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Enhancement of Image Segmentation Using Morphological Operation

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Abstract

Segmentation of image play vital role in the area of image processing field there is wide use of segmentation of image in medical science. Image segmentation can be obtained by using various methods, but the drawback of most of the methods is that they use a high level language for coding In this paper we emphasises on graphical approach to solve the segmentation problem which is easy to understand this can be possible with the help of MATLAB simulink blocks which makes it very easy to handle with respect to other software. we use different methodology for better segmentation so that there is better visibility to find out a particular point where the dieses in the human body occur. . The purpose of this paper is to present a comprehensive overview of different segmentation methodology. In this paper segmentation technique is defined using the edge detection and morphological operations and mathematical model is proposed both the cases and compare the result.

I. INTRODUCTION

Image segmentation is a fundamental process in many image, video, and computer vision applications. It is often used to partition an image into separate regions, which ideally correspond to different real-world objects. It is a critical step towards content analysis and image understanding. Many segmentation methods have been developed, but there is still no satisfactory performance measure, which makes it hard to compare different segmentation methods, or even different parameterizations of a single method Image segmentation is often described as the process that subdivides an image into its constituent parts and extracts those parts of interest (objects). It is one of the most critical tasks in automatic image analysis because the segmentation results will affect all the subsequent processes of image analysis, such as object representation and description, feature measurement and even the following higher level tasks such as object classification and scene interpretation. It basically implies partitioning a digital image into different parts or objects regions corresponding to Individual surfaces, objects, or natural parts of objects. It is the process of labeling and grouping each pixel and then identifying the similar regions or the groups of pixels sharing some visual characteristics. Ideally each such region could be objects or patterns in the image.

The goal of this act being to change or simplify an image into something more meaningful and easier to analyze. The field of pattern recognition involves the use of image segmentation in the initial Phase to divide an input digital image into different patterns. Each region or groups of pixels have some shared characteristic on the basis of which they are grouped, these characteristics maybe purely mathematical such as based on the locality of the pixels and their surrounding ones, or visual such as color, intensity, or texture repetitiveness.

Considering image segmentation as the partition of an image into a set of non-overlapping regions whose union is the entire image, some rules to be followed for regions resulting from the image segmentation can be stated as (Haralick, 1985):

a. They should be uniform and homogeneous with respect to some characteristics;

b. Their interiors should be simple and without many small holes;

c. Adjacent regions should have significantly different values with respect to the characteristic on which they are uniform; and

d. Boundaries of each segment should be simple, not ragged, and must be spatiallyaccurate.

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Image segmentation

The first step in image analysis is segment the image. Segmentation subdivides an image into its constituent parts or objects. The level to which this subdivision is carried depends on the problem being viewed. Sometime need to segment the object from the background to read the image correctly and identify the content of the image for this reason there are two techniques of segmentation, discontinuity detection technique and similarity detection technique. In the first technique, one approach is to partition an image based on abrupt changes in gray-level image. The second technique is based on the threshold and region growing. This paper discusses the both techniques Edge Detection and threshold technique.

II. METHODOLOGY

The main step in order to achieve segmented image in case when input image is ultrasound and CT SCAN image This paper uses digital image processing techniques to extract some variables (segmentation) from digital photo, taken by a device. In this paper we use two methodology of segmentation of image

I. Edge detection technique for segmentation
II. Morphological operation technique for segmentation

Firstly in edge detection technique the model based design used for image pre-processing Input images which could be color or gray scale are provided as input to the workspace block. A color space conversion block converts RGB to gray scale image and this data which is in 2D is to be converted to 1D for further processing. Image Video viewer block at output signal to show the converted image(RGB to gray scale).

Secondly we use another technique for the segmentation i.e segmentation using morphological operations in morphological operations there is the study of the shape and form of objects. Morphological image analysis can be used to perform object extraction, Image filtering operations, such as removal of small objects or noise from an image, Image segmentation operations, such as separating connected objects, Measurement operations, such as texture analysis and shape description. The Video and Image Processing Blockset software contains blocks that perform morphological operations such as erosion, dilation, opening, and closing.

Often, you need to use a combination of these blocks to perform your morphological image analysis. Morphological image analysis can be used to perform image filtering, image segmentation, and measurement operations. After the sobel edge detection operator applied, different morphological operations like opening, closing, dilation etc. were applied gradient component of image because it provides better segmentation image.

III. IMAGE SEGMENTATION IMPLEMENTATION USING MATLAB SIMULINK

A Simulink model has been developed using different image processing block sets from MATLAB. MATLAB Simulink Library provides a variety of opportunities and methods to process images through the different image processing blocks to obtain the desired image with the required feature or objects of the images extracted or segmented. The basic data structure in MATLAB is the array, an ordered set of real or complex elements. This object is naturally suited to the representation of images, real-valued ordered sets of color or intensity data. MATLAB stores most images as two-dimensional arrays (i.e., matrices), in which each element of the matrix corresponds to a single pixel in the displayed image. Pixel is derived from picture element and usually denotes a single dot on a computer display. We have developed a MATLAB Simulink model for visualization of simple jpg image .In developing the Simulink model; we used the Video and Image Processing Blockset software tool in MATLAB. The Video and Image Processing Blockset software is a tool for processing images and video in the Simulink environment. The Video and Image Processing Blockset software is a tool used for the rapid design, prototyping, graphical simulation, and efficient code generation of video processing algorithms. Video and Image Processing Blockset blocks can process images or video data. These blocks can import streaming image into the Simulink environment and perform two-dimensional filtering , Morphological and frequency transforms, block processing, motion estimation, edge detection and other operations and these blocks used in developing the Simulink model for the segmentation of image.

The model based design used for image pre-processing is shown in Fig. 1, the blocks utilized here are discussed below. Input images which could be colour or gray scale are provided as input to the workspace block.

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A colour space conversion block converts RGB to gray scale image and this data which is in 2D is to be converted to 1D for further processing. Image Video viewer block at output signal to show the converted image(RGB to gray scale).
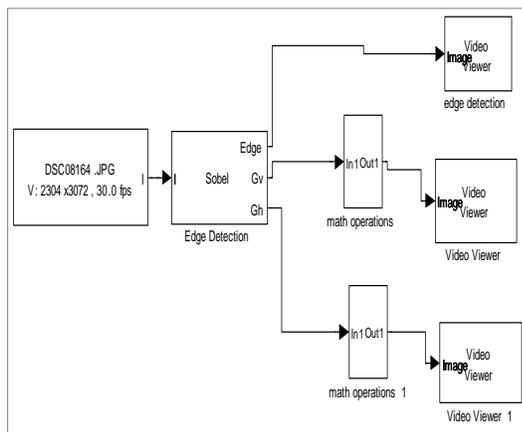

FIG1 Simulink Model of .Edge Detection Technique For Segmentation
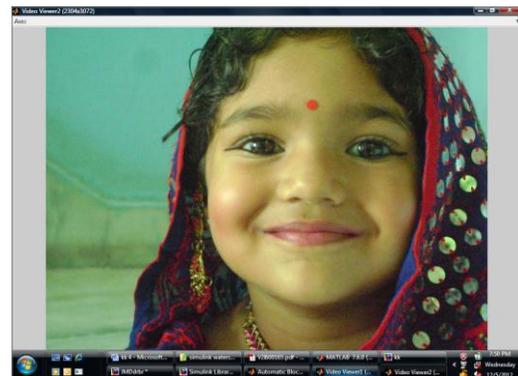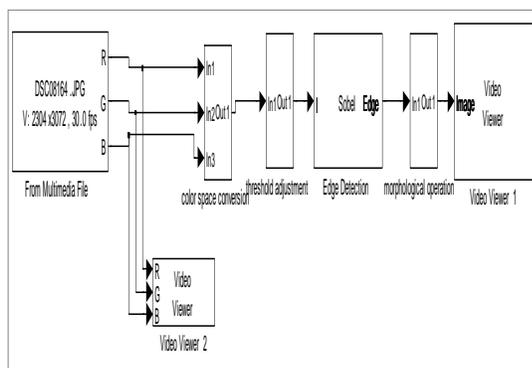
FIG 2 Simulink Model of Morphological operation technique for segmentation

IV. RESULTS AND CONCLUSION

This paper proposes morphological technique for image segmentation. This proposed method contains preprocessing, color space conversion, threshold adjustment, feature extraction, segmentation and evaluation stages.

Simulink models have been developed and outputs are taken and concluded that segmented image comes from of Morphological operation technique which give better performance as compare to the edge detection technique, this is due to because by using morphological operation we can adjust threshold level which gives better result. .

Fig:3 Original image

Fig 4: Segmented image using edge detection technique
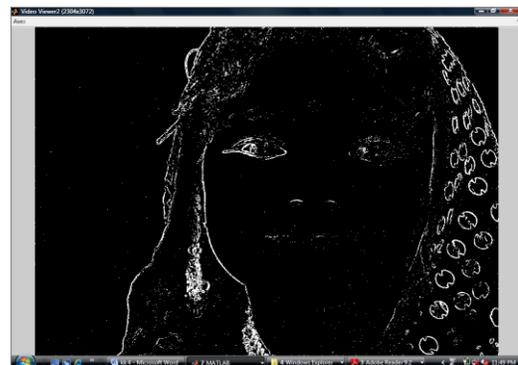
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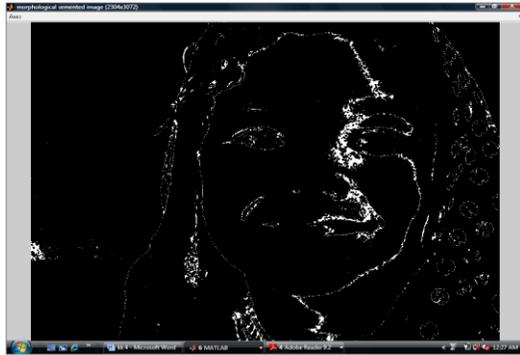

Fig: 5 segmented image using Morphological operation technique

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