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STUDY ON DIGITAL IMAGE PROCESSING

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Abstract: It is simply called as DIP. Digital Image Processing is a algorithm to perform image processing on digital images. And it is also use of computer algorithm to create, processing, display digital images. Digital image processing remove noise, and improve clarity of images. We can remove noise using Linear Filter , Median Filter , Adaptive Filtering. We can extract the size, scale using this processing. It is include remote sensing data via satellite, medical image processing, radar and sonar image processing and robotics. Modern technology had made this possible to manipulate multi-dimensional signals. It has broad spectrum of applications.

Keywords: Digital Image Processing, Sampling, Quantization, Applications, Colour representation.

I. INTRODUCTION

- **Image** – A two-dimensional image that can be observed by human visual system.
- **Digital image**-Representation of a two-dimensional image as a finite set digital values, called picture elements or pixels. Pixels values typically represent grey levels, colours, heights, opacities etc.
- **Digital image processing**-perform digital signal processing operations on digital images. Digital image processing is the use of computer algorithm to perform image processing on digital image. Conversion of natural images into digital form involves two key processes, jointly referred to as digitisation:
  - ❖ **Sampling**
  - ❖ **Quantisation**

Both involve loss of image fidelity i.e. approximations.

II. SAMPLING

Sampling represents the image by measurements at regularly spaced sample intervals. Two important criteria:-

- ❖ **Sampling interval**
  - Distance between sample points or pixels.
- ❖ **Tessellation**
  - The pattern of sampling points

The number of pixels in the image is called the resolution of the image. If the number of pixels is too small, individual pixels can be seen and other undesired effects (e.g. aliasing) may be evident.

III . QUANTIZATION

Quantisation uses an ADC (analogue to digital converter) to transform brightness values into range of integer numbers, 0 to M, where M is limited by the ADC and the computer.

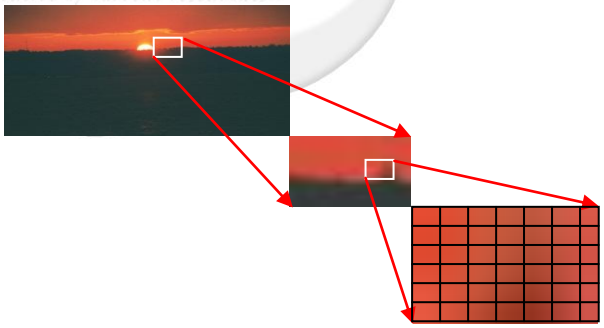
Where m is the number of bits used to represent the value of each pixel. This determines the number of grey levels.

Too few bits results in steps between grey levels being apparent.

Example

For an image of 512 by 512 pixels, with 8 bits per pixel: Memory required = 0.25 megabytes Images from sources (e.g. video camera) arrive at 25 images, or frames, per second: Data rate = 6.55 million pixels per second

The capture of video images involves large amounts of data occurring at high rates.



Digital image processing focuses on two major tasks

1. Improvement of pictorial information for human interpretation.
2. Processing of image data for storage, transmission and representation for autonomous machine perception

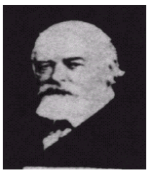
IV.HISTORY OF DIGITAL IMAGE PROCESSING :

Early 1920s: One of the first applications digital imaging was in the news-paper industry.

- ✓ The Bartlane cable picture transmission service.
- ✓ Images were transferred by submarine cable between London and New York.
- ✓ Pictures were coded for cable transfer and reconstructed at the receiving end on a telegraph printer.

Mid to late 1920s: Improvements to the Barlane system resulted in higher quality images.

- New reproduction processes based on photographic techniques.
- Increased number of tones in reproduced images.



1960s: Improvements in computing technology and the onset of the space race led to a surge of work in digital image processing.
1964: Computers used to improve the quality of images of the moon taken by the *Ranger7*probe .
1970s: Digital image processing begins to be used in medical applications.
1979: Sir Godfrey N. Hounsfield and Prof. Allan M.Cornmmack share the Nobel prize in medicine for the invention of tomography, the technology behind Computerised Axial Tomography (CAT) scans.
1980s-Today: The use of digital image processing techniques has techniques has exploded and they are now used for all kinds of tasks in all kinds of areas.

- Image enhancement/restoration
- Artistic effects
- Medical visualisation
- Industrial inseption

V.APPLICATIONS OF IMAGE PROCESSING :

Visual information is the most important type of information perceived, processed and interpreted by the human brain. One third of the cortical area of the human brain is declared to visual information processing.
Digital image processing, as a computer-based technology, carries out automatic processing, manipulation and interpretation of such visual information, and it plays an increasingly important role in many aspects of our daily life, as well as in a wide variety of disciplines and fields in science and technology, with applications such as television, photography, robotics, remote sensing, medical diagnosis and industrial inspection.

- Computerized photography(e.ge, Photoshop)
- Space image processing (e.g., Hubble space telescope images, interplanetary probe
- Automatic character recognition (zip code)
- Finger print/face/iris recognition.
- Remote sensing: aerial and satellite image interpretations
- Reconnaissance
- Industrial applications

VI.COLOUR REPRESENTATION

Three Components of Colour:
Hue:The dominant wavelength, the redness of red, greenness of green, etc.
Saturation:How pure the colour is, or how much white is contained in the colour. For example, red and royal blue are more saturated than pink and sky blue, respectively.

Luminance: The amount or intensity of light.
Common image formats include:

- 1 sample per point (B &W or Grayscale)
- 3 samples per point (Red, Green, and Blue)
- samples per point (Red, Green, Blue, and "Alpha", a.k.a. Opacity)

For most of this we will focus on grey-scale images.

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