Histogram Specification: A Fast and Flexible Method to Process Digital Images

ABSTRACT:

Histogram specification has been successfully used in digital image processing over the years. Mainly used as an image enhancement technique, methods such as histogram equalization (HE) can yield good contrast with almost no effort in terms of inputs to the algorithm or the computational time required. More elaborate histograms can take on problems faced by HE at the expense of having to define the final histograms in innovative ways that may require some extra processing time but are nevertheless fast enough to be considered for real-time applications. This paper proposes a new technique for specifying a histogram to enhance the image contrast. To further evidence our faith on histogram specification techniques, we also discuss methods to modify images, e.g., to help segmentation approaches. Thus, as advocates of these techniques, we would like to emphasize the flexibility of this image processing approach to do more than enhancing images.

Existing System:

In case of the existing system we need to take a lot of image to make a 3D Sean. And also took a lot of time to create the 3D Sean. And also we cannot estimate the time in which the Sean can be created. In order to obtain a better resolution, a technique based on the combination of gray code and phase shifting is often used. The main drawback of this is that we need a lot of image to achieve that. And so look forward to advanced system. Through which we can make the process quicker.

Proposed System:

What is a good contrast then?We will go for a simple answer here—a method that offers you more gray-level values or more saturation values for the different color tones in the image but will not degrade an image in a considerable way.In case of the proposed

system we over come the problem in the existing system. And also we propose a structured pattern in order to manage the image from a computer. We are getting the image in a matrix, converting to grayscale. Using encoded pattern project, we getting the combination of image from the matrix and adding new pixel colors according to the encoded one, with out using any similar images.

Hardware Requirements & Software Requirements:

Hardware Requirements

- SYSTEM : Pentium IV 2.4 GHz
- HARD DISK : 40 GB
- FLOPPY DRIVE : 1.44 MB
- MONITOR : 15 VGA colour
- MOUSE : Logitech.
- RAM : 256 MB
- KEYBOARD : 110 keys enhanced.

Software Requirements

- Operating system :- Windows XP Professional
- Front End :- Microsoft Visual Studio .Net 2005
- Coding Language :- C# 2.0

MODULES USED:

- Semiautomatic Histogram Specification
- Using Morphological Segmentation
- Using Thresholding
- Using an Entropy Filter

Semiautomatic Histogram Specification:

An image histogram is a type of histogram that acts as a graphical representation of the tonal distribution in a digital image. It plots the number of pixels for each tonal value. By looking at the histogram for a specific image a viewer will be able to judge the entire tonal distribution at a glance.

The horizontal axis of the graph represents the tonal variations, while the vertical axis represents the number of pixels in that particular tone. The left side of the horizontal axis represents the black and dark areas, the middle represents medium grey and the right hand side represents light and pure white areas. The vertical axis represents the size of the area that is captured in each one of these zones. Thus, the histogram for a very bright image with few dark areas and/or shadows will have most of its data points on the right side and center of the graph. Conversely, the histogram for a very dark image will have the majority of its data points on the left side and center of the graph.

Using Morphological Segmentation:

Morphological operators often take a binary image and a structuring element as input and combine them using a set operator (intersection, union, inclusion, complement). They process objects in the input image based on characteristics of its shape, which are encoded in the structuring element.

Usually, the structuring element is sized 3×3 and has its origin at the center pixel. It is shifted over the image and at each pixel of the image its elements are compared with the set of the underlying pixels. If the two sets of elements match the condition defined by the set operator (*e.g.* if the set of pixels in the structuring element is a subset of the underlying image pixels), the pixel underneath the origin of the structuring element is set to a pre-defined value (0 or 1 for binary images). A morphological operator is therefore defined by its structuring element and the applied set operator

Using Thresholding:

The classical segmentation by thresholding the histogram is investigated. Here, the minimum-error-thresholding (MET) method is used to assess another thresholding approach aside from Otsu's because of the excellent results of this technique reported, in which 40 different thresholding segmentation methods were investigated. In order to have a quantitative analysis of the improvement achieved by using the HS, 100 images of a wide variety of natural scenes were tested, and the segmentation was compared with the database ground-truth segmentations performed by human observers

Using an Entropy Filter:

The entropy is calculated using a 9 × 9 mask, which gives an estimation of the "roughness" of the area. Morphological operations then eliminate artifacts and fill gaps after the entropy filter is used. Note how the specified image obtained better results for the segmentation of the two textures. Note also how the images are almost identical. This corroborates the results in the sense that a small modification based on a specified histogram that almost has the same entropy as the original histogram yields good results.

REFERENCE:

Gabriel Thomas, Daniel Flores-Tapia and Stephen Pistorius, "Histogram Specification: A Fast and Flexible Method to Process Digital Images", **IEEE Transaction on Instrumentation and Measurement, Vol.60, No.5, May 2011.**