Image Processing Based Apporoach

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***Abstract*— "Image processing is any form of signal processing for which the input is an image, such as photographs or frames of video; the output of image processing can be either an image or a set of characteristics or parameters related to the image." Image processing is a physical process used to convert an image signal into a physical image. The image signal can be either digital or analog. This paper presents that the actual output itself can be an actual physical image or the characteristics of an image. Image processing techniques were first developed in 1960 through the collaboration of a wide range of scientists and academics. The main focus of their work was to develop medical imaging, character recognition and create high quality images at the microscopic level. During this period, equipment and processing costs were prohibitively high.**

Key-words: Image Processing, Microscopic level

I. INTRODUCTION

Image Processing is a technique to enhance raw images received from cameras/sensors placed on satellites, space probes and aircrafts or pictures taken in normal day-to-day life for various applications. Various techniques have been developed in Image Processing during the last four to five decades. Most of the techniques are developed for enhancing images obtained from unmanned spacecrafts, space probes and military reconnaissance flights. Image Processing systems are becoming popular due to easy availability of powerful personnel computers, large size memory devices, graphics software etc. Image Processing is used in various applications such as:

• Remote Sensing
• Medical Imaging
• Non-destructive Evaluation
• Forensic Studies
• Textiles
• Material Science.
• Military

The common steps in image processing are image scanning, storing, enhancing and interpretation transmission of electricity is relatively efficient and inexpensive, although unlike other forms of energy, electricity is not easily stored, and thus, must be produced based on the demand.

II. METHODSOF IMAGE PROCESSING

There are two methods available in image processing.

1. Analog image processing

Analog image processing refers to the alteration of image through electrical means. The most common example is the television image. The television signal is a voltage level which varies in amplitude to represent brightness through the image. By electrically varying the signal, the displayed image appearance is altered. The brightness and contrast controls on a tv set serve to adjust the amplitude and reference of the video signal, resulting in the brightening, darkening and alteration of the brightness range of the displayed image.

2. Digital image processing

In this case, digital computers are used to process the image. The image will be converted to digital form using a scanner – digitizer [6] (as shown in figure 1) and then process it. It is defined as the subjecting numerical representations of objects to a series of operations in order to obtain a desired result. It starts with one image and produces a modified version of the same. It is therefore a process that takes an image into another. The term digital image processing generally refers to processing of a two-dimensional picture by a digital computer. In a broader context, it implies digital processing of any two-dimensional data. A digital image is an array of real numbers represented by a finite number of bits. The principle advantage of digital image processing methods is its versatility, repeatability and the preservation of original data precision.

The various image processing techniques are:

- image reconstruction
- image data compression

III. IMAGE PREPROCESSSING

1. Scaling

The theme of the technique of magnification is to have a closer view by magnifying or zooming the interested part in the imagery. By reduction, we can bring the unmanageable size of data to a manageable limit. For resampling an image nearest neighborhood, linear, or cubic convolution techniques are used.

2. Magnification

This is usually done to improve the scale of display for visual interpretation or sometimes to match the scale of one image to another. To magnify an image by a factor of 2, each pixel of the original image is replaced by a block of 2x2 pixels, all with the same brightness value as the original pixel.

3. Reduction

To reduce a digital image to the original data, every mth row and mth column of the original imagery is selected and displayed. Another way of accomplishing the same is by taking the average in 'm x m' block and displaying this average after proper rounding of the resultant value.

4. Rotation

Rotation is used in image mosaic, image registration etc. One of the techniques of rotation is 3-pass shear rotation, where rotation matrix can be decomposed into three separable matrices.

IV. IMAGE ANALYSIS

Image analysis is concerned with making quantitative measurements from an image to produce a description of it [8]. In the simplest form, this task could be reading a label on a grocery item, sorting different parts on an assembly line, or measuring the size and orientation of blood cells in a medical image. More advanced image analysis systems measure quantitative information and use it to make a sophisticated decision, such as controlling the arm of a robot to move an object after identifying it or navigating an aircraft with the aid of images acquired along its trajectory. Image analysis techniques require extraction of certain features that aid in the identification of the object. Segmentation techniques are used to isolate the desired object from the scene so that measurements can be made on it subsequently. Quantitative measurements of object features allow classification and description of the image.

V. IMAGE SEGMENTATION

Image segmentation is the process that subdivides an image into its constituent parts or objects. The level to which this subdivision is carried out depends on the problem being solved, i.e., the segmentation should stop when the objects of interest in an application have been isolated e.g., in autonomous air-to-ground target acquisition, suppose our interest lies in identifying vehicles on a road, the first step is to segment the road from the image and then to segment the contents of the road down to potential vehicles. Image thresholding techniques are used for image segmentation.

VI. IMAGE RESTORATION

Image restoration refers to removal or minimization of degradations in an image. This includes de-blurring of images degraded by the limitations of a sensor or its environment, noise filtering, and correction of geometric distortion or non-linearity due to sensors. Image is restored to its original quality by inverting the physical degradation phenomenon such as defocus, linear motion, atmospheric degradation and additive noise.

VII. IMAGE RESTORATION FROM PROJECTORS

Image reconstruction from projections [3] is a special class of image restoration problems where a two- (or higher) dimensional object is reconstructed from several one-dimensional projections. Each projection is obtained by projecting a parallel x-ray (or other penetrating radiation) beam through the object. Planar projections are thus obtained by viewing the object from many different angles. Reconstruction algorithms derive an image of a thin axial slice of the object, giving an inside view otherwise unobtainable without performing extensive surgery. Such techniques are important in medical imaging (ct scanners), astronomy, radar imaging, geological exploration, and nondestructive testing of assemblies.

VIII. IMAGE COMPRESSION

Compression is a very essential tool for archiving image data, image data transfer on the network etc. They are various techniques available for lossy and lossless compressions. One of most popular compression techniques, jpeg (joint photographic experts group) uses discrete cosine transformation (dct) based compression technique. Currently wavelet based compression techniques are used for higher compression ratios with minimal loss of data.

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