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REVIEW ARTICLE

A Review on Novel Approach of Boundary Detection and Image Segmentation using Brightness Gradient and Cardinal Splines

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ABSTRACT: ***Image processing is faster process and cost effective process. It provides us number of techniques to avoid the problem like noise and signal distortion. Image segmentation is a fundamental process in many image, video and computer vision application. Using of image segmentation we can able to understand the fundamental of digital image processing. Image segmentation is used to enhancement of image and also useful different medical application. . On the basis of pixel intensity we can differentiate the boundaries of different objects. Segmentation identifies separate object within an image and also find boundary between different regions. In this paper, we are going to use the Brightness Gradient and Cardinal splines for segmentation.***

Keywords: Gradient Splines, Cardinal splines, Image segmentation, Digital image

I. INTRODUCTION

A digital image is composed of finite set of value which is called image element or pixels. Pixel is term which is used to process the element of digital image applying a number of computer algorithms. In digital image processing we manipulate and analysis the image by computer. Its processing is divided into three levels, high-level, mid-level, low-level. The low-level processing includes noise reducing and contrast enhancement process. Mid-level processing includes segmentation and classification. In segmentation image is partition into region or objects and classification is used to recognition of objects. High-level process includes learning, action taking, and performance

cognitive function. Interest in image processing method around the two application area: - processing of image data for storage, transmission and representation autonomous machine perception and improvement of pictorial information for human interpretation.

Image segmentation

It is a fundamental process in many image, video and computer vision application. The segmentation is required when it acquires an image. It might be interesting to know what parts of the image are belongs to each other. For example in MRI image where the doctors are interested to know how much of each tissue type is present and where it is located. In satellite image, we wish to quantify and locate different types of vegetation. Usually image segmentation is an initial and vital step in a series of processes aimed at overall image understanding. Today almost no area of technical that is not impacted in some way by digital image processing. Image segmentation is the classical problem in image processing and computer vision. Using of image segmentation we can able to understand the fundamental of digital image processing. Image segmentation is used to enhancement of image and also useful different medical application.

Segmentation

Segmentation is the process of digital image processing which is widely used. Segmentation is the process of separating a digital image into different segment or objects. So that the image can be more simplify, understandable and helpful to analyzing. On the basis of pixel intensity we can differentiate the boundaries of different objects. Segmentation identifies separate object within an image and also find boundary between different regions. This thesis proposes a unified approach to low level image processing called local segmentation. Quality of the result of image processing heavily depends upon the result of segmentation.

Classification of Image segmentation

Segmentation can be classified into two types: local segmentation and global segmentation. Local segmentation is small windows on a whole image and deal with segmenting sub image. Global segmentation deals with segmenting whole image [3]. Global segmentation mostly deals with relatively large no of pixel. But local segmentation deal with lower no of pixel as compare to global segmentation. Image segmentation is one of the classical problems in image processing and computer vision. Using of Image segmentation we can able to understand the fundamental of digital image processing. Image segmentation is used to enhancement of image and also useful different medical application. Image segmentation can also use for analysis of the image and further pre processing of the image. After a segmentation process each phase of image treated differently.

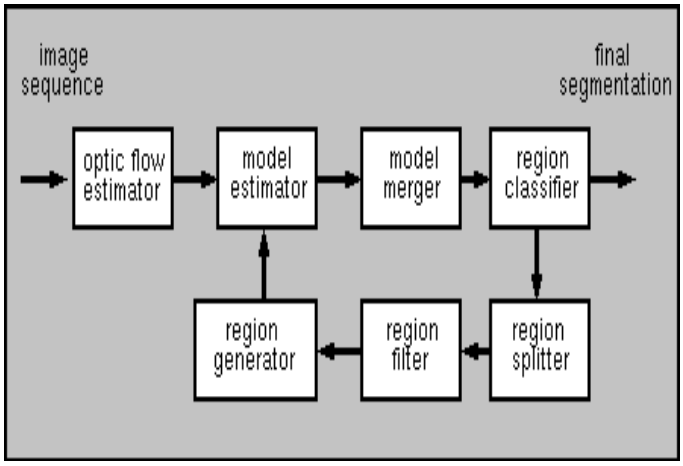


Fig 1: Segmentation Process

Image Segmentation Techniques

Segmentation technique can be divided into two basic categories: edge based and region based. Edge based segmentation is a segmentation where edge filter is applied to the edge. It is basically used to look image discontinuities. When changes in gray level intensity occur in the images then edge based segmentation is applied. Assumption is that changes occur in the data at the boundary between object of interest. Region based segmentation method based on pixel intensity values.

II. LITERATURE SURVEY

In 2009, Jan-Ji Shen & Jia-Min Ren [4] proposed a novel semi blind approach for digital watermarking based on vector quantization and association rules. In this method instead of inserting a watermark in an image, association rules of the watermark are embedded. Vector quantization encoding is done on the image and the watermark to form index tables and from these tables association rules for the image and watermark, are extracted. The association rules of the watermark are embedded into the association rules of the host image and vector quantization decoding is done to generate the watermarked image. The proposed method allows to embed a watermark of size larger than the image itself and moreover it can be extended to application of grayscale and color watermarks.

In 2010,T. Logeswari and M. Karnan[5] discuss about the medical image segmentation. As in the Image segmentation medical image segmentation is the challenging task. The segmentation method consists of two phases. In the first phase, the MRI brain image is acquired from patient's database. In the second phase artifact and noise are removed after that HSom is applied for image segmentation. The HSom is the extension of the conventional self organizing map used to classify the image row by row. The detection and extraction of tumor is done from patient's MRI scan images of the brain. The basic concepts of the image processing are some noise removal functions, segmentation and morphological operations. The modified image segmentation and histogram thresh holding techniques were applied on MRI scan images in order to detect brain tumors.

Geodesic Thin Plate Splines for Image Segmentation Herve Lombaert, Farida Cheriet,(2010): discuss that the Image segmentation is a crucial part when trying to understand and analyze image. The various methods exist for the image segmentation and they are often categorized into either intensity [1] or contour based. Thin Plate Splines are used in image registration to model deformations. Its physical analogy involves a thin lying sheet of metal. The Thin Plate Spline equation minimizes that thin plate bending energy. In this paper author uses the geodesic distances for image segmentation. Control points become seed points and force the thin plate to pass through given heights. The minimally bended thin plate gives a condence. Thin Plate Spline has a closed-form solution which is fast to compute and global optimal.

Mahdi Marsousi et.al,(2011): discuss about the segmentation. In this paper, author discuss about a fully automated method for segmenting left ventricle in echocardiography images is proposed. A new method named active ellipse model is developed to automatically find the best ellipse inside the LV chamber without intervention of any specialist. A modified B Spline Snake algorithm is used to segment the LV chamber in which the initial contour is formed by the predefined ellipse. As a result of using active ellipse model, the segmentation is extricated from dealing with gaps within myocardium boundary which are highly problematic in echocardiography image segmentation. Based on the results obtained from different studies, the proposed method is faster and more accurate than previous approaches. Our method is evaluated
on 20 sets of echocardiography images of patients.

III. PROPOSED WORK

Shape is a powerful cue for recognizing objects in images. Segmentation divides image into several regions corresponding to its object. The detection of boundary information from an image is very important task. In this, it extends the current approaches for the contour detection and it also includes the motion cues. The object recognization is another area, where the boundary information is crucial. In our purposed work, we are work on the image and boundary detection using Brightness Gradient and Cardinal Splines. It is comes under the hermit curves. Cardinal splines are just a subset of the hermite curves. They don't need the tangent points because they will be calculated from the control points. We'll lose some of the flexibility of the hermite curves, but as a tradeoff the curves will be much easier to use

Methodology:

Brightness Gradient: This algorithm uses local brightness gradients to detect boundaries. It draws boundary on the basis of brightness. Now brightness can be low or high means our object can be brighter then background or it can be less bright means there will be a difference of object and background. So here we are going to use brightness gradient with Cardinal splines to detect boundary. As we know that Cardinal splines work according to control points so in our case these control points are decides on the basis of brightness. Like as shown is figure that object is brighter the background so our Cardinal splines draw boundary on the basis of high brightness. As shown is middle

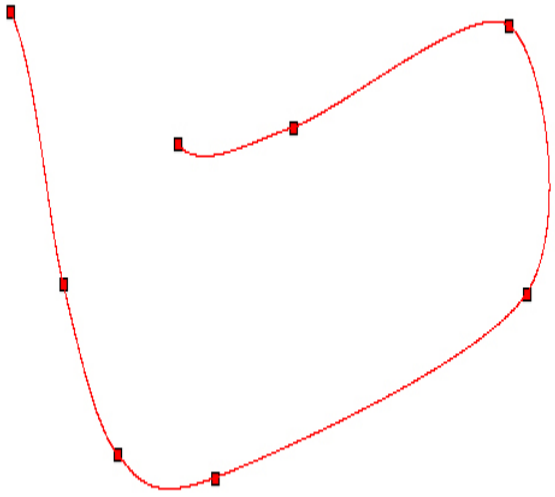
figure red line is a Cardinal splines are green points are edge points of brightness and the Cardinal splines is turn on the basis of high brightness and draw boundary.

Cardinal splines are a subset of the hermite curves. Cardinal splines don't have tangent points. They are calculated from the control points. The formula for the tangents for cardinal splines is:

$$T_i = a * (P_{i+1} - P_{i-1})$$

Here:

- 'a' is a constant which affects the tightness of the curve.
- 'P' the start point of the curve
- 'T' Point from the curve leaves the start point



Cardinal splines are controlled by points means we have to decide points to draw Cardinal splines as shown in figure.

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