

# A Review of Process, Issues and Different Techniques of Image Segmentation

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**Abstract**-Image Segmentation is the procedure of separating and putting image into multiple disjoint, non-overlapping regions such that pixels that belongs to the same region will be same based on some image property like gray scale value, color, texture etc. of the pixels. Actually it helps to find out the region of interest and reduce the size of the data space to be analysed further. It has extensively applications in the fields of semantic image retrieval, real-time visual tracking, medical image, remote sensing images, etc. With the continuous development of computer hardware and software technology, additional and additional investigators have attentive on the expansion of image segmentation and a lot of classic algorithms have been proposed. There are many clinical studies based on image segmentation; for example, distinguished diagnosis of dementia and progress estimation by means of the cerebral region volumetric using magnetic resonance (MR) images, automated aneurysms extraction by segmenting artery region from MR angiography (MRA) images, quantification of lung function by segmenting lung region from multi-detector row CT (MDCT) images, etc.

**Keywords:** Image Segmentation, Magnetic Resonance, retrieval image and multi detector.

## I. INTRODUCTION

Image segmentation can be generally regarded as partitioning an picture into multiple sections. The segmentation procedure provides a more simplified image representation as these sections can be separately analysed deprived of the need of human to do manual segmentation at first small hand. There are massive variety of subdivision methods such as unassuming conventional forward segmentation with just determining the foreground and contextual of the picture. This basic subdivision is not sufficient in meeting demands from the current trend of picture depiction particularly in object detection application. A more reliable segmentation is needed to counter additional complicated cases by smearing some useful areas. Colour information is one of the popular domains used for image segmentation.[1] The goal of image segmentation is to cluster pixels into salient image regions, i.e., regions consistent to individual exteriors, objects, or usual parts of objects. Integration could be used for object recognition, boundary estimation within motion or stereo systems, image compression, image editing etc. Pest detection is a main trial in horticulture. Conventionally, counting is done manually and this is very time-consuming and expensive process. Image

segmentation is one of the desirable steps in image analysis which is required for pest detection.[2]

## II. PROCESS OF IMAGE SEGMENTATION

Image segmentation refers to the process of dividing image into regions with characteristics, removing the targets of attention and deleting the unusable part. It is one of the most basis and important image processing issue for pattern recognition and low-level computer vision. The latter middle-level, high level computer vision works are always relying on it, such as feature extraction, feature description, pattern recognition and image understanding. Because the diversity of the application of image segmentation, there are no general segmentation methods so far, it is a long-standing classic problem in many fields.[3] Image segmentation is considered to be a medium level activity in an image processing system. When an image is segmented mainly five conditions should be satisfied. First, the segmentation process must be complete that means each pixel belongs to atleast any one of the region. Second, the pixels in a region must be connected i.e. each region is a connected set of pixels. Third, two regions cannot intersect with each other. This condition may be violated in case of fuzzy segmentation. Fourth, each region of the segmented image necessity satisfy a establish based on the gray measure value, consistency etc. Fifth two adjacent region cannot simultaneously qualify the same predicate[4]

## III. RELATED WORKS

Shaohua Zhu et al., 2011[5] In this paper, choosing chip mechanisms as research object, completing the alteration of the colour space based on the theory of Realistic and Image processing and understanding the adaptations since the non-uniform RGB colour planetary to HSV space for human eyes comment by means of MATLAB. Pick the better H domain as segmentation object. After that eliminating noise, filter and image enhancement by using technology of image pre-processing. Chunming Li et al., 2011 [6] suggests an original region-based method for image segmentation, which is able to transaction with intensity in homogeneities in the subdivision. First, based on the model of images with intensity in homogeneities, they derive a local concentration gathering stuff of the image strengths, and describe a local grouping criterion function for the image strengths in a area of every point. This native bunching standard function is then integrated with respect to the district centre to stretch a global standard of image subdivision. In a level set preparation, this standard defines an energy in terms of the level set purposes

that characterize a partition of the image domain and a bias field that versions for the intensity inhomogeneity of the image. Therefore, by diminishing this energy, our method is able to instantaneously segment the image and estimate the bias field, and the assessed bias arena can be used for strength in homogeneity alteration. Hui Zhang ,Quanyin Zhu et al., 2012 [7] efforts on the research of image segmentation accuracy problematic because out dated Sobel operator image segmentation is easy to cause the imprecision of image segmentation , difference is not apparent, segmentation accuracy is low . Absorbed against these defects, this paper puts forward an enhanced Sobel operator 2-d maximum entropy digital image segmentation method. This algorithm primarily carries out image segmentation, rendering to digital image features, and then finds its real edge through the threshold of Sobel edge detection algorithm. ChuanLong Li, Ying Li et al., 2012 [8] propose a novel fuzzy c-means image segmentation algorithm. Its effectiveness is due to two apparatuses. The first mechanism is the replacement of the Euclidean distance conventionally used to measure similarity of the image pixels by a novel resemblance measure which is considered spatial neighbourhoods using Gaussian kernel, and thus technique becomes less sensitive to the noise of the image. The second mechanism is not necessity of any comparison disadvantage period in FCM's objective purpose as some FCM's variations to reduce the inspiration of noise on the end result of image subdivision; in adding, our method needs no condition of setting parameter according to the image.

Syoji Kobashi et al., 2013 [9] In command to abbreviate the processing time and to decrease the effort of users, this paper presents two methods of interactive image segmentation method based on fuzzy connectedness image segmentation. The first method interactively updates object sympathy of FCIS according to users' extra seed voxels. The second method replicas the profile of the thing empathy using radial-basis purpose network, and applies online training for users' extra seed voxels. Trupti S. Bodhe et al., 2013 [10] In contemporary crop status organisation in greenhouse, instead of doing physically, crop status is monitored using cameras with some automation. One of the major difficulties in the greenhouse harvest manufacture is the attendance of pests. An correct and timely monitoring of pests populace is the basic requirement. In the pest uncovering, image analysis is very important and image segmentation is one of the wanted steps to distinguish the pest from rest of part of an image. Colour image segmentation is desirable than grey scale image segmentation.

#### IV. TECHNIQUES OF IMAGE SEGMENTATION

##### A. Region Based

In this technique pixels that are related to an object are grouped for subdivision .The thresholding procedure is certain with region based subdivision. The part that is noticed for subdivision should be locked. Section based subdivision is also called as "Similarity Shaped Subdivision".

- Superiority Established

Subdivision container to be completed by using edge recognition methods. Here are several events and is proprietary .In this method the boundary is documented to section. Limits are noticed to classify the Breaks know the picture. Edges on the constituency are traced by classifying the pixel value and it is likened with the adjacent pixels. For this organization they use both protected and adaptive feature of Support Vector Machine.

##### B. Threshold

Thresholding is the easiest method of subdivision. It is done finished that threshold standards which are achieved from the histogram of persons edges of the unique image . The threshold values are obtained from the edge noticed image. So, if the advantage detections are precise then the verge too. Segmentation through thresholding has fewer computations compared to other techniques. Segmentation is founded on "histon". For a specific section there forte be set of pixels which is so-called by way of "his ton". Unevenness amount is followed by a thresh holding process for image subdivision.

##### C. Feature Constructed Clustering

Subdivision is also complete finished Clustering. They surveyed a different procedure, where most of them put on the method directly to the picture but here the picture is converted into histogram and then clustering is completed on it. Pixels of the color picture are gathered for segmentation using an unsupervised technique Fuzzy C. This is practical for normal picture. If it is a noisy picture, it results to disintegration.

##### D. Model Based

Markov Unsystematic Field (MRF) grounded subdivision is known as Model based subdivision. An inherent region softness constraint is obtainable in MRF which is recycled for color subdivision. Components of the bleach pixel tuples are measured as dependent unsystematic variables for additional dispensation. MRF is individual with edge detection for identifying the edges accurately. [11]

#### V. WHY WE SEGMENTATION IMAGE?

Many years ago, People have conducted the research of gray image. Then its procedure has also comparatively matured. With expertise develop, color image are used more and more and the segmentation of color double stimulate additional and more kindness recent years. Compared with gray image, color image include not only brightness information, but also other more useful information such as hue and saturation. Actually, the information gray image contain are less than color spitting image in the similar scene. Human existence is more sensitive in perception of color. Because the human eyes have adjustability for the brightness, which we can identify dozens of gray-scale at some point of multifaceted image, but container identify thousands of colors. In many cases, only using gray-level info cannot excerpt the board from contextual; we must by incomes of color information [12]

## VI. ISSUES OF IMAGE SEGMENTATION

Image segmentation methods can be classified into manual delineation, (semi-) automated method, and interactive segmentation method. Manual delineation is a method in which a user manually assigns a label for each pixel in 2-D image or voxel in 3-D image. The method can ensure segmentation accuracy regardless of the kind of image, although, the accuracy strongly depends on the knowledge and experience of the user. And, there would be intra- and interoperator variability. In addition, when there are many images, dynamic images, or 3-D images, it will be difficult to segment the ROI manually. In order to decrease the effort of segmentation, to shorten the analyzing time, to increase the robustness of the segmentation performance, to analyze the 3-D images, and/or to automate the post processing procedure, many researchers studied a computer-aided automation or a semi-automation.

Some of the conventional studies are

- Methods with respect to connectedness and similarity of neighboring voxels such as region growing, level set, fuzzy connectedness, graph-cut, etc.,
- Methods with the statistical characteristics of intensity such as k-means clustering, fuzzy C-means clustering, vector quantization, support vector machine (SVM), etc., and others.
- And, there are many studies for (semi-) automated segmentation that combines two or more segmentation techniques. By using these methods, we can segment ROI with a short computation time, a high reproducibility, and a less user interaction. However, they cannot segment unknown images, there should be some images that the methods miss-segmentation, and there are limitation of segmentation accuracy.[13]

## VII. CONCLUSION

Image segmentation technology has been one of the key technologies in the field of image processing. This paper mainly aims at lower segmentation accuracy and higher complexity of the traditional image segmentation the best type of image segmentation technique, with respect to the application. focused on discussion of color image segmentation. Compared with gray image, color image segmentation makes full use of hue, saturation and other more useful information.

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