

Weighted Histogram Approach For The Image Enhancement

¹Nishtha Khalsa, ²Shobha Tyagi

¹M.Tech Student, Computer Science Department, MRIU, FBD, Haryana, India

²Assistant Professor, Computer Science Department, MRIU, FBD, Haryana, India

Abstract

This paper proposes an efficient weighted histogram modification method for image enhancement, which plays a significant role in digital image processing, computer vision, and pattern recognition. The histogram enhancement method is a very vital method to enhance the aerial images. This paper describes the study of the image enhancement and provides the comparison between power law transformation and Adaptive gamma correction weighted distribution. In this paper, we will describe the importance of image enhancement and we will represent the two techniques or algorithm for image enhancement. The paper also shows the histogram of the enhanced image. In this comparison of both techniques, we will show the qualitative and quantitative results. The proposed technique will be implemented in MATLAB environment.

Keywords

Image enhancement, HE (histogram enhancement), pixel, threshold, Power law transformation etc.

I. Introduction

Digital image processing is an area characterized by need for extensive experimental work to establish the viability of proposed solutions to a given problem. Image processing technology is used by planetary scientists to enhance images of mars, Venus or other planets. One of part of the image processing is the image enhancement. Image Enhancement is the improvement of digital image quality, without knowledge about the source of degradation. Image Enhancement is the technique to improve the interpretability or perception of information in images for human viewers [1]. It is to improve the image quality so that the resultant image is better than the original image for a specific application. The main purpose of image enhancement is to bring out detail that is hidden in an image or to increase contrast in a low contrast image. Whenever an image is converted from one form to other such as digitizing the image some form of degradation occurs at output.

A. Document Image Analysis

The objective of Document Image analysis is to recognize the text & graphics components in image of documents & to extract intended information from them. Two categories of document image analysis can be defined

1. Text Processing

Deals with the textual components of a document image & its task are;

- Determining the skew (any tilt at which the document may have been scanned in the computer).
- Finding columns, paragraphs, textual lines, words, recognizing the text (Possibly its attributes such as size, font etc) by OCR.

Processing of document to extract their content in an automated fashion is essential task in all types of organizations for varied applications. Any document under processing is subjected to the following steps as depicted

II. Literature Survey

Madhu suggested that the Adaptive histogram equalization produced a better result, but the image is still not free from washed out appearance. The sharpness is poor and the background information as well as the plane is still fogged and poor in contrast. Alpha rooting rendered the entire image in a dark tone. Even the outline of the clouds which was visible in case of histogram

equalization is lost.

- 1) The Pre-Processing Stage that enhances the quality of the input image & locate the data of interest.
- 2) The feature extraction stage that captures the distinctive characteristics of the document under processing.
- 3) The classification stage that identifies the document; groups the according to certain classes & helps in their efficient recognition.

The figure below shows the example of a histogram of an image enhancement.

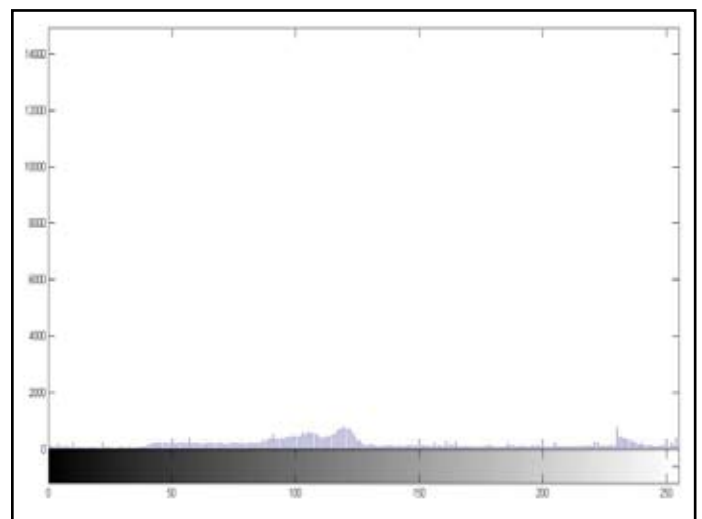


Fig. 1: Histogram of image

Tang suggested global histogram equalization, which adjusts the intensity histogram to approximate uniform distribution. The global histogram equalization is that the global image properties may not be appropriately applied in a local context. In fact, global histogram modification treats all regions of the image equally and, thus, often yields poor local performance in terms of detail preservation. Therefore, several local image enhancement algorithms have been introduced to improve enhancement.

III. Histograms

- A graphical representation is similar to a bar chart that organizes a group of data points into user-specified ranges. The histogram condenses a data series into an easily interpreted visual by taking many data points and grouping them into

logical ranges or bins.

- A Histogram is a graphical display of data using bars of different heights.
- The horizontal axis of the graph represents the color variations, while the vertical axis represents the number of pixels in that particular color.
- The histogram compresses a data series into an easily interpreted visual by taking many data points and grouping them into logical ranges.
- It plots the number of pixels for each tonal value.

IV. Power Law Transformations

Power-law transformations have the basic equation

$$S = cr^Y \tag{1}$$

Where c and Y are the positive constants. Sometimes this equation is written as

$$S = c(r + \epsilon)^Y \tag{2}$$

to account for an offset. However, offsets typically are an issue of display calibration and result they are normally ignored in (1). As in the case of the log transformation power-law curves with fraction values of gamma map a narrow range of dark input values into a wider range of output values. It has opposite being true for higher values of input levels. According to this, it will generate the curves with values of Y > 1 have exactly the opposite effect as those generated with values of Y < 1. Finally from (1) it reduces to the identity transformation when c = Y = 1. A variety of devices used for image capture, printing and display respond according to a power law. The exponent in the power law equation is referred to as gamma. The process is used to correct these power-law response phenomena is called gamma correction.

Gamma correction is important if it is displaying an image an image accurately on a computer screen is of concern. Images that are not corrected properly can look either bleached out , or what is more likely too dark. It is trying to reproduce colors accurately also requires some knowledge of gamma correction because varying the value of gamma correction changes not only the brightness but also the ratios of red to green to blue. Basically in this method it utilizes for enhanced the dimmed images. In this method gamma is adjusted manually, according to this gamma value, the image will be enhanced. So the main drawback of this method is to give the value of gamma manually, it does not optimize the value of gamma.

V. Simulated Results

In this section of results, we will show the qualitative results. We take the input images of Aerial, Dimmed and another general purpose application images. It is important to qualitative assess the contrast enhancement. The major goal of the qualitative assessment is to judge if the output image is visually acceptable to human eyes and has a natural appearance.



Fig. 1: Original image



Fig. 2 : Enhanced image



Fig.3 : Proposed enhanced image



Fig.4 : Original image



Fig.5 : Enhanced Image



Fig.6 : Proposed Enhanced Image

VI. Conclusion And Future Scope

We study the comparative analysis between Power-Law Transformation and Adaptive gamma correction method. These techniques are used for contrast enhancement. Most of the techniques are useful for altering the gray level values of individual pixels and hence the overall contrast of the entire image. But they usually enhance the whole image in a uniform manner which in many cases produces undesirable results. There are various techniques available which produce highly balanced and visually appealing results for a diversity of images with different qualities of contrast and edge information and it will produce satisfactory result. The captured images of aerial image always lead to an ambiguity which is the main concern of research. The same concern we have taken in our proposed work to enhance the aerial images with the help of adaptive gamma correction method to improve the quality of the images so that the information contained in them could be extracted in a meaningful sense. In weighting distribution is used to smooth the fluctuation phenomena and avoid the generation of unfavorable artifacts. Gamma correction can automatically enhance the image contrast through use of smoothing curve. The same method can be further implemented by considering colored images directly. The method can be made more adaptive to gamma and other parameters.

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