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A Low-Light Video/Image Enhancement Using Image Processing Technique

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ABSTRACT: 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 enhancing low light video/image; However, most of them consider video/image from moderately dark conditions. In this project, we propose an effective framework approach to enhance video/image from low light environments using appropriate noise removal filter technique which will maintain video/image quality.

KEYWORDS: low light video/image Enhancement Contrast, Noise, Image Adjustment, MATLAB.

I. INTRODUCTION

Digital video/image has become an integral part of everyday life. It is well-known that video enhancement as an active topic in computer vision has video/image received much attention in recent years. The aim is to improve the visual appearance of the video/image, or to provide a "better" transform representation for future automated video/image processing, such as analysis, detection, segmentation and recognition. Moreover, it helps analysis background information that is essential to understand object behavior without requiring expensive human visual inspection. There are numerous applications where digital video/image is acquired, processed and used, such as surveillance, general identity verification, criminal justice system, civilian or military video/image processing. More and more video/image cameras are widely deployed in many scenarios e.g. Public places, production plants etc.

Most of the cameras work in the open air which means the quality of video/image depends on the weather conditions. The camera and surveillance system are expected effective in all lighting and weather condition, but the majority of these cameras were not designed for low lighting, therefore the poor capture quality of video/image camera makes the video/image unusable for many applications in bad conditions e.g. dark night, soaking rain. Over the last several decades, there have been substantial capability improvements in digital cameras include resolutions and sensitivity. Despite these improvements, However, modern digital range, but the longer exposure time often results motion blur.
To design an effective and fast low lighting video/image enhancement is challenging problem. Many approaches are developed for enhancing low light video/image however most of them consider video/image from moderately dark conditions.

Fig 1: Enhance Denoising pictures

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II. LITERATURE SURVEY

➢ HENRIK MAGNUS OSCARSON ERIC WARRANT [1] presented a methodology for adaptive enhancement and noise reduction for very dark image sequences with very low dynamic range. The best approach when applying the method to color images has been discussed, which includes demos icing from the Bayer pattern in raw input color data simultaneously to the noise reduction.

➢ QING XUL et. al. [2] presented a novel three-stage algorithm for very low-light video denoising and enhancement. A new framework for very dark videos denoising and enhancement has been introduced by authors and shown to largely improve current state-of-the-art results.

➢ JINHUI HU et. al. [3] presented a technique of Kinect depth-based method for low light surveillance image enhancement. Pre- processing for Kinect depth map, depth constrained non-local means denoising and depth aware contrast stretching are performed successively in this algorithm to promote the visual quality for low light surveillance image. Comparing with the previous works, this method is able to enlarge the low dynamic range and promote both globe and local depth perception for the low light surveillance image meanwhile. Their experimental results show that this method generates clearer object edges and more distinct depth perception for enhanced low light surveillance images. High noise level from darkness and low dynamic range are two characteristics of low light surveillance image that severely degrade the visual quality.

➢ MINJEE KIM et. al. [4] proposed a novel framework for enhancement of very low- light video. For noise reduction, motion adaptive temporal filtering based on the Kalman structured updating is presented. Dynamic range of denoised video is increased by adaptive adjustment of RGB histograms. Finally, remaining noise is removed using Non-local means (NLM) denoising. They proposed a method that exploits color filter array (CFA) raw data for achieving low memory consumption, Histogram adjustment using the gamma transform and the adaptive clipping threshold is also presented to increase the dynamic range of the low light video/image. The experimental results indicate that this method is highly promising for real time applications to consumer digital cameras, especially CCTV and the surveillance video/image system.

The video/image enhancement is still an active area of research by name experts. There are still many problems of enhancing, such as false background problem, color shift problem etc., They were preprocessed to get rid of noise and moot background by filtering and transformation. Then the strategy of grey-level co-occurrence matrix (GLCM) was introduced to section images of skin problem.

III. PROBLEM STATEMENT

Digital filters are used to removal noise from the degraded image as any noise in the image can cause serious errors. Thus, the filters are the inverse degradation models of the image and when they are applied to a corrupted or degraded image, an original image can be reconstructed. As far as an image is concerned, edges and fine details are actually the high frequency contents and carry very important information. So, those filters are highly suitable for digital image filtering which can efficiently preserve edge and image details. In this paper, Mean Filter and Median Filter used for the removal of noise are discussed. These filters are applied on different noisy images having different types of noise models induced, their performance is evaluated in terms of PSNR and noisy & denoised signals are compared on the basis of PSNR.

IV. PROPOSED SOLUTION

The input video/image is converted into frames. The Gaussian noise is added to the video/image frames. The temporal noise reduction process is first employed. The difference between the current frame and the previous frame is calculated. The calculated difference is the motion difference in each frames of the video/image. The sum of squared distance and the mean absolute deviation were calculated. The Kalman gain of the process is calculated and based on the noise amount estimated. The prediction and the estimation step are helpful in the identification of the noises and the removal of the noise. Since noise in a low-light video/image can be amplified by stretching dynamic range, severe noise should be suppressed before the tone-mapping step. A spatial-temporal filtering can suppress most of noise in a low-light video/image. However, too strong demising may cause over-smoothing around moving object region.

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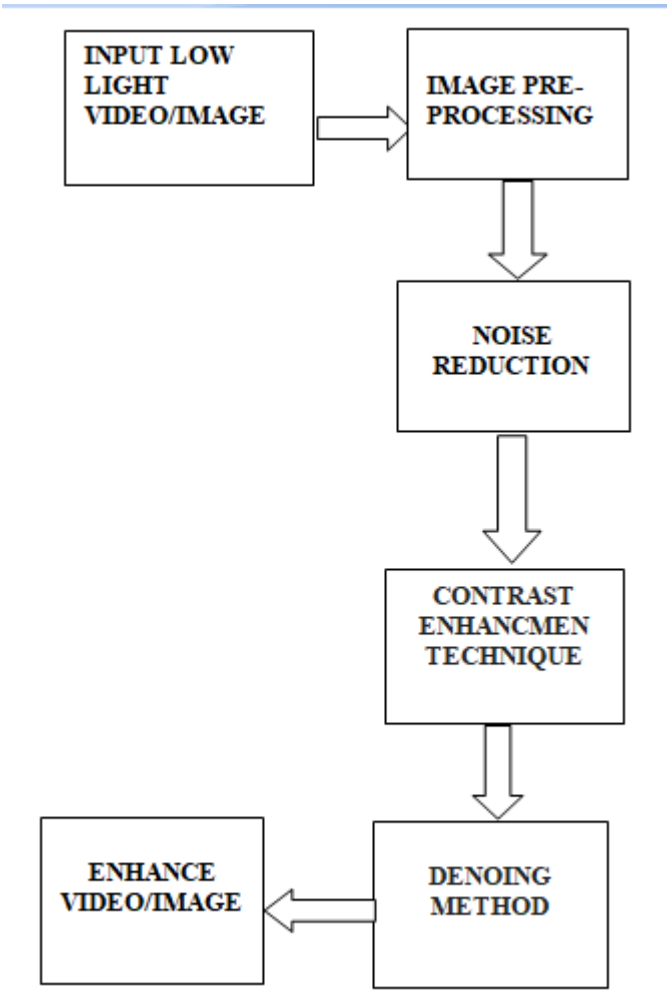
V. OBJECTIVES

To get an enhanced quality image or video clips from low light or blurred quality, following objectives were framed:

- To aim of restoration techniques to produce an image/video that closely resembles to original image process.
- To enhance more perfect noise-free image/video.
- To filtered performance of a particular filters to quantitative information of the noisy and denoised image/video.

VI. METHODOLOGY



The above Fig 1 shows the block diagram of methodology the detailed description of the methodology as follow:

A. Image Preprocessing

Image Pre-processing may be an elementary step in image process and laptop vision. It includes primitive operations to cut back noise, contrast sweetening, image smoothing sharping and advanced operation like image segmentation.

B. Noise Reduction

Noise is the result of errors in the image acquisition process that result in pixel values that do not reflect the true intensities of the real scene. Since image/video sequences temporally correlated, noise can be reduced effectively by temporal filtering.

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C. Contrast Enhancement Technique

The contrast of an image/video is a measure of its dynamic range, or the "spread" of its histogram. After the noise reduction, we have to amplify the intensity of the low-light. This stage is used to enhance the contrast of low-light. It is also called as tone mapping. Contrast enhancement processes adjust the relative brightness and darkness of objects in the scene to improve their visibility.

D. Denoising Method

For the final step of low light video/image enhancement, we have to apply filtering for smoothing the remaining noise. Even though most of the noise is removed by the noise reduction, the noise is introduced by tone mapping step. Moreover, since the level of the noise is much higher than the low light environment, edges and textures are often over smoothed during the denoising process.

VII. EXPERIMENT DESIGN AND RESULTS

The paper has been implemented using MATLAB 2015a version. A Row images received from cameras/sensors placed. Various techniques have been developed in Image processing we have used median and mean filters to enhance the video/image. These images were then preprocessed through image re-sizing, format conversion and contrast enhancement. These were then given as an input to the image segmentation by calculating the PSNR (PEAK SIGNAL NOISE RATIO) we can classify the enhanced Image/Video.

Input Image

Fig 2: Input Image

Contribution to the framework the Image will uploaded to acquire the data with respect to it. The Fig 2 shows the input image from the dataset.

Preprocessing

Fig 3: Image preprocessing

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Image Preprocessing is a step-in picture handling and computer vision. It incorporates crude activities to decrease clamor, contrast upgrade, picture smoothing and sharping, and progressed activity. The above Fig 3 describes the Image processing.

Fig 4: Enhance pictures

The Preprocessed Image is isolated into 3 groups. The above Fig 4 describes the Enhance picture in.

VIII. CONCLUSION

The Proposed solution is undertaken to present a survey of different types of methods and technologies that have been used for video/image enhancement. But the low contrast and noise remains a barrier to visually pleasing video/images in low light conditions. In that condition, to find out a more accuracy in video/image enhancement process there is need to detect and measure the intensity level of individual pixel channel as well as have to present an appropriate enhancement factor for enhancement purpose, so that effective and efficient video/image enhancement video/image enhancement process will be created.

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