AN IN-DEPTH ANALYSIS OF PREVIOUS-BASED DARK CHANNEL IMAGE DEHAZING

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ABSTRACT - Digital image processing (DIP) is the use of a digital computer to modify digital photographs. Visual communication is a subset of the larger realm of signals and frames, with an emphasis on visual aspects. The basic goal of the Digital Image Processing (DIP) field is to design and build a computing system capable of processing and manipulating visual input effectively. The system's input is a digital image, which is then processed using structured algorithms to yield an output image. Adobe Photoshop is one of the most well-known examples. This application is widely regarded as one of the most popular digital image processing tools. The goal of image enhancement is to improve the many components of a given image and highlight the prominent features. The goal of this investigation is to look into a variety of previously used approaches for multi-scale retinex, including histogram equalization and other well-established procedures.

Keywords: Image processing, Image Enhancement, Histogram Equalization (HE). Digital image processing.

1.INTRODUCTION

"Image processing" (IP) is a term used in modern information technology to describe a variety of techniques used to enhance or process photos. IP is used for a variety of functions, including image extraction, image identification, picture clarity or augmentation, and pattern measurement. The software in analog image processing must act on a physical image, whereas the software in digital image processing functions on a digital array of pixels. Color image enhancement is a major research motive for improving the visual quality of computer vision, pattern recognition, and endoscopic image processing.

PRINCIPLES OF IMAGE PROCESSING

The practice of identifying hidden items is known as visualization.

The technique of refining an image through image restoration and sharpening.

Image retrieval entails looking for the desired image. Dissimilar objects in an image are measured using patterns.

Photographic Illustration Identify and distinguish the things in a photograph.

APPLICATION OF DIP

- Image sharpening & restoration
- Medical field
- Remote-sensing
- Transmission & encoding
- Machine-Robot vision
- Color processing
- Pattern recognition
- Video processing

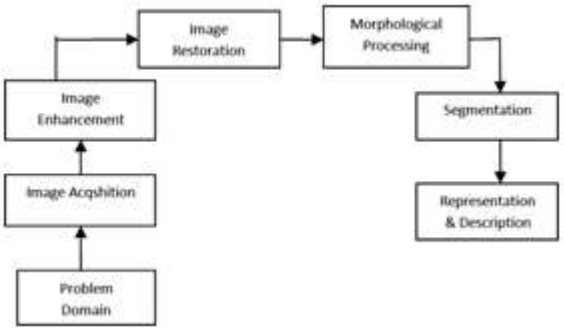

Fig. 1 Digital Image Processing

Image enhancement is a necessary approach for boosting an image's visual quality for human observers. One of the image enhancement frameworks that may be used to improve the quality of the input image is a contrast enhancement method.

STRATEGIES OF IMAGE ENHANCEMENT

Image enhancement's major goal is to increase the interpretability or perception of information in

images for human observers, as well as the i/p for additional automated image processing approaches.

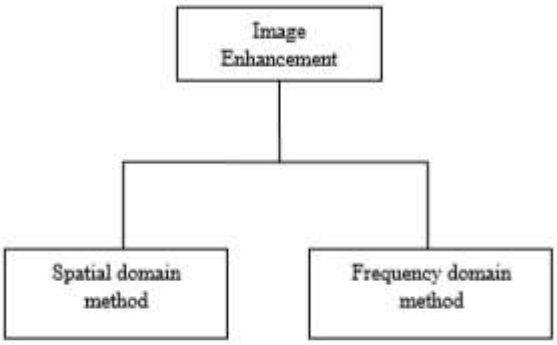

Fig. 2 Image enhancement techniques

We contract spatial domain approaches directly with picture pixels. The pixel values must be changed to produce the desired improvement. When frequency domain methods are utilized, the image is first translated into frequency domain. It implies that the image's Fourier Transform is evaluated first. The Fourier transform of the picture is employed in all enhancement operations, and the Inverse Fourier transform is used to generate the final image. picture enhancement is used in every area that involves picture comprehension and analysis. Image analysis includes the examination of medical photos, satellite images, and other types of images.

2.TECHNIQUES OF IMAGE ENHANCEMENT

Techniques for improving image quality for human interpretation have been extensively used. Local image enhancement and global picture improvement are the two main types of image enhancement strategies.

Image Enhancement on a Local Scale

Local enhancement is used to capture fine features in an image. It improves the gradient's local details, delivering critical information to the picture analyzer. It focuses on the pixels that a global approach would overlook. In this case, unsharp masking is used for local picture enhancement [7]. The image is sharpened with this technique by deleting a blurred or smoothed variant of the original image. This approach is made up of the following procedures: An image that has been blurred.

The mask is formed by subtracting the blurred image from the original image.

Adding the mask to the one-of-a-kind image.

Global Enhancement (GE) of the Image

The image's GE is utilized to boost the contrast. Throughout this process, each pixel of the image is altered to improve visibility. The technique is carried out directly on the pixel during spatial contrast enhancement. The pixel pattern guarantees that they are scattered across the ideal spectrum of intensity levels. Global contrast stretching is used as a broad image enhancing technique. Global procedures include histogram equalization (HE), contrast-limited adaptive histogram equalization, and a plethora of other transformation techniques such as the discrete cosine transform (DCT), discrete shearlet transform (DST), adaptive inverse hyperbolic tangent function transformation, and so on. None of the global techniques took the image's local qualities into account; rather, they sought the image's global data. As a result, the basic HE is used to evaluate the algorithm before applying the local enhancement.

3.IMAGE COLOR IMAGE ENHANCEMENT METHOD

Figure shows a simple block diagram that explains the main goal of the proposed color picture enhancement method. The proposed approach is divided into two steps: color reproduction and image enhancement. It first converts the RGB endoscopic picture to a 2-D spectral image, then uses entropy to choose the best grayscale enhanced spectral image. By matching the brightness and texture information, the whole color mood of the source RGB image is conveyed to the enhanced gray scale spectral image.

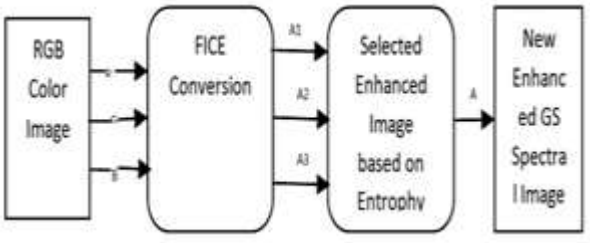

Fig. 3 An image enhancement algorithm's block diagram

The technique's foundation is FICE (Fuji

Intelligent Color Enhancement). It is critical to highlight that in our proposed technique, the FICE conversion matrix was used for image improvement. RGB endoscopic pictures are converted into 2-D spectral images using the FICE matrix. The approach is built on Spectral Estimation Technology. This conversion matrix is used to approximate various pixelated image spectrums. **HISTOGRAM EQUALIZATION**

Histogram equalization (HE) is one of the picture enhancement techniques. The i/p image's pixel intensity values are distributed by HE in such a way that the o/p image has a predictable intensity distribution. It increases contrast and produces a consistent histogram. This method can be applied to an entire image or to a specific section. The histogram of the presented image clearly depicts the probability of intensities occurring relative to intensity levels. Let f represent a specific image that has been translated into a mr by mc integer matrix with pixel intensities ranging from 0 to L 1. The number of potential intensity values, L, is commonly 256. Histogram equalization can be used to equalize the probability distribution of the image's intensity values.

4.LITERATURE SURVEY

Kambam Bijen Singh et al. [2017] employ both local and global image enhancing approaches in this investigation. To give a properly enhanced image without diminishing its luminosity, the image is first improved locally, and then the o/p is reprocessed using the GE method. The results of this improvement strategy are compared to image quality measures and simulated in MATLAB.

(2017) Manas Sarkar and colleagues This study shows how to use various well-known techniques, such as homomorphic filtering, discrete wavelet transform (DWT), and unsharp masking (USM). The effective output of these techniques was then integrated with the dynamics of Artificial Bee Colony (ABC) tactics to achieve improved contrast enhancement while optimizing the objective function meant to preserve the significant unique traits.

Image enhancement is defined as the process of changing an image to make it more acceptable for a specific purpose in this 2016 article by Hardeep Kaur and Jyoti Rani. It is used to improve the contrast ratio and brightness of an image, reduce image noise, and make the image easier to identify. Magnetic resonance imaging (MRI), a unique medical technique, delivers more accurate information about the brain's fragile tissues, cancer, stroke, and a variety of other disorders.

We expand the DHE to color image processing in this study, as Janani Purushothaman et al. described in 2016. Then, for color image enhancement, hue and intensity data are analyzed. In processing intensity, the chroma component is used. Even if the intensity remains constant, changing the hue allows us to capture the edge. After the intensity component, the chroma component is processed. The intensity and color component data are merged to generate greater results. In the suggested method, one parameter controls the enhancing property of the color image. Furthermore, the concepts for determining which parameter human senses agree on are explained.

Jinwen Yang and others in 2016 This paper focuses on HE, histogram processing, and the provision of improved approaches. Using verified algorithms and standard digital pictures, this study compares pre-processing with post-processing. Because the histogram equalization and specification approach has made the original image's dense gray distribution more sparse, the contrast and visual effects of the image processing can be improved.

(2015), Yan-Tsung Peng and others We propose employing image blurriness to determine the depth map for underwater image enhancement in this study. In underwater images, the closer an object is to the camera, the sharper it appears. We can recover and improve underwater images by using blurriness in the image formation model (IFM). Experiments with these pictures under various lighting situations show that the suggested method surpasses earlier IFM-based enhancement strategies.

The histogram equalization technique is used in this study by Liangping Tu and Changqing Dong [2013] to increase the relevant information in the original image through preprocessing. The

preprocessed image is subsequently subjected to the SIFT and ASIFT algorithms, which extract and match the image's feature points. The goal of image preprocessing is to increase the number and frequency of matching image feature points. The results of the experiments show that the picture processed by HE can significantly increase the number of matching image feature points.

Histogram equalization (HE), according to Lei Zeng et al. [2013], is often utilized for contrast enhancement in a range of applications due to its ease of use and effectiveness. However, it typically results in excessive contrast augmentation, which gives the processed image an artificial aspect and visual artifacts. To address the shortcomings of classic HE algorithms for grayscale photos, a unique technique based on histogram similarity is extended. The proposed method outperforms certain traditional HE methods in terms of contrast and image quality.

5.PROPOSE FUTURE

We have offered a fresh approach in our work that will successfully handle the issue of picture processing. The suggested paper employs the Multi Scale Retinex (MSR) method. A multi-scale retinex algorithm for picture enhancement that is more reliable and consumes less processing resources is described. Rather of using the maximum value technique, the algorithm chooses the first approximation image by taking into account both the value of each pixel and the maximum value of their logarithmic image. Using discrete wavelet modification lowers computing complexity.

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This essay looks at various picture enhancing techniques. HE is a straightforward image enhancement technique. It has the rare ability to substantially alter an image's brightness and result in over-enhancement. To address the problem, we looked into a variety of histogram equalization-based contrast enhancement techniques. These traditional HE techniques, however, fail when processing photos with limited brightness

This problem will be overcome in the future by employing creative ways.

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