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Video Enhancement & Suspicious Object Detection In Low Quality Video Frames

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Abstract: *To develop the real world computer vision system, detection of moving objects in video images is very important. The automatic detection of moving objects in video images is very important. The automatic detection of moving objects in monitoring system needs efficient algorithms. The common method is simple background subtraction i.e. to subtract current image from background. But it can't detect the difference when brightness difference between moving objects and background is small. The other approach is to use some algorithms such as color based subtraction technique but the costs are very high and have problem in stability. Here a method is proposed to detect moving objects using difference of two consecutive frames. The objective is to provide a software that can be used on a pc for performing tracking along with video enhancement using bilinear interpolation. The program is able to track moving objects and it is structured as different blocks working together. Initially the spatial resolution and the contrast of the extracted frames of the video sequence are enhanced. The position of the object is now marked manually so as to obtain the "Region of Interest". The algorithm is implemented in MATLAB and the results demonstrate that both the accuracy and processing speed are very promising. Furthermore, the algorithm is robust to the changes of lighting condition and camera noise. The algorithm can be used in video based applications such as automatic video surveillance.*
Keywords*- Video, Frames extraction, Image Enhancement, Object Tracking and detection ,Suspicious objects*

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I. Introduction

Detection of moving objects in video images is one of the most important and fundamental technologies to develop the real world computer vision systems, such as video monitoring system, intelligent-highway system, intrusion surveillance, etc. Traditionally, the most important task of monitoring safety is based on human visual observation, which is a hard work for watchmen. Therefore, the automatic detection of moving objects is required in the monitoring system that can help a human operator, even if it cannot completely replace the human's presence. To facilitate a monitoring system, efficient algorithms for detecting moving objects in video images need to be used. The usual method for detecting moving objects is simple background subtraction that is to subtract current image from background image. However, there exist gradual illumination changes, sudden changes in illumination and other scene parameters alter the appearance of the background. Simple background subtraction is susceptible to these changes. And when the brightness difference between moving objects and the background is small, it cannot detect the difference. In order to resolve these problems, some algorithms such as color based subtraction technique and the technique based on optical flows have been proposed. But the computational costs of these methods are very high and have problem in stability. In our method Moving objects are detected from the difference of two consecutive frames. This approach uses the motion to distinguish moving objects from the background. So it is more efficient than the previous approaches. In our system, images are captured with a stationary camera. The experiment results demonstrate that both the accuracy and processing speed are very promising. Furthermore, the algorithm is robust to the changes of lighting condition and camera noise.

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1.1 OBJ ECTIVES

Enhancement of low degraded video to realize the great quality video and higher frame quality. The separation of Associate in Nursing audio and frames in uncompressed low vision video to reinforce inferiority video and perform object detection.

- To Improve the speed and accuracy of technique used for police work target image at intervals less time.
- To increased frames of pictures that works well below image blur, camera motion, modification of cause, illumination, and scale conditions.
- To propose increased object following techniques supported following rule used template matching methodology.
- To find target object and match each frames in video.
- To bring home the bacon Noise Free Video.

1.2 SCOPE

Many algorithms and technology have been developed to automate monitoring the object in a video file. Object detection and tracking is a one of the challenging task in computer vision. Also, tracking of an object mainly involves two preceding steps object detection and object representation. Object detection is performed to check existence of objects in video and to precisely locate that object .Object tracking is a process of segmenting a region of interest from a video scene and keeping track of its motion, position and occlusion. The tracking is performed by monitoring objects' spatial and temporal changes during a video sequence, including its presence, position, size, shape, etc. Object tracking is used in several applications such as video surveillance, robot vision, traffic monitoring.

II. Literature Review

[M. kim, 2014] propose 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. The proposed method exploits color filter array (CFA) raw data for achieving low memory consumption. The adaptive temporal filter based on the Kalman filter and adopted the NLM denoising for further smoothing. Histogram adjustment using the gamma transform and the adaptive clipping threshold is also presented to increase the dynamic range of the low-light vid234eo.

[W. Zhong, 2014] proposed method based on a sparse collaborative model that exploits both holistic templates and local representations to account for drastic appearance changes. Develop a sparse discriminative classifier (SDC) and sparse generative model (SGM) for object tracking. In the SDC module, we present a classifier that separates the foreground object from the background based on holistic templates. It plays a critical role in numerous vision applications such as motion analysis, activity recognition, visual surveillance and intelligent user interfaces. Local representations are adopted to form a robust histogram that considers the spatial information among local patches with an occlusion handling module, which enables our tracker to better handle heavy occlusions.

[N. Kumar, 2015] proposed Mean and Median image filtering algorithms are compared based on their ability to reconstruct noise affected images. The purpose of these algorithms is to remove noise from a signal that might occur through the transmission of an image. These algorithms can be applied to one-dimensional as well as two-dimensional signals. A new framework for removing impulse noise from images is presented in which the nature of the filtering operation is conditioned on a state variable defined as the output of a classifier that operates on the differences between the input pixel and the remaining rank-ordered pixels in a sliding window. In this comparison of noise removal filters, the experiment has been conducted for different images and at various noise levels, and is seen that Median filters performed the best overall noise compositions tested by providing minimum MSE. Local Mean filter take the mean value of group of pixels surrounding to target pixel to smooth the image where as "Non Local Means" filtering take a mean of all pixels in the image, weighted by how similar those pixels are to the target pixels. If the image sequences are temporally correlated, noise can be reduced effectively by temporal filtering [1] because of temporal (inter-frame) filter can exploit the correlation to achieve high noise attenuation [10]. In the working areas of the video frames it cannot be applied as it is because it creates a motion blur. In respect to identified the true noise the temporal filter may use. Most of the noise is removed by the temporal filtering and the remaining noise can be exaggerated by the Non-local means denoising. The level of noise is much higher in low-light environment, edges and textures are often over smoothed during the denoising process. Tone Mapping is a technique used in image processing and computer graphics to map one set of colors to another to approximate the appearance of high dynamic range image in a medium that has a more limited dynamic ranges. Tone mapping is the process of amplify intensity of low-light video by judicious histogram adjustment [1]. Mostly three types of histograms of RGB color are computed separately after grouping pixels of each color channel from a CFA (color filter array) image, and then they are transformed with adaptively selected low and high feature thresholds [1].System use transform value which should be less than 1 to map dark pixels to a bright level. Because most of pixels have very small intensity values ranging about 5% of maximum intensity in extremely low light condition, stretching all pixels causes an associate degree incorrect conversion with a high offset intensity. By clipping pixels below the highest value of histogram and pixels with intensity beyond top 99th percentile, system can obtain satisfactory tone-mapped result while color balance is retaining always better than the result generated [1]. The principle behind the tone mapping process is to extend the dynamic range of dark image areas and meanwhile it slightly affected in other areas. If system wish to deliver an output in high dynamic range (HDR) image on paper or on a display, there must somehow convert the wide intensity range in the image to the lower range supported by the display [6]. The tone mapping technique is operated on brightness level (luminance) [7] Histogram Equalization is image processing technique. Greater is the histogram stretch greater is the contrast of the input image [2]. Histogram Equalization is one of the foremost familiar, computationally quick and straightforward to implement techniques for image enhancement but it mostly prefer for contrast enhancement of digital images [3].A histogram is a graphical representation of the distribution of data while an image histogram is a graphical representation of the number of pixels in an image as operate of their intensity. The HE Histogram equalization technique is used to stretch the histogram of the input image. If the distinction of the image is to be exaggerated then it means that the histogram equalization distribution of the corresponding image has to be widened. Histogram equalization is that the most generally used enhancement technique in digital image process because it deliver better result and cleanness in output that other [3]. The histogram of an input image is generally refers to a histogram of the pixel intensity values. The bar graph may be a graph showing the amount of pixels in a picture at every totally different intensity worth found therein image. For an 8 bit grayscale image there are 256 different possible intensities are available and so that the histogram will graphically display 256 numbers showing the distribution of pixels amongst those grayscale values. Histograms take input as color picture and may provide individual demonstration of red, green and blue color channels of histograms [3]. It tries to change the special bar graph of a picture to closely match the same distribution. The main aspire of this process is to obtained a uniform distributed histogram by using the cumulative density function of the given image. HE consist of following advantages such as,2.3.1 It suffers from the problem of being poorly suited for retaining local detail due to its global treatment of the image.2.3.2 Small-scale details that are often associated with the small bins of the histogram are eliminated [6].

III. Proposed Methodology (*Algorithm)*

1. Select an input video
2. Extract Frames and audio
3. Classify Frames as quality frames and degraded frames.
4. Enhance degraded frames.
5. Define suspicious objects.
6. Track suspicious object in each frames of video.
7. Display result.

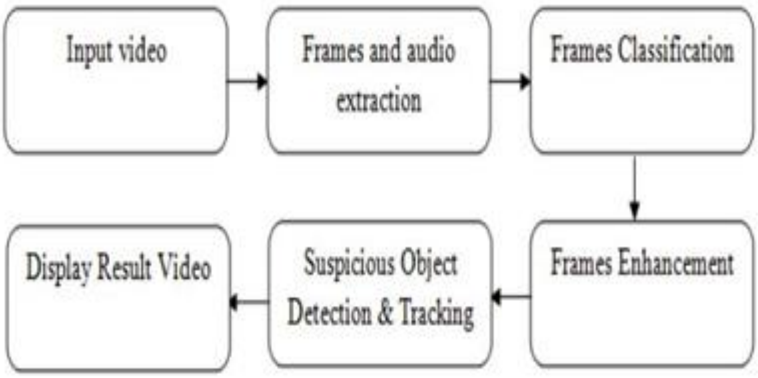

Figure 3.1 System Architecture Diagram

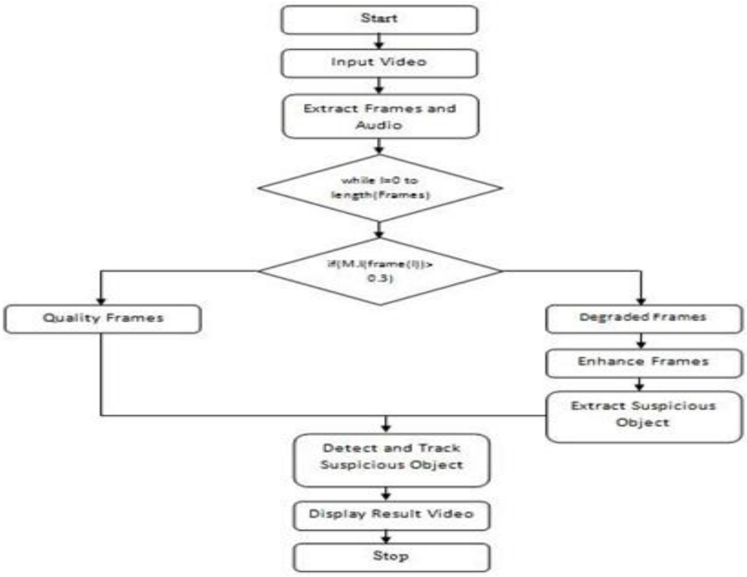

Figure 3.2 Data Flow Diagram

IV. Result Analysis

SN	Video Name	No of Frames	Frames Extracted	Quality Frames	Degraded Frames	Time of Frame Enhancement
1	1.avi	25	25	5	20	0.4
2	MM.avi	50	50	3	47	0.8
3	nn.avi	100	100	5	95	1.34
4	VID-20151230-WA0005.avi	150	150	6	144	1.87
5	VID-20160121-WA0004.avi	175	175	10	165	2.45

SN	Video Name	Suspecious Objects Detected	Time for Object detection	Total Suspecious Objects	Accuracy	Failure Rate
1	1.avi	3	0.345	3	100	0
2	MM.avi	5	0.453	5	100	0
3	nn.avi	3	0.563	3	100	0
4	VID-20151230-WA0005.avi	3	0.675	3	100	0
5	VID-20160121-WA0004.avi	2	0.567	2	100	0

V. Conclusion

Proposed methodology expected to be work as per objectives and will be better enhance video that will help in suspicious object detection.

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