A Review on Low Light Image Enhancement Using Image Processing Technique

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Abstract: - Digital image are the most common application of now days world. It is used in almost every area of life and technology. Enhancing the low light image is a critical process. Our main goal is to better the quality of image. The images being used in different Areas of life are usually captured by some digital cameras or scanners. Over the several decades, there have been notable capability improvements in Digital cameras including resolution and sensitivity. Despite these improvements, however, modern digital cameras are still limited in capturing high dynamic range images in low-light conditions. These cameras often rely on automatic exposure control to capture image of high dynamic range, but the longer exposure time often results motion blur. Many approaches are developed for enhancing low light image; however most of them consider image from moderately dark conditions. In this research, we propose an effective framework approach to enhance image from low light environments using appropriate noise removal filter technique which will maintain image quality.

Keywords— Digital Image, Low Light, Contrast Enhancement, Sparse Representations, De-nighting, MATLAB.

I. INTRODUCTION

Digital image has become an integral part of everyday life. It is well-known that image enhancement as an active topic in computer vision has received much attention in recent Years. The aim is to improve the visual appearance of the image, or to provide a “better” transform representation for future automated image processing, such as analysis, detection, segmentation, and recognition. Moreover, it helps analyses background information that is essential to understand object behavior without requiring expensive human visual inspection. There are numerous applications where digital image is acquired, processed and used, such as surveillance, general identity verification, criminal justice systems, civilian or military image processing. Color images provide more and richer information for visual perception than that of the gray images. Color image enhancement plays an important role in Digital Image Processing. The purpose of image enhancement is to get finer details of an image and highlight the useful information. During poor illumination conditions, the images appear darker or with low contrast. Such low contrast images needs to be enhanced. In the literature many image enhancement techniques such as gamma correction, contrast stretching, histogram equalization, and Contrast-limited adaptive histogram equalization (CLAHE) have been discussed. These are all old techniques which will not provide exact enhanced images and gives poor performance in terms of Root Mean Square Error (RMSE), Peak Signal to Noise Ratio (PSNR) and Mean Absolute Error (MAE). Use of the old enhancement technique will not recover exact true color of the images. Recently, Retinex, Homomorphism and Wavelet Multi-Scale techniques have been popular for enhancing images.

II. LITERATURE REVIEW

Mihaela Costin et al. [2] Extreme anomalies and abnormalities give important clues on how our brain is really functioning, our mind being able to reveal its secrets. “Understanding” a scene is not as simple as it seems to us even the interpretation that a little child might give to the things perceived around him. Yet, behind that little child there are months, years of knowledge acquisition. Cognitive aspects implemented in computational processes establish frames to model human actions relative to the human corresponding senses. The anatomical aspects, physiology, are modeled in simplified schemas in order to be implemented in virtual systems and machine models. Eye tracking models are examples to be considered for implementing artificial vision on robots. The paper comments, from the cognitive viewpoint, relevant recent studies prosopagnosia, analysis the relevant features that have to be modularly treated in a face recognition system and
proposes a new method of important directions detection on a face, which might constitute a new module, in addition to the existent face recognition software programs. Ashamdeep Singh et.al.[4] Region based techniques using texture analysis are simple and more effective as they work according to the specified regions of the image. Seed selection is an optimal method for initiate any spatial enhancement. This paper suggests a new hybrid approach for enhancement of the digital images. The suggested technique is based on region growing segmentation and works adaptively for enhancement of the image. Further, the technique is seed dependent so selection of seed is very important in this algorithm. A seed chosen in darker regions will give better results than the seed chosen in brighter region, because it is assumed that user will require enhancing the darker portions of the image. Initial seed selection is our first module. Our second module is region growing it is used to segment the image based on seed regions. The third and last module is region merging and used morphological operations as texture analysis. Chuancheng Ren et.al. [1] The color microscopic image is firstly divided into hue, saturation and value components from RGB color space to HSV color space through the color space conversion. The value component is decomposed by the curvelet transform. A modulus square function and a linear gain operator are applied to the high frequency curvelet coefficients to reduce noise and weight the detail. Then, the processed curvelet coefficients are reconstructed in order to obtain the enhanced value component by inverse wavelet transform. The saturation component is enhanced by adaptive histogram equalization. The enhanced value and saturation components together with unchanged hue component are finally converted back RGB color space. The experimental results show that the proposed method effectively enhances the color microscopic image which is better to reduce noise and render the clarity and colorfulness of the original image. Annu Saini [3] Fingerprints patterns do not change throughout the life. This is the reason for the popularity of fingerprints as the biometric identifier. The quality of image plays very important role in matching the two fingerprints .But most of the fingerprint recognition systems results poor matching due to the poor quality of image. In this paper I have explained some image enhancement methods that will improve the quality of the image before matching them. These techniques help the fingerprint recognition systems to give better results. Manu Gupta et.al. [9] Different algorithms have been purposed for enhancement of an image like Histogram Equalization, Median Filter, Spatial Averaging, High Boost filtering &Un-sharp masking, etc. In this paper we have proposed a hybrid technique by optimizing two techniques namely Fuzzy Logic and Artificial Neural Network (ANN). The results are obtained experimentally and compared using different parameters like MSE (Mean Square Error), RMSE (Root Mean Square Error), SNR (Signal to Noise), and PSNR (Peak Signal to Noise Ratio). The results have clearly shown that Fuzzy Logic and Artificial Neural network is best suitable technique that helps to improve the image visibility and also it useful in preserving the significance features of images which can further used in multiple useful purposes.

III. IMAGE ENHANCEMENT TECHNIQUES

Image enhancement is basically improving the Interpretability or perception of information in images for human viewers and providing better input for other automated image processing techniques [1]. There exist many techniques that can enhance a digital image without spoiling it. The enhancement methods can broadly be divided in to the following two categories:

1. Spatial Domain Methods
2. Frequency Domain Methods

In spatial domain techniques, we directly deal with the image pixels. The pixel values are manipulated to achieve desired enhancement. In frequency domain methods, the image is first transferred in to frequency domain. It means that, the Fourier Transform of the image is computed first. All the enhancement operations are performed on the Fourier transform of the image and then the Inverse Fourier transform is performed to get the resultant image. Image enhancement is applied in every field where images are ought to be understood and analyzed. For example, medical image analysis, analysis of images from satellites etc. In this section we briefly describe the various image enhancement techniques.

IV. FLOW SEQUENCE OF COLOR RESTORATION METHOD

1. Original Image (RGB)
2. Separate into R,G,B Channels

IV. CONCLUSION

The MATLAB brings to digital image processing is an extensive set of functions for processing multidimensional arrays of which images (two-dimensional numerical arrays) are a special case. The Image Processing Toolbox is a collection of functions that extend the capability of the MATLAB numeric computing environment. These functions, and the expressiveness of the MATLAB language, make image-processing operations easy to write in a compact, clear manner, thus providing an ideal software prototyping environment for the solution of video processing problems. The previously used methodologies are able to reduce the noise as well as increase the contrast level of the image but used methods are not still effectively work on color image. Therefore our aim to get clear image from the low light image.

References


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