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Research Papers

THE REVIEW PAPER ON "BI-LEVEL IMAGE PROCESSING"

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Abstract

Image processing is a rapidly growing area of computer science. Image processing is defined as analyzing and manipulating images with a computer. The goal of thesis is to improve the quality of degrade images using global thresholding. There are four algorithm and different algorithms gives different results on different type images. The research in image recognition usually includes two stages, "low-level" and "high-level".

KEY WORDS:

Bi-level , Review Paper , analyzing , global thresholding.

INTRODUCTION

Image:-

An image is an artifact that depicts or records visual perception, for example a two dimensional picture, that has a similar appearance to some subject- usually a physical object or a person, thus providing a depiction of it.

Pixel:-

In digital imaging, a pixel is a physical point in raster image or the smallest addressable element in an all points addressable point display device. So it is the smallest controllable element of a picture represented on the screen. The address of pixel corresponds to its physical coordinates. LCD pixels are represented in 2D grid, and are represented using dots but CRT pixels corresponds to their timing mechanisms and sweep rates. Each pixel is a sample of an original image. So more samples provide more accurate representations of original image.

Bits Per Pixel:-

The number of distinct colors that can be represented by a pixel depends on the number of bits per pixel (bpp). A 1 bpp image uses 1-bit for each pixel, so each pixel can be either on or off. Each additional bit doubles the number of colors available, so a 2 bpp image can have 4 colors.

RGB:-

The RGB colour model relates very closely to the way we perceive colour with the r, g and b

receptors in our retinas. The primary RGB color is related to r i.e. RED, g i.e. GREEN, b i.e. BLUE.

Digital Image:-

A Digital Image is a discrete two-dimensional function f(x, y) which has been quantized over its domain and range.

Vector Graphics:-

A Vector graphic is made up of lines and curves defined by mathematical descriptions called vectors.

Raster Graphics:-

A raster graphic is made of a grid of small squares known as pixels.

Image Processing

Image processing generally involves three steps:

1. Import an image with an optical scanner or directly through digital camera.
2. Manipulate or analyze the image in some way. This stage can include image enhancement and data compression. The image may be analyzed to find patterns that aren't visible by the human eye.
3. Output the result. The result might be the image altered in some way or it might be a report based on analysis of the image.

Segmentation

Segmentation refers to the process of partitioning a digital image into multiple segments (sets of pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.Image segmentation is an essential procedure in many applications of image processing.Image segmentation is typically used to locate objects and boundaries in images. Segmentation is very important to image retrieval. Both the shape feature and the layout feature depend on good segmentation.

Thrsholding

Thresholding is an important technique for image segmentation that tries to identify and extract a target from its background on the basis of the distribution of gray levels or texture in image objects.

Thresholding methods are either global or local and point- or region-dependent. Global thresholding algorithms choose one threshold for the entire image while local thresholding algorithms partition the image into sub images and select a threshold for each sub image. Point-dependent thresholding algorithms only analyze the gray level distribution of the image while region-dependent algorithms also consider the location of the pixels [15].

How it Works:-

The input to a thresholding operation is typically a grayscale or colour image. In the simplest implementation, the output is a binary image representing the segmentation. Black pixels correspond to background and white pixels correspond to foreground (or vice versa). In simple implementations, the segmentation is determined by a single parameter known as the intensity threshold. In a single pass, each pixel in the image is compared with this threshold. If the pixel's intensity is higher than the threshold, the pixel is set to, say, white, in the output. If it is less than the threshold, it is set to black.

Histogram

The histogram of a digital image with gray levels in the range [0, L - 1] is a discrete function h(rk) = n_k, where r_k is the k^{th} gray level and n_k is the number of pixels in the image having gray level rk. It is common practice to normalize a histogram by dividing each of its values by the total number of pixels in the Image, denoted by n. Thus, a normalized histogram is given by p(rk) = nk/n, for k = 0, 1, 2,….. L – 1, p(rk) gives an estimate of the probability of occurrence of gray level r_k. The sum of all components of a normalized histogram is equal to 1. The distribution of all gray level probabilities is called histogram.

Implementation

Four algorithms are explained in my research from which one is explained here:-.

Intermean algorithm:-

1.Make an initial guess at t such that between class variance is maximized and the intra class is minimized and the algorithm positions t midway between the means of the two classes : for example, set it equal to the median pixel value, that is, the value for which

$$\sum_{k=0}^{t} h_k \ddagger \frac{n^2}{2} > \sum_{k=0}^{t-1} h_k$$

Where n^2 is the number of pixels in the n n image.

2.Calculate the mean pixel value in each category. For values less than or equal to t, this is given by:

$$m_1 = \sum_{k=0}^{t} k h_k \Big/ \sum_{k=0}^{t} h_k$$

Whereas, for values greater than t, it is given by:

$$m_2 = \sum_{k=t+1}^{N} k h_k \Big/ \sum_{k=t+1}^{N} h_k$$

3.Re-estimate t as halfway between the two means, i.e.

$$t = [(m_1 + m_2)/2]$$

Where [] denotes the integer part of the expression between the brackets [29].

4. Repeat steps (2) and (3) until t stops changing value between consecutive evaluations.

CONCLUSION AND FUTURE WORK

To improve the quality of degraded images Thresholding is widely used. First, a global thresholding technique specifically designed for old document images is applied to the entire image. Then, the image areas that still contain background noise are detected and the same technique is reapplied to each area separately.

Image segmentation plays an important role in image analysis and computer vision system. Among all segmentation techniques, the automatic thresholding methods are widely used because of their advantages of simple implement and time saving.

In Future, The running-time of the algorithms may be improved. This will make the execution of the algorithms much faster and output image may be retrieved much faster.

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