Morphological Detection in Images

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ABSTRACT:

In this paper, morphological connected transformation technique is used to detect the background of the image is captured in poor lighting. Here the contrast image enhancement has been carried out by histogram equalization. Histogram equalization is a well known technique where image quality is improved by equally distributing pixel intensity through available grey scale. The histogram of an image represents the relative frequency of occurrence of the various gray levels in the image. This technique for equalizing the histogram gives the best possible dynamic range and strong contrast. So the image is more visible and it is useful in image enhancement techniques. Transforming an image by its cumulative histogram gives an output histogram, which is flat or equalized. These operators proposed through the processing of images with background, these are mostly captured in dim conditions. Detection using geometrical structures and contrast. Development of images captured in dim conditions using histogram equalization technique is proposed.

Keyword : Morphological Detection, Histogram, Image Capturing

I. INTRODUCTION:

In this work, there are several morphological transformation are used to detect the histogram equalization using geometrical structures and contrast development of images captured in dim conditions. Frequently, an image is scanned in such a way that the resulting brightness values do not make full use of the available dynamic range. This can be easily observed in the histogram of the brightness values shown in by stretching the histogram over the available dynamic range it attempt to correct this situation[8]. histogram equalization is the technique by which the dynamic
range of the histogram of an image is increased. Histogram equalization assigns the intensity values of
pixels in the input image such that the output image contains a uniform distribution of intensities. This technique can be used on a whole image or just on a part of an image. Histogram equalization redistributes intensity distributions. If the histogram of any image has many peaks and valleys, it will still have peaks and valley after equalization, but peaks and valley will be shifted. Because of this, "spreading" is a better term than "flattening" to describe histogram equalization. In histogram equalization, each pixel is assigned a new intensity value based on its previous intensity level. In order to improve the contrast of this mage, without affecting the structure (i.e.geometry) of the information contained therein, its can

apply the histogram equalization operator. The methodology consists in solving an optimization problem that maximizes the average local contrast of an image [1]. Contrast operators are based on the logarithm function in a similar way to Weber's law [1], [2], [3]. Also, two approximations are used to compute the background in the processed images is proposed [1]. Mainly use the technique morphological transformation. Detection using geometrical structures and contrast development of images captured in dim conditions using histogram equalization technique is proposed. There are two technique is used such as local histogram equalization and global equalization.

II. METHODLOGIES:

There are several mathematical morphological transformation is used [1]. Principal component analysis is a popular method of reducing the dimensionality of a set of data. This is carried out using Eigen analysis of the data covariance matrix to find an ordered set of orthogonal basis vectors that best define the directions of greatest variance [2]. Zicheng Liu, Cha Zhang and Zhengyou Zhang propose a data driven approach for video enhancement in video conferencing application to improve the perceptual image quality for videoconferencing. Compared to existing image enhancement techniques, the novelty of our technique is that adjust not just the Brightness, but more importantly, the color tone. The basic idea is to use a set of professional-taken face images as training examples [3].some applications are captured in dim conditions in fig 1. Used for processing of images taken by satellites in cloudy weather conditions. Before processing Courtesy: image taken by satellite (Castor). Fig 2 after processing, Used for processing of space images taken from ground-based cameras. These image compared to fig 1 is better. Courtesy: Picture taken using a ground-based camera at Palomar Observatory in California fig 1&2 taken. The processes in the order the compare to first picture second figure it is most visible. These using some morphological transformation are used such as block analysis and opening and closing method are used to enhance the picture. Note that global histogram equalization leads to oversaturation of parts of the image [9]. While local histogram equalization alleviates that problem, it ends up introducing noise in the background and changes the appearance of parts of the image, like the shirt. Our method does not suffer from both of these and achieves an image that is closer to the original in its Appearance.

1. Optimization techniques:

To solve the optimization problem; aditi majumder and sandy irani propose a new greedy iterative algorithm. it compare the results from this algorithm with existing different global and local contrast-enhancement techniques and show that the results are superior than any traditional or state-of-the art.

Fig 1: Before processing, used for processing of space image taken from ground based cameras

Fig 2: After processing,used for processing of space image taken from ground based cameras

By imposing explicit constraints in our optimization formulation, it's able to avoid all common artifacts of contrast enhancement like halos, intensity burn-out, hue shift, and introduction of noise [4]. Fig 3. Shows that before processing a picture captured from dim conditions.

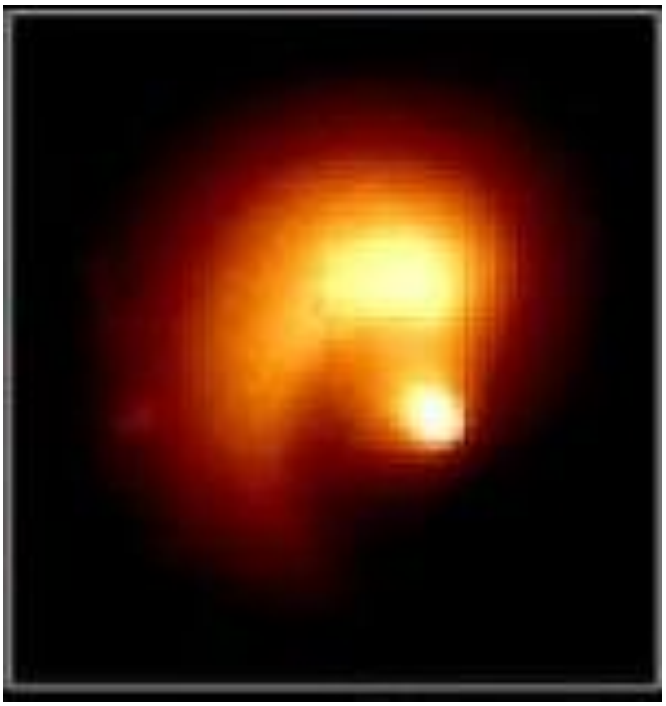

Fig 3: Before processing used for processing of space imagestaken from Ground based cameras.

Fig 4 : After processing the clear image will appear. Used for processing of space images taken from ground-based cameras.

Fig 4. Shows that after processing the image of above diagrams. A good ambience of light illuminating the object or scene to be imaged may give rise to exhaustive utilization of the entire dynamic range of grayscale in the image[11],[20], but the contrast over a small region may be very poor [12]. Second, a relatively smaller number of Pixels in such areas are insufficient to have any significant influence on the computation of global transformation. So the conventional histogram stretching or histogram equalization technique fails

to serve the purpose. Such images need local enhancement and the technique by which this can be achieved is called local contrast stretching [5]. The histogram equalization technique may be adopted to enhance the local contrast of the image. In this method the intensity of each pixel Fig 2 after processing, Used for processing of space images taken from ground-based cameras._ Fig 3 Before processing Used for processing of space images taken from ground-based cameras. Courtesy: Picture taken using a ground-based camera at Palomar Observatory in California. _ Fig 4 After processing the clear image will appear. Used for processing of space images taken from ground-based cameras. is modified through local histogram equalization over a small region of the image around that pixel. Mathematical Morphology is a powerful technique in the field of image processing and computer vision [19]. In morphology, the objects in an image are considered as set of points and operations are defined between two sets: the object and the structuring element (SE). The shape and the size of SE are defined according to the purpose of the associated application. Basic morphological operations are erosion and dilation. Other operation like opening (closing) is sequential combination of erosion (dilation) and dilation (erosion). The method employs multiscale morphological filtering in extracting the scale specific dark and bright features from the input image through the implementation of a number of towers. The recombination of all such features at the time of reconstruction emphasizes the basic requirement of local contrast enhancement which demands that features of progressively smaller scales should get more weights [18]. The scheme has been implemented and executed on a set of grayscale images. This broad area undertakes the challenge of providing the computer with an intelligent way to automatically process images and extract useful information. These images may be computer-generated or captured by cameras from the real world [6]. Although researchers currently pursue a variety of applications, ranging from providing quality control on parts in a manufacturing process to uiding robots, the ambitions of computer vision remain limited only by human imagination. To understand the working of the histogram equalization, take the example of the following image fig 5.

Fig 5 : Histogram equalization technique before processing.

Fig 6 the dynamic range of image intensities is shown by the following histogram: If the istogram of any image has many peaks and valleys, it will still have peaks and valley after equalization,but peaks and valley will be shifted. Because of this, "spreading" is a better term than "flattening" to describe histogram equalization.

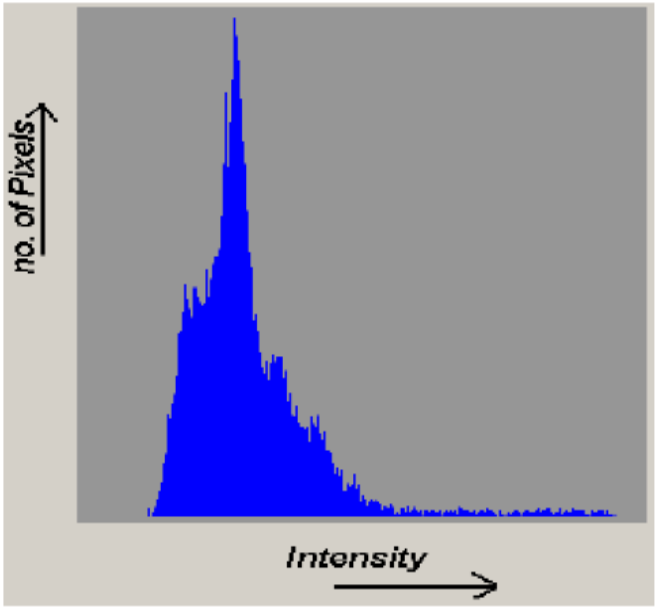

Fig 6: The dynamic range of image intensities.
In graphical representation. Fig 7. After processing_ the histogram equalization operation is performed on this image.
Fig 7 When the histogram equalization operation is performed on this image, the effects can be shown by the following equalized histogram: In histogram equalization, each pixel is assigned a new intensity value based on its previous intensity level

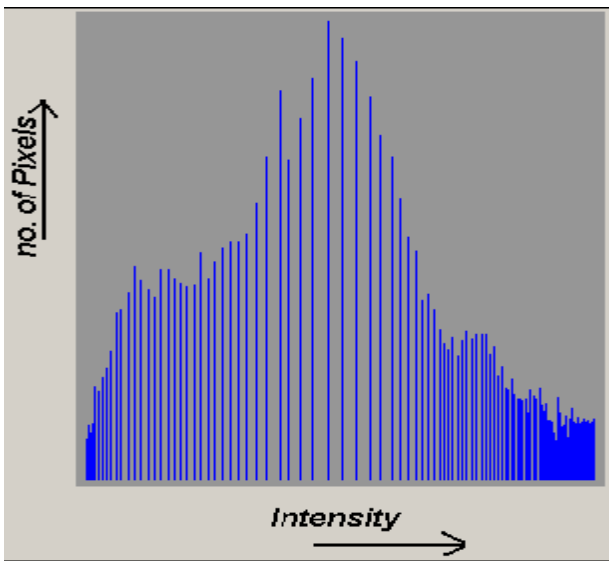

Fig 7 : After processing_ the histogram equalization operation is performed on this image.

Fig 7. After the equalization technique the image will become more visible.

To extend the notion of connected operators to lattices of functions, the extension cannot be done directly because the connectivity has no simple equivalent in lattices of functions [10]. Since the extension cannot be done through the connectivity itself, let it introduce an alternative definition of connected operators that is easily

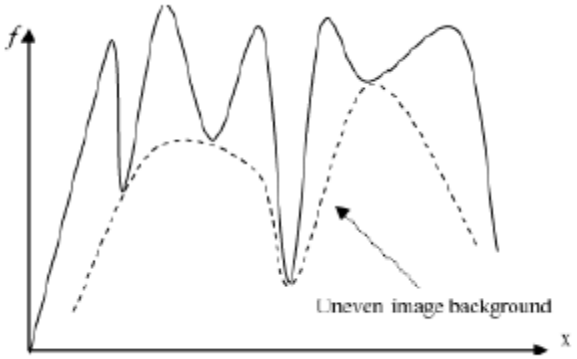

Fig. 8 : Background detection from the smallest and largest minima of the image. transposable to lattices of functions. This ternative definition relies on partitions [6]. In morphological iltering, each signal is viewed as a set, and its eometrical features are modified by morphologically convolving the signal with a structuring element, which is another set of simple shape and size [7]. By varying the structuring element can extract different types of information from the signal.

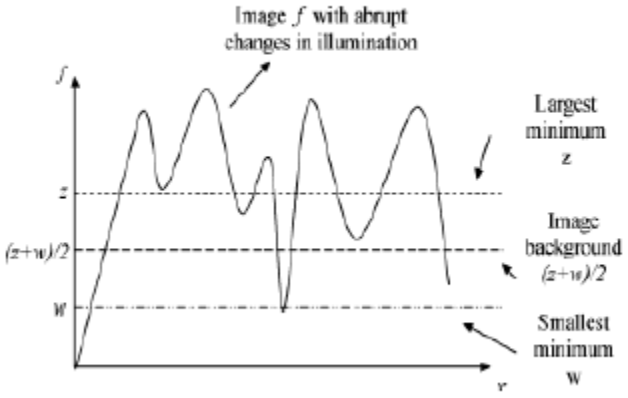

Fig. 9. Uneven background (dashed line) in images captured in dim conditions.

2. Background image performances:

On the other hand, in [1], a methodology to compute the background parameter [1] is proposed. The methodology consists in calculating the average between the smallest and largest regional minima, as illustrated in Fig. 8. However, the main disadvantage of this proposal is that the image background is not detected in local way [17]. As a result, the contrast is not correctly enhanced in images with poor lighting, since considerable changes occur in the image background due to abrupt changes in luminance as illustrated in Fig. 9.It is desirable to obtain a function that resembles the image background without dividing the original image into blocks, and without using the morphological erosion and dilation, since these morphological transformations generate new contours when the structuring element is increased. The histograms of some images obtained from the picture located in Fig. 10(a1) are presented in Fig. 10. He purpose of Fig. 13 is to illustrate the changes produced in the enhanced image when the background is modified by the application of (16). The background of the image was detected for m=10, 20, and 30. The histograms of the processed images [see Fig. 10(a2)–(a4)] can be observed in Fig. 10(b2)–(b4). Notice that,for each size m, different histograms are obtained.

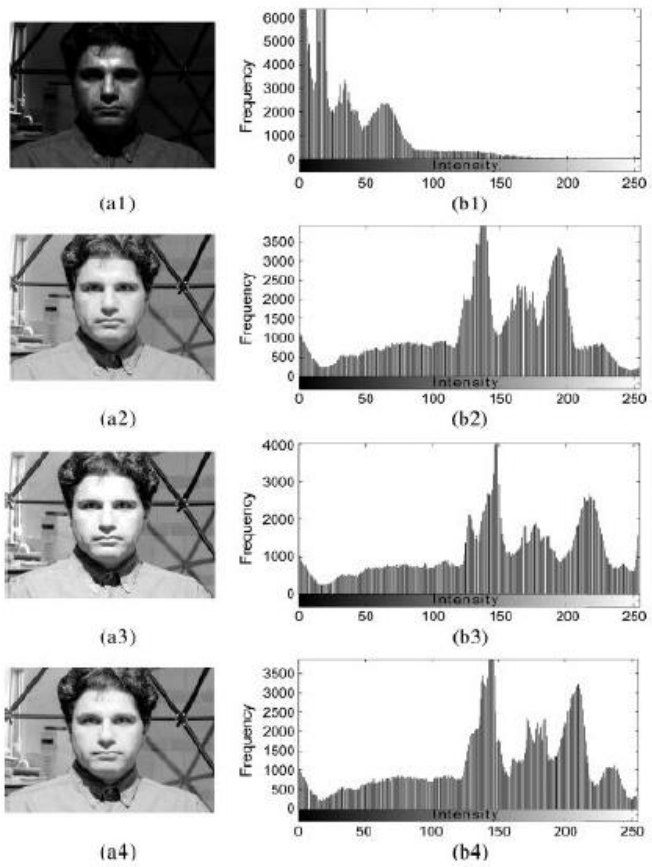

Fig. 10. (a1) Original image; (b1) histogram of the image in Fig. 10(a1); (a2), (a3), (a4) Enhanced images using _1 [_][(f)as background with m=10, 20, and 30; (b2), (b3), (b4) corresponding istograms of the images in Figs. 10(a2), (a3), (a4).

The main idea of contrast mappings consists in selecting at each point of the analyzed image the grey level value between different patterns (primitives) in accordance with some proximity criterion [8]. This transformation modifies the contrast by means of two primitive's equivalent o the morphological erosion and dilation defined by order-statistical filters [7]. An operator is connected if and only if it extends the flat zones of the input image. The term ''extends'' in latter definition means that the flat zones of the image are enlarged during the processing by merging contiguous flat zones.

3. Mathematical morphology:

Mathematical morphology is a well-founded non-linear theory of image processing [12, 13, 14, 15]. Its geometry oriented nature provides an efficient framework for analyzing object shape characteristics such as size and connectivity, which are not easily accessed by linear approaches. Morphological operations take into consideration the geometrical shape of the image objects to be analyzed[16]. The initial form of mathematical morphology is applied to binary images and usually referred to as standard mathematical morphology in the literature in order to be discriminated by its later extensions such as the gray-scale and the soft mathematical morphology[22],[23]. Mathematical morphology is theoretically founded on set theory. It contributes a wide range of operators to image processing, based on a few simple mathematical concepts. The operators are particularly useful for the analysis of binary images, boundary detection, noise removal, image enhancement, and image segmentation [21]. The advantages of morphological approaches over linear approaches are direct geometric interpretation, simplicity and efficiency in hardware mplementation. Basic operation of a morphology-based approach is the translation of a structuring element over the image and the erosion and or dilation of the image content based on the shape of the structuring element. A morphological operation analyzes and manipulates the structure of an image by marking the locations where the structuring element fits. In mathematical morphology, neighborhoods are, therefore, defined by the structuring element, i.e., the shape of the structuring element determines the shape of the neighborhood in the image.

4. Dilation and erosion:

The fundamental mathematical morphology operations dilation and erosion, based on Murkowski algebra are defined as[16], Dilation-

$$E(A,B) = A \ominus (-B) = \bigcup_{\beta \in \mathbf{B}} (A - \beta)$$

Erosion-

$$D(A,B) = A \oplus B = \bigcup_{\beta \in \mathbf{B}} (A + \beta)$$

Where,

$$-B = \{-\beta \,|\, \beta \in B\}$$

Dilation, in general, causes objects to dilate or grow in size; erosion causes objects to shrink. The amount and the way that they grow or shrink depend upon the choice of the structuring element. Dilating or eroding without specifying the structural element makes no more sense than trying to low pass filter an image without specifying the filter [25]. These methods are also used in this proposed.

III. CONCLUSION AND FUTURE WORKS

Image quantization algorithms are considered of such less usefulness today due to the increasing power of most digital imaging devices, and the decreasing cost of memory. The function of a filtering and signal enhancement module is to transform a signal into another more suitable for a given processing task. As such, filters and signal enhancement modules find applications in image processing, computer vision, telecommunications, geophysical signal processing, and biomedicine. However, the most popular filtering application is the process of detecting and removing unwanted noise from a signal of interest, such as color images and video sequences. Noise affects the perceptual quality of the image decreasing not only the appreciation of the image but also the performance of the task for which the image is intended. Therefore, filtering is an essential part of any image processing system whether the final product is used for human inspection, such as visual inspection, or an automatic analysis.

This paper discusses a study to detect the image background and to enhance the contrast in grey level images captured in dim conditions. First, a methodology is introduced to compute an approximation to the background using blocks analysis. This proposal is subsequently extended using mathematical morphology operators and histogram equalization. However, a difficulty is detected when the morphological erosion and dilation are employed; therefore, a new proposal to detect the image background is propounded, that is based on the use of morphological connected transformations. Also, morphological contrast enhancement transformations were introduced. These contrast transformations are characterized by the normalization of grey level intensities, avoiding abrupt changes in illumination. The performance of the proposals provided in this work is illustrated by means of several examples throughout the paper. Also, the operators performance employed in this paper are compared with others given in the literature. Finally, a disadvantage of contrast enhancement transformations studied in this paper is that they can only be used satisfactorily in images captured in dim conditions; it will take as future.

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