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Image Processing in Modern World

Harkirat Singh[1], Dr. Sukhwinder Singh[2]
[1]Student, PEC University of Technology, Sector 12 Chandigarh, India
[2]Mentor, PEC University of Technology, Sector 12 Chandigarh, India

Abstract: Digital Image Processing is a rapidly evolving field with growing applications in Science and Engineering. Modern digital technology has made it possible to manipulate multi-dimensional signals. Digital Image Processing has a broad spectrum of applications. They include remote sensing data via satellite, medical image processing, radar, sonar and acoustic image processing and robotics. Uncompressed multimedia graphics, audio and video data require considerable storage capacity and transmission bandwidth. Despite rapid progress in mass-storage density, processor speeds, and digital communication system performance, demand for data storage capacity and data-transmission bandwidth continues to outstrip the capabilities of available technologies. This is a crippling disadvantage during transmission and storage. So there arises a need for data compression of images.

Keywords: Distributed Image processing, data association, Image Enhancement, Image compression.

I. INTRODUCTION

Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems. Images are produced by a variety of physical devices, including still and video cameras, x-ray devices, electron microscopes, radar, and ultrasound, and used for a variety of purposes, including entertainment, medical, business (e.g. documents), industrial, military, civil (e.g. traffic), security, and scientific. The goal in each case is for an observer, human or machine, to extract useful information about the scene being imaged.

Often the raw image is not directly suitable for processing. Such processing is called image enhancement; processing by an observer to extract information is called image analysis. Enhancement and analysis are distinguished by their output, images vs. scene information, and by the challenges faced and methods employed.

II. THE CHALLENGE

An image is not a direct measurement of the properties of physical objects being viewed. Rather it is a complex interaction among several physical processes: the intensity and distribution of illuminating radiation, the physics of the interaction of the radiation with the matter comprising the scene, the geometry of projection of the reflected or transmitted radiation from 3 dimensions to the 2 dimensions of the image plane, and the electronic characteristics of the sensor. Unlike for example writing a compiler, where an algorithm backed by formal theory exists for translating a high-level computer language to machine language, there is no algorithm and no comparable theory for extracting scene information of interest, such as the position or quality of an article of manufacture, from an image.[2]

III. HISTORY AND DEVELOPMENT

Initial ideas back to 1920 for cable transmission of pictures.

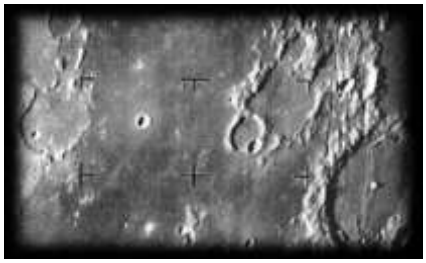

Fig. 1 [13]

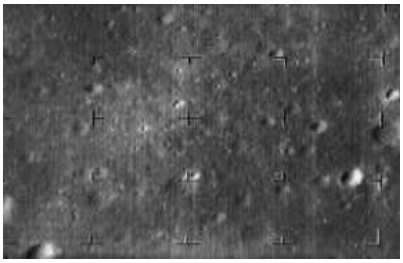

Fig. 2 [13]

Fig. 1 shows first Computer Processing introduced about 1964 at JPL Usedin images from Ranger-7 video images.

Early 1920s - Bartlane cable picture transmission system - used to transmit newspaper images across the Atlantic.

- images were coded, sent by telegraph, printed by a special telegraph printer.

- took about three hours to send an image, first systems supported 5 gray levels

1964 – NASA's Jet Propulsion Laboratory began working on computer algorithms to improve images of the moon.

- Images were transmitted by Ranger 7 probe.

- Corrections were desired for distortions inherent in on-board camera

Evolving technology and algorithms => explosion of application areas.[13]

IV. THEORY

A large proportion of information comes in the form of electrical waveforms or signals. Information can also be encoded in two-dimensional signals or images, certain processes being required to provide useful information Digital Processing Techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre- processing, enhancement and display, information extraction.[4]

In computer graphics images are manually made from physical models of objects, environments, and lighting instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies.[6]

Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans). [6]

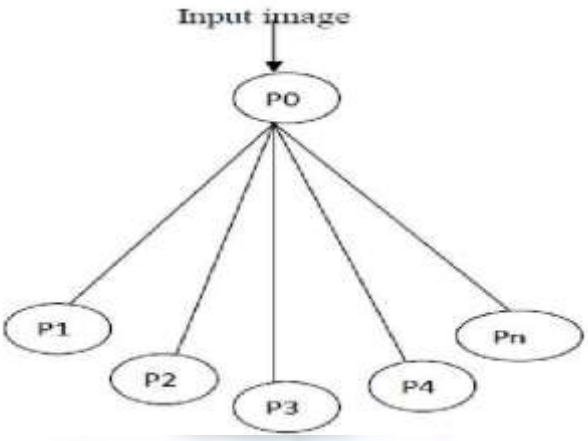

Figure 3: [6] A Single Level Tree Network

Image Restoration: It is concerned with filtering the observed image to minimize the effect of degradations. [11] Effectiveness of image restoration depends on the extent and accuracy of the knowledge of degradation[12] process as well as on filter design. Image restoration differs from image enhancement in that the latter is concerned with more extraction or accentuation of image features.

Image Compression: It is concerned with minimizing the number of bits required to represent an image. Application of compression are in broadcast tv ,remote sensing via satellite, military communication via aircraft, radar, for educational and business documents that arise in digital radiology, motion, pictures, images and so on.[12]

V. REVIEW OF SCIENTISTS

X.L. Li, B. Veeravalli, and C. C. Ko describes in their research on a network of workstations using parallel virtual machine communication library and process a very large volume of image data on a network workstations. The edge

detection using sobal operator, an application to demonstrate the performance of the strategy proposed by divisible load theory,[6] and the experimental results and performance analysis using different image sizes, kernel sizes, and number of workstations which verifies the feasibility of DLT in practical application. Joel Guillod, Philippe Schmid-Saugeon describes in their research An open internet platform to distributed image processing applied to dermoscopy. This system will allow for an international collaborative work in the fight against the malignant melanoma by offering a conceptual and technical platform of teledermoscopy.

VI. APPLICATIONS

In many applications shape information provides an important process and quality indicator. Based on digital the CAMSIZER / CAMSIZER XT is immediately able to analyze the particle shape of sample material in a detailed and representative manner. The advantages of the full-frame cameras used in the CAMSIZER / CAMSIZER XT for the distortion-free recording of all the particle projections is particularly obvious when measuring the particle shape and size.[9]

The measuring setup – two digital cameras as an adaptive measuring unit – improves and optimizes particle analysis by digital image processing. Thus, it is possible to measure a wide range of particles from 1 µm to 30 mm extremely accurately, without having to switch measuring ranges or make adjustments.[9]

The sample is fed in from the feed channel so that all particles fall through the measurement field During the measurement procedure the two digital cameras (CCD) perform different tasks. The basic camera (CAM-B) records large particles, the zoom camera (CAM-Z) records the small ones. The contact-free optical measurement is carried out in real time and simultaneously obtains all the required information about particle size and particle shape.[9]

As a result of the high information content obtained from the digital images made during the measurement procedure, the particle projections can be evaluated in many different ways. Depending on the application, the CAMSIZER / CAMSIZER XT measures the particle projections according to various areas, circumferences and lengths by making a high-resolution scan of each individual particle in 64 directions.[9] The results obtained can be, for example:

CONCLUSION

A large amount of processing power is required for image processing.. In the distributed environment where network latency significantly affects the power of execution the particular operations, there is need of some security algorithms in distributed image processing in client server architecture. In the proposed work jpeg encoder and jpeg decoder will be added for high performance with security in this architecture.

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