

IT 51026 :Digital Image Processing

Chapter I

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What is image, picture and digital image?

Image: In image processing, an "image" is a two-dimensional array of pixels, where each pixel represents a specific value corresponding to the intensity or color of a point in the image. Images in image processing can be grayscale or color and are typically processed using various techniques to enhance, analyze, or manipulate their visual content.

What is image, picture and digital image?

Picture: The term "picture" in image processing is often used synonymously with "image." It refers to a visual representation or digital photograph that is subjected to computational operations for analysis, enhancement, or modification. The term "picture" is more colloquial and may be used in a broader sense to describe visual data.

What is image, picture and digital image?

Digital Image: A digital image is a representation of a two-dimensional image as a finite set of digital values, called picture elements or pixels. Pixel values typically represents gray level, colors, heights, opacities etc. There are many types of image formats. They are gray scale image, binary image and RGB image.

Explain the types of the images and find the difference between them

Four basic types of image are Binary, Greyscale, True Color (RGB) and Indexed.

Binary: Each pixel is just black or white. Since there are only two possible values for each pixel, we only need one bit per pixel. eg. text (printed or handwriting), fingerprints, or architectural plans.

Greyscale: Each pixel is a shade of grey, normally from 0 (black) to 255 (white). This range means that each pixel can be represented by eight bits, or exactly one byte. eg. X-rays

Explain the types of the images and find the difference between them

True Color (RGB): Each pixel has a particular color; that color being described by the amount of red, green and blue in it. If each of these components has a range 0-255, a total of 255³ different possible colors exist in the image. Every pixel corresponds three values (red, green, blue).

Indexed: Most color images only have a small subset of the more than sixteen million possible colors. Each pixel has a value which does not give its color (as for an RGB image), but an index to the color in the map.

Describe some applications of image.

Applications of Image Processing

Medical Imaging:

- ✓ Diagnosis and medical imaging, including X-rays, CT scans, MRIs and ultrasound
- ✓ Disease detection and analysis

Traffic and Transportation:

- ✓ Traffic monitoring and management
- ✓ License plate recognition
- ✓ Vehicle and pedestrian tracking

Describe some applications of image.

Food and Agriculture:

- ✓ Quality assessment of agricultural products
- ✓ Monitoring crop health and growth

Biometrics:

- ✓ Fingerprint, iris and retina scanning for security and identification
- ✓ Voice and speech recognition
- ✓ Handwriting recognition for document analysis

What are the aspects of image processing?

Image enhancement: This refers to processing an image so that the result is more suitable for a particular application. Examples include:

- ✓ Sharpening or de-blurring an out of focus image
- ✓ Highlighting edges
- ✓ Improving image contrast or brightening an image
- ✓ Removing noise

Image restoration: This may be considered as reversing the damage done to an image by a known cause, for example:

- ✓ Removing of blur caused by linear motion
- ✓ Removal of optical distortions
- ✓ Removing periodic interference

What are the aspects of image processing?

Image segmentation: This involves subdividing an image into constituent parts, or isolating certain aspects of an image::

- ✓ Finding lines, circles or particular shapes in an image
- ✓ In an aerial photograph, identifying cars, trees, buildings or roads

Describe about image processing task.

Acquiring the image: Acquiring an image involves capturing a representation of a visual scene and converting it into a digital format that can be processed, stored, and analyzed by a computer. The process typically involves the use of image acquisition devices, such as cameras or scanners.

Preprocessing: This is the step taken before the “major” image processing task. The problem here is to perform some basic tasks in order to render the resulting image more suitable for the job to follow. In this case it may involve enhancing the contrast, removing noise, or identifying regions likely to contain the postcode.

Describe about image processing task.

Segmentation: Image segmentation is a computer vision task that involves dividing an image into meaningful and homogeneous regions or segments based on certain characteristics such as color, intensity, texture, or other visual properties.

Representation and description: These terms refer to extracting the particular features which allow us to differentiate between objects. Here we will be looking for curves, holes and corners which allow us to distinguish the different digits which constitute a postcode. Recognition and interpretation: This means assigning labels to objects based on their descriptors (from the previous step), and assigning meanings to those labels. So, we identify particular digits, and we interpret a string of four digits at the end of the address as the postcode.



THANK YOU!