

The importance of Digital Image Processing and its applications

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Abstract- Digital image processing is continuously an exciting field as it gives improved pictorial information for human clarification and processing of image data for storage, transmission, and representation for machine view. Image Processing is a technique to increase raw images expected from cameras/sensors placed on satellites, space probes and aircrafts or pictures taken in normal everyday life for several applications. This field of image processing expressively better-quality in recent times and that prolonged of science and technology. The image processing deals with image acquisition, Image enhancement, image segmentation, feature extraction, image classification, a regular study on the importance of image processing and its applications to the field of computer revelation is conceded out in this paper. In an image processing operation, the input given is an image and its output is an enriched high-quality image as per the methods used.

Keywords- Digital Image Processing, Image acquisition, Image enhancement, image segmentation, feature extraction, Edge Detection, image classification, Image Restoration, Image Compression.

Introduction

The simple definition of image processing refers to the processing of a digital image, i.e. eliminating the noise and any kind of anomalies existing in an image using the digital computer. Image processing is a way to perform some operations on an image to acquire an improved image or to cutting some useful information from it. It is a thoughtful of signal processing in which involvement is an image and yield may be image or topographies associated with that. Currently, image processing is among promptly rising technologies. It customs primary research area within engineering and computer science disciplines too.

Image processing mostly includes the following three steps:

- Importing the image via image acquisition tools;
- Examining and manipulating the image;
- Output in which result can be improved it or report that is construct on image analysis.

On behalf of mathematical analysis, an image may be precise as a twodimensional function $f(x, y)$ where x and y are spatial coordinates, and the amplitude of f at any pair of coordinates (x, y) is called the strength or gray level of the image at that fact. When $x, y,$ and the intensity values of f are altogether determinate, isolated quantities, we appeal it a digital image. It is very significant that a digital image is collected of an encoded number of elements, each of which has a definitelocality and cost are called picture elements, image elements, peals and pixels.

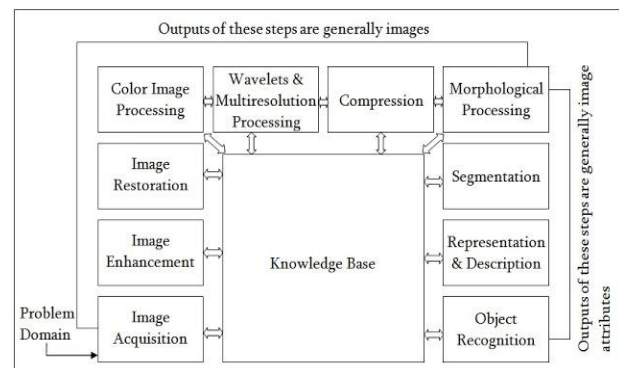


Figure1: Fundamental steps in digital image Processing [1]

The above figure shows that the fundamental steps in Digital image processing.

Image Acquisition: This is the initial step of the digital image processing. Digital image acquisition is the creation of precise images, such as of a physical scene or of the internal arrangement of an object. The term is often anticipated to embrace the processing, compression, storage, printing, and display of such images. Image acquisition could be as humble as being assumed an image that is previously in digital form.

Image Enhancement: Image enhancement is the process of altering digital images so that the results are more appropriate for demonstration or more image analysis. For example, you can eliminate noise, sharpen, or brighten an image, making it easier to identify key features.

Image Restoration: Image Restoration is the operation of taking an unethical/noisy image and appraising the unsoiled,

innovative image. [2]Exploitation may come in many forms such as gesture blur, noise and camera miss-focus. The objective of image restoration techniques is to reduce noise and recover resolution loss.

Color Image Processing: The color image processing requires an understanding of the physics of light as well as the psychology of color perception. Human use color information to distinguish objects, materials, food, places and time of the day. For the classification purpose color image processing technique is used.

Wavelets and multiresolution processing: If you decorated a picture thru an atmosphere, clouds, trees, and flowers, you would use a different extent brush contingent on the size of the topographies. Wavelets are comparable those brushes. Wavelets transform is an efficient tool to represent an image. The wavelet transform permits multi-resolution investigation of an image.

Image Compression: Image compression is a kind of data compression useful to digital images, to decrease their cost for storage or spread. Procedures could revenue gain of visual awareness and the numerical possessions of image data to afford sophisticated results related with standard compression techniques.

Character Recognition: Optical Character obligation, typically shortened to OCR, is the machine-driven or electronic alteration of scanned or picture images of kind written or printed text into machine-encoded i.e., computer-readable text. It is frequently used as an existence of records access from a minute kind of innovative data source, whether papers, invoice, bank proclamation, revenues, business cards, a numeral of printed records or

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mail. It is an ordinary technique of digitizing printed manuscripts such that they can be by electronic means edited, searched, store more closely used in machine processes such as machine conversion and showed online, text-to-speech, key data withdrawal and text mining. OCR is a pitch of research in intelligence, pattern and computer idea. Primary versions required to be computerized with images of each character, and performed on one font at a time. "Intelligent" structures with a prodigious degree of gratitude correctness for most fonts are now even. Some vendible methods are skilled of duplicating formatted output that very much resemble the original scanned sheet with columns, images and other non-textual modules [3].

Signature Verification: A digital signature is a mathematical scheme for representing the validity of a digital communication. A legal digital signature affords a receiver reason to consider that the message was created by a recognized sender, such that the sender cannot reject having sent the message with non-repudiation and authentication and the message was not changed in transfer. A digital signature (not to be confused with a digital certificate) is a mathematical technique used to validate the authenticity and integrity of a message, software or digital documents

Conclusion: I have presented an efficient study of image processing and its applications in this paper. I have discussed the fundamentals of image processing such as Image, image-analysis and understanding, image-transforms, compression techniques, optical character recognition (OCR) This study will help the researchers who working on basic steps of digital image processing. I have basically discussed on fundamental steps in Digital image processing and its few applications.

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