation, basically provide the meaningful objects of the image. This paper represents the various image segmentation techniques that could be used in the segmentation. Whenever we work with the image in any application, initial step is to segment the image in order to solve its complexity. The segmentation of images is the basic thing for understanding the images. It is used in the Image processing applications, Computer vision, etc. In this paper, two categories are emphasized: Edge based and region based segmentation, which further includes their respective techniques.

Keywords:- Image segmentation, Edge-Based Technique, Region Based technique.

I. INTRODUCTION

Image segmentation is a most important part in the image processing, it is used almost everywhere to process the images so our model should be able to recognize what's inside the image. The segmentation splits the image into many sections or objects. The level to which the splitting the image is being carried rely on the problem is which has been solved.

When the object of an image has been segregated, segmentation should stop on that time. For example, we have an image so our aim is to recognize the objects into the image, for that we segment the image the details should be visible so our model work if there is a presence of an outliers or the paths aren't clear or broken. It's of no use to segment the image it may not be able to identify those elements.

Image segmentation is the general issue in today's era, when we work with computer vision. It is in itself, a broad view to be considered. In order to process the image, we need to segment it so that it would become easier for the computer to understand. Image segmentation is the process of segmenting the image into various segments, that could be used for the further applications such as: Image understanding model, Robotics, Image analysis, medical diagnosis, etc. Image segmentation is the

Process of partitioning an image into multiple segments, so as to change the representation of an image into something that is more meaningful and easier to analyze. Segmentation technique, basically convert the complex image into the simple image

Image segmentation means assigning a label to each pixel in the image such that pixels with same labels share common visual characteristics. It makes an image easier to analyze in the image processing tasks.

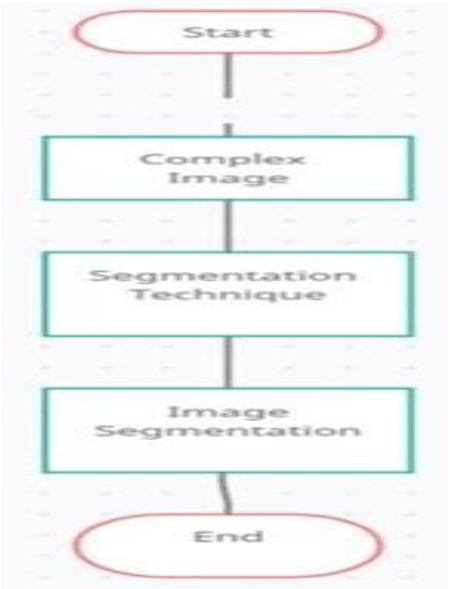

Fig 1. Image segmentation.

There are many different techniques available to perform image segmentation. Our motive is to implement the same concept as we humans try to implement, while understanding the image which we visualize. In human vision, the complex image is immediately segmented into the simple objects based on color, texture, patterns, shapes, etc.

This same thing is constructed with the help of the image segmentation techniques in the computer vision system. We could segment the digital image based on these features, so that the task of understanding of image could be done in a simple and humanly way.

II. IMAGE SEGMENTATION TECHNIQUES

Basically, There are two categories of segmentation techniques: Edge-Based, Region-A Study Analysis on the Different Image Segmentation Techniques

1. Detecting Discontinuity:

It means to partition an image based on abrupt changes in intensity, this includes image segmentation algorithms like edge detection.

2. Detecting Similarity:

It means to partition an image into regions that are similar according to a set of predefined criteria this includes image segmentation algorithms like thresholding, region growing.

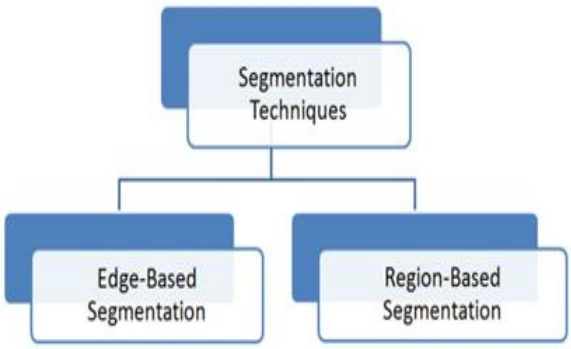

Fig 2. Detecting Similarity.

3. Edge-Based Segmentation:

Segmentation Methods based on Discontinuity find for abrupt changes in the intensity value. These methods are called as Edge or Boundary based methods. Edge detection is the problem of fundamental importance in image analysis. Edge detection techniques are generally used for finding discontinuities in gray level images. Edge detection is the most common approach for detecting meaningful discontinuities in the gray level. Image segmentation methods for detecting discontinuities are boundary based methods. Edge detection can be done using either of the following methods. Edges are local changes in the image intensity. Edges typically occur on the boundary between two regions.

Important features can be extracted from the edges of an image (e. g., corners, lines, curves). Edge detection is an important feature for image analysis. These features are used by higher-level computer vision algorithms (e. g., recognition). Edge detection is used for object detection which serves various applications like medical image processing, biometrics etc. Edge detection is an active area of research as it facilitates higher level image analysis. There are three different types of discontinuities in the grey level like point, line and edges. Spatial masks can be used to detect all the three types of discontinuities in an image.

4. Region-Based Segmentation:

Region based methods are based continuity. These techniques divide the entire image into sub regions depending on some rules like all the pixels in one region must have the same gray level. Region-based techniques rely on common patterns in intensity values within a cluster of neighboring pixels.

Fig 3. Region based methods are based continuity.

The cluster is referred to as the region, and the goal of the segmentation algorithm is to group the regions according to their anatomical or functional roles. Compared to edge detection method,

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segmentation algorithms based on region are relatively simple and more immune to noise [3, 4].
Edge based methods partition an image based on rapid changes in intensity near edges whereas region-based methods, partition an image into regions that are similar according to a set of predefined criteria.

III. CONCLUSION

In this paper, On the basis of representation of different segmentation approaches is defined. Throughout this study of the various techniques, we concluded out various facts. First, the image segmentation is the crucial part of the image understanding/image processing model. Second, the segmentation technique of the image could be used as per the required application or the usage as image is segmented on the basis of different features.Third, the segmentation techniques are broadly categorized on the basis of detection of discontinuity and similarity of the image.

REFERENCES

[1] Yuheng, Song, and Yan Hao. "Image segmentation algorithms overview." arXiv pre print arXiv :170 7.02051 (2017).
[2] Nikita Sharma, Mahendra Mishra, Manish Shrivastava, "Color Image Segmentation Techniques And Issues: An Approach", International.
[3] N. Senthilkumaran and R. Rajesh, "Edge Detection Techniques for Image Segmentation – A Survey of Soft Computing Approaches", International Journal of Recent Trends in Engineering, Vol. 1, No. 2, May 2009.
[4] Punam Thakare, "A Study of Image Segmentation and Edge Detection Techniques", International Journal on Computer Science and Engineering (IJCSE), Vol. 3 No. 2 Feb 2011.
[5] PunamThakare, "A Study of Image Segmentation and Edge Detection Techniques", International Journal on Computer Science and Engineering (IJCSE), Vol. 3 No. 2 Feb 2011.
[6] Warif, Nor Bakiah Abd, et al. "Copy-move forgery detection: survey, challenges and future directions." Journal of Network and Computer Applications 75 (2016): 259-278.