A REVIEW OF DIGITAL IMAGE PROCESSING TECHNIQUES

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Abstract: In today's world, image processing is one of the rapidly expanding fields. It is a process that is frequently used to improve raw photos obtained from various sources. This is a type of signal processing. This presentation presents an overview of image processing approaches. The primary goal of this work is to define the various strategies utilized in different stages of image processing.

Index Terms - **Image processing, Segmentation, Threshold, Acquisition, Enhancement.**

I. INTRODUCTION

Image processing is a method which is commonly used to improve raw images which are received from various resources. It is a technique to transform an image into digital form. It is a kind of signal. It is a dispensation where image is an input and output is also an image or features related with image. The purpose of image processing is distributed into several groups.

Image retrieval: By image processing user can detect only that portion of the picture which is relevant to the user.

Image recognition: Image processing use mathematical procedures for processing of images.

Image sharpening and restoration: In image processing various techniques are applied on the picture to produce a better image.

II. ANALOG IMAGE PROCESSING:

This processing method use electrical signals for any change required in the picture. Analog processing includes two dimensional analog signals. In this approach images are modified by changing the electrical signal. It is mainly used for hard copies like as for printing purpose and for photography.

III. DIGITAL IMAGE PROCESSING:

In this technique processing of images are done by digital computers. Firstly via scanner-digitizer images are converted into digital form and then further processing is done on the images. Digital image processing uses many techniques like as correction, formatting of the data, enhance procedure to create picture with better quality. Basically, there are mainly four operations used in digital image processing like as image preprocessing, segmentation of image, feature extraction. Figure 1 shows the image processing methods to process a required image data.
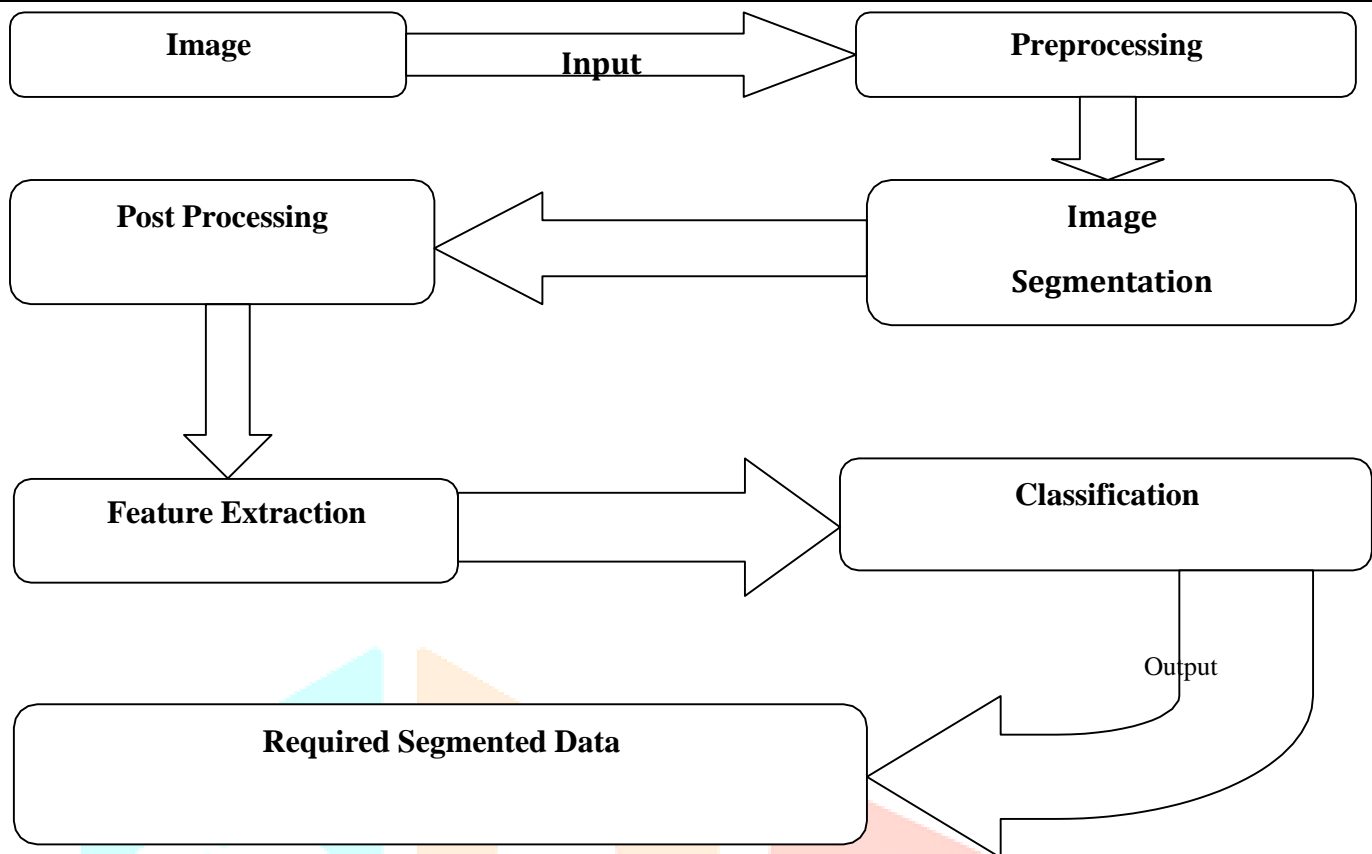
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FIGURE 1 IMAGE PROCESSING METHODS FOR REQUIRED IMAGE DATA

IV. IMAGE ACQUISITION:

The first phase of every visualization scheme is the image acquisition phase. Basically, and image acquisition is a process through which images are retrieved from various resources. The most common method for image acquisition is real time acquisition method. This method creates a pool of files which are processed automatically. An image acquisition method creates 3D geometric data.

V.IMAGE ENHANCEMENT:

Image enhancement improves the picture displaying quality. Sometimes one picture is captured from various resources then the quality of image is not very good due to obstacles. Image enhancement modifies components of the pictures so that clarity of images can be increased. This technique is used for analyzing the image, for feature extraction and displaying the images. There are some improvement methods namely contrast stretching, noise filtering and histogram modification. Spatial domain techniques are work with pixels. In this technique the values of pixels are altered in desired enhancement. It contains various techniques whose working directly dependent on the pixels of the images. Frequency domain methods are appropriate with images which are based on frequency mechanisms and it works on the orthogonal conversion of the image. Figure 2 shows the image enhancement techniques.
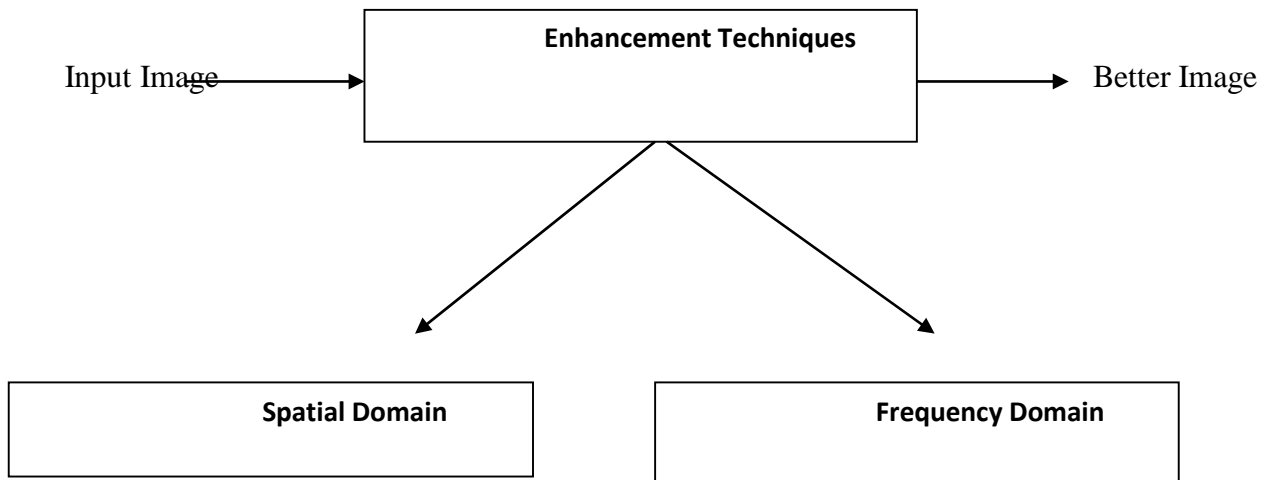
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Input Image ──────▶ │   Enhancement Techniques    │ ──────▶ Better Image
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        │   Spatial Domain    │      │   Frequency Domain  │
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FIGURE 2 IMAGE ENHANCEMENT
TECHNIQUES

VI.IMAGE SEGMENTATION:

In image segmentation, an image is divided into subparts according to the requirements of the user of the problem. It divides the image into pixels. Image segmentation divides the image in such a way so that it becomes very accurate. Basically this approach is used for analysis for substances, borders and additional records processing. The outcome of image segmentation is a set of sections that together cover the total image or group of contours removed from the image. The objective of segmentation is modifying the demonstration of picture in such a manner that is more significant and easy to evaluate. It produces the better appearance of image. Segmentation of images is done for compression of image, recognition of objects and for editing purpose. For image segmentation image thresholding methods are applied. Some segmentation allocates label to each pixel in the image, such that pixel having similar label.

Threshold Based Segmentation:

The easiest method for segmentation is thresholding. These points are below and on upper side of the definite threshold value. The value of the histogram is calculated by detection of edges. So threshold value is accurate only if the detection of edges is accurate.

Edge Based Segmentation:

Another technique for segmentation is edge detection method. To recognize pixel values edges are drawn and these edges are compared with other pixel. The edges are not closed with each other so there are some gaps among the edges.

Region Based Segmentation:

This technique groups together certain objects used for segmentation. Region based segmentation technique used with this method. The region must be together with each other. It is also known as similarly based segmentation. After applying the process color and texture of the image is altered and then vector is created from the edge flow.

Clustering Based Segmentation:

Clustering can be considered the most important unsupervised learning problem. Other kind of problem, the clustering deals with finding a structure in a collection of unlabeled data. The clustering is a process of organizing objects into groups whose members are similar in some way. A cluster is therefore a collection of objects which are 'similar' between them and are 'dissimilar' to the objects belonging to other clusters.

Model Based Segmentation:

Model based segmentation method is used to segment the objects from image. This method includes an initial guess and an iterative process that modifies the initial guess. Model based segmentation framework provides the infrastructure for fully automatic segmentation of features and their substructures in multi model images. The segmentation is performed in very efficiently in this model.
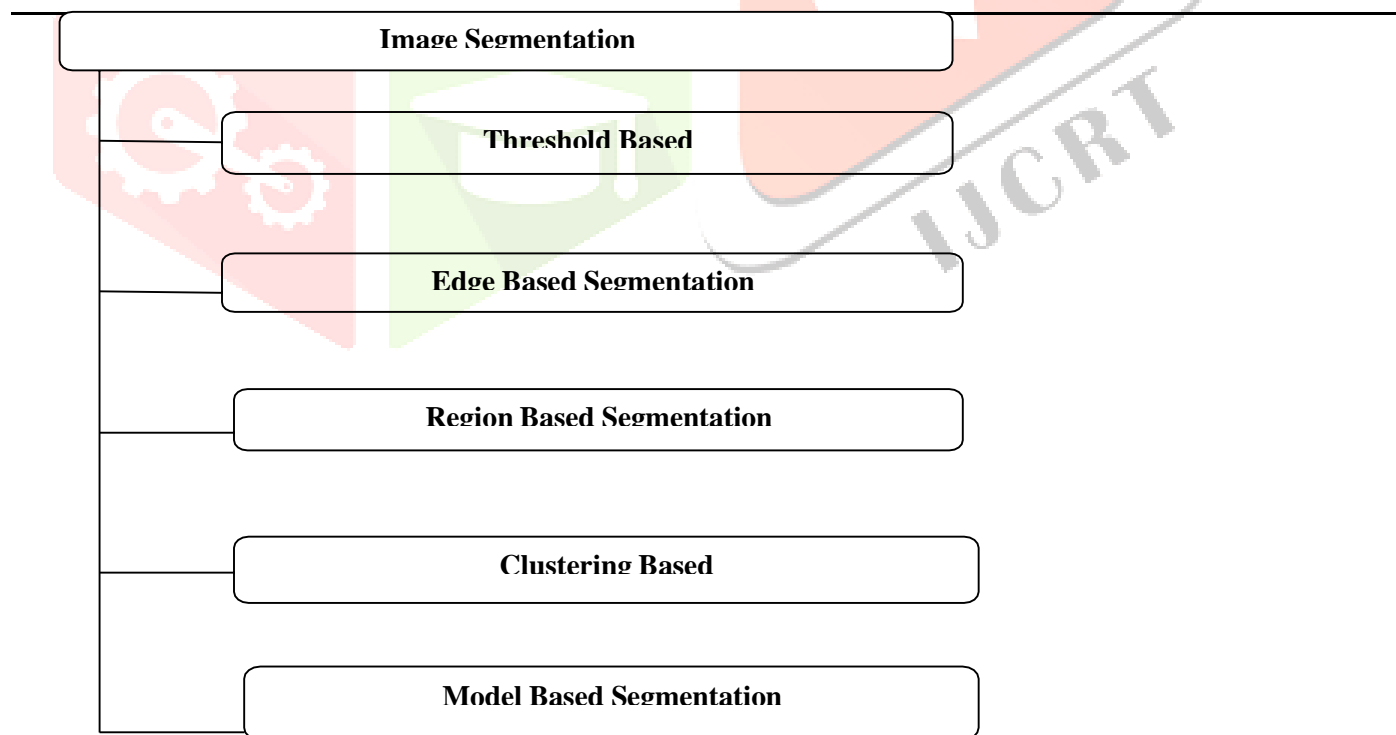

FIGURE 3 IMAGE SEGMENTATION
METHODS

VII.CONCLUSION:

Image processing is used to enhance the quality of the picture that is taken from various resources. This paper discusses various image processing like image representation, segmentation, compression, acquisition, image enhancement etc. These techniques are used in numerous areas. The method that we are choosing depends upon the application area. This research can be extended to develop some more image processing technique in future.

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