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OBJECT DETECTION AND TRACKING ALGORITHM FOR LOW VISION VIDEO

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ABSTRACT

We propose a general framework for Object Recognition into regions and objects. In this framework, the detection and recognition of objects proceed simultaneously with image segmentation in a competitive and cooperative manner .Videos are a collection of sequential images with a constant time interval. So video can provide more information about our object when scenarios are changing with respect to time. Therefore, manually handling videos are quite impossible. So we need an automated devise to process these videos. 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, Video inpainting and Animation. 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. The detected object fall into various categories such as humans, vehicles, birds, floating clouds, swaying tree and other moving objects.

KEYWORDS:Image objects detection, image segmentation, object detection, object recognition, Video surveillance.

INTRODUCTION

Videos are actually sequences of images, each of which called a frame, displayed in fast enough frequency so that human eyes can percept the continuity of its content. It is obvious that all image processing techniques can be applied to individual frames. Besides, the contents of two consecutive frames are usually closely related [1]. The identification of regions of interest is typically the first step in many computer vision applications including event detection, video surveillance, and robotics.[2]. 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. An image, usually from a video sequence, is divided into two complimentary sets of pixels. The first set contains the pixels which correspond to foreground objects while the second and complimentary set contains the background pixels. This output or result is often represented as a binary image or as a mask. It is difficult to specify an absolute standard with respect to what should be identified as foreground and what should be marked as background because this definition is somewhat application specific. Generally, foreground objects are moving objects like people, boats and cars and everything else is background [3]. Many a times shadow is classified as foreground object which gives improper output.[2]. There are three key steps in video analysis: detection of interesting moving objects, tracking of such objects from frame to frame, and analysis of object tracks to recognize their behavior. But there is no commonly accepted method of combining segmentation with recognition. We show that our image object detection approach gives a principled way for addressing all three tasks simultaneously in a common framework which enables them to be solved in a cooperative and competitive manner.

RELATED WORK

1 Video Object Tracking Mechanism [5] In this paper, we proposed a new Bayesian filtering framework where analytic representations are used to approximate relevant density functions. Density approximation and interpolation technique are introduced for density propagation. Various simulations and tests on object tracking in real videos show the effectiveness of our density approximation methods and the kernel-based Bayesian filtering.The proposed CH-LSK tracker is robust to illumination variations, as it tracks the person's face, either in the case where the illumination change is gradual, i.e., when the person moves slowly toward the lit part of the room, or in the case where the illumination change is abrupt, i.e., when the lights are switched off. The PF tracker has similar behavior to the CH-LSK tracker, while the FT tracker is not able to handle the gradual illumination change future work is focused on analyzing the approximation error in the posterior distribution and its propagation over time.

2.A real-time object detecting[4] in this paper a novel real time object detection algorithm is proposed for night-time visual surveillance. The algorithm is based on contrast analysis Object detection is based on local contrast changes and detection results are improved by tracking the detected objects from one frame to the next. Experiments demonstrate that our algorithm has the ability to detect and track objects robustly at night under conditions in which more conventional algorithms fail. Other parameters such as the size of rectangular regionfor contrast measure, the threshold on contrast measure and the threshold on the distance measure between two rectangles are chosen by hand.Future work is focused on a multi-scale algorithm and decide the size of the rectangular region for contrast measure

3.Detecting and Tracking of Moving Objects from Video[6],in this paper proposed method as compared with the basic model of background subtraction and mean shift method. This approach for the segmentation of a moving foreground combines temporal image analysis with a background subtraction approach. In short, temporal features are used for the background updating so that the background subtraction for the dynamically changing environment can be achieved. Then afterwards makes use of spatial features to tackle with intensity changes. The performance is compared with the well known mean shift method and the basic background subtraction method.Future scope will be to resolve the problems of locating multiple moving objects separately in the real time scenarios.

4. A Novel Framework for Extremely Low-light Video[7], In this paper,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. a motion 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 video. use a 1.2Mega pixel progressive-scan CMOS sensor with maximum gain and the exposure time was set to 33.3ms which is normal speed of the sensor FPS. the proposed method is compared to two prominent conventional denoising techniques,denoted as ST3D [4] and DNLM [5], respectively.

5.Object Recognition by Template Matching[8],in this paper object recognition is to correctly identify objects in a scene and estimate their pose. emplate matching techniques is used to recognize the object using correlation and Phase Angle Method. Template matching technique, especially in two dimensional cases, has many applications in object tracking, image compression, stereo correspondence, and other computer vision applications. On rotating same images, correlation method takes less time for most of images to recognize same objects in it.

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Basic algorithm steps to detect and track moving objects with the proposed approach are as given below.

1. Take sample video as input -Read the sample video file.
2. Extract frames and sound separately in video file.
3. Check the video quality
   If (Low video quality:need to enhance)

Else (no need to enhance)

4. Enhance frame(enhance the qulity of frame used filter object And spatial noise reduction method)
5. Load enhance frame
6. Get track object into enhance frame
7. Check tracking object into all enhance frame (with strong and random feature)
8. Store and display the track object with blue square box.
9. Display the difference between the original frame and enhance frame.

In this approach we check the video quality. Low video quality, enhance that frame. By using filter object algorithm.the filter object algorithm used histogram method. After filter frame apply spatial noise reduction method to enhance more that frame. Then stored that enhance frame. Get tracking object into enhance frame and match the track object into all enhance frame.template matching algorithm are used ,and also display the difference between the original frame and enhance frame.

Histogram Equalization:

Histogram equalization is a common technique for enhancing the appearance of images. Suppose we have an image which is predominantly dark. Then its histogram would be skewed towards the lower end of the grey scale and all the image detail is compressed into the dark end of the histogram.[9] If we could `stretch out' the grey levels at the dark end to produce a more uniformly distributed histogram then the image would become much clearer. Histogram equalization involves finding a grey scale transformation function that creates an output image with a uniform histogram (or nearly so). The following four step scan design the local contrast modification factor. The first step detects the hidden local contrast signals that should be enhanced. One simple way to do this is to select the hidden local contrast by using the magnitude of the local contrast. This is realized by defining the two threshold levels .One is the threshold level THL, which divides the noise and the hidden contrast. The other threshold level THH divides the hidden contrast and large (visible) contrast. The hidden contrast can be selected by choosing the contrast whose magnitude is within these two threshold levels. The second step calculates the histogram of the hidden contrast signals in the whole image for each local luminance mean level. This histogram shows the local luminance mean levels where the contrast signals which should be enhanced exist. The third step is the smoothing of the histogram. In general, histogram levels are not smooth for luminance levels, which is not appropriate for their direct use as a local contrast modification function. Therefore, smoothing of the histogram is necessary. Finally, the fourth step is the weighting correction of the histogram. Local contrast signals close to the maximum or minimum level are usually suppressed by the limitation of the dynamic range of the recorded medium. This is realized by enhancing the local contrast modification factor for those levels where the local luminance mean is very high or very low.

Template Matching:

The generated templates from detection module are passed on to the tracking module, which initiate tracking the moving object with a given input reference template. The tracking module makes use of template-matching to search for the input template in the future frames grabbed by the video. . A new template is generated in case the object is lost during tracking due to change in its appearance and used further. Generations of such templates are dynamic which helps to track the object in robust manner. The theory behind template matching is given below[10]

i)The matching process moves the template image to all possible positions in a larger source image and computes a numerical index that indicates how well the template matches the image in that position.

ii)Matching is done on a pixel-by-pixel basis of both input template and masked template.

The main objective of this study is to provide a better and enhanced method to find the moving objects in the continuous video frame as well as to track them dynamically using template matching of the desired object.

Spatial Noise Reduction:

The noise filtering algorithms can be classified based on how filtering is applied to noise image. Noise filtering classified as spatial filtering and order statistics filtering. The filtering methods come under the spatial filtering is only employed when random noise is present.Impulse noise represents random spikes of energy that happen during the data transfer of an image. To generate noise, a percentage of the image is damaged by changing a randomly selected point channel to a random value from 0 to 255. The noise model, In is given by where I is the original image, Ir, Ig, and Ib represent the original red, green, and blue component intensities of the original image, x,y=

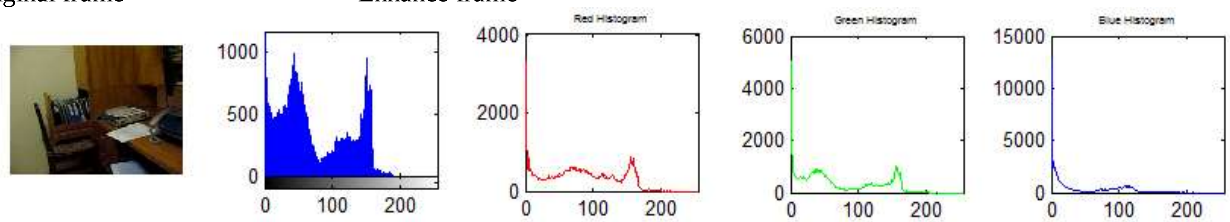
[0,1] are continuous uniform random numbers, z= [0,255] is a discrete uniform random number,and p = [0,1] is a parameter which represents the probability of noise in the image.

EXPERIMENTAL RESULT

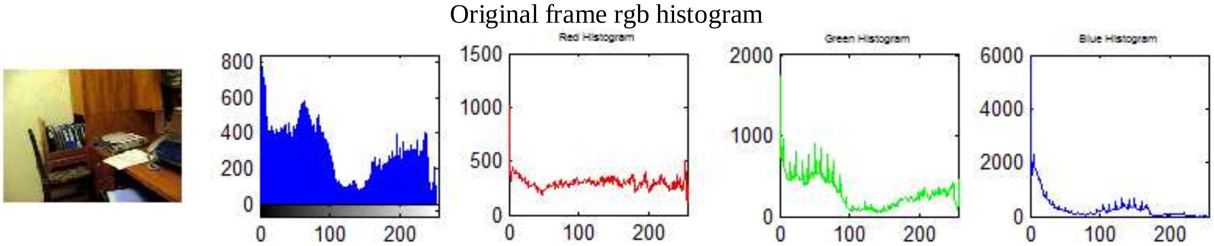
We tested the proposed method with a low-light video .this approach improve the quality of frame ,noise reduction . When play low vision frame. Extract the frame. result are compare original frame and enhance frame.

Original frame

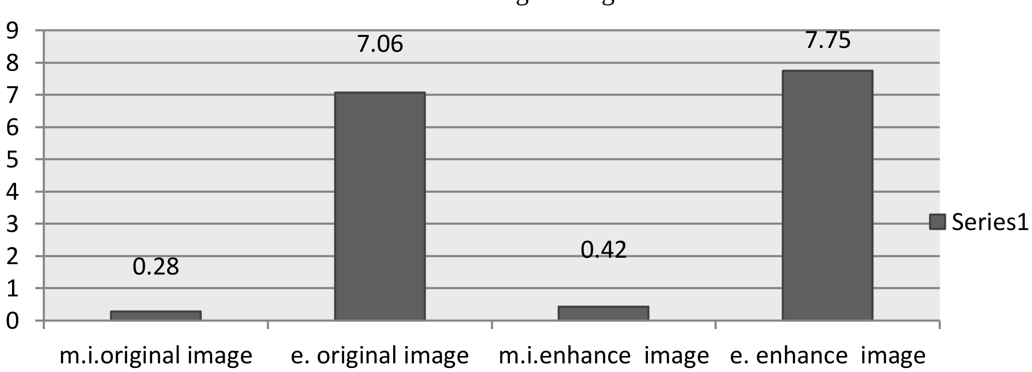
Enhance frame



Original frame rgb histogram



Enhance frame rgb histogram.



Graph :Show mean intensity and entrophy (original,enhance)

The proposed method are enhance the original image,increase the mean intensity and entrophy of original image Graph shows the difference between the original and enhance. Enhance image are easy to track the object .This methodology detect and track the object properly with less time conscption. Table show the enhance time ,low quality frame into extracted frame in video and proposed method are work properly or not.

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Video clip	Low quality frame into extracted frame	Time for enhance frame in sec	Proposed method work properly/not
Video1	8	0.14	y
Video2	24	0.15	y
Video3	12	0.14	y
Video4	21	0.13	y

Table: Low quality frame and time enhancement

CONCLUSION

This project is to develop an algorithm for moving object detection and tracking system. This algorithmis successfully implemented using Matlab integrated development environment. As a result, the algorithm is able to detect and track a moving object that is moving. Algorithm focus on Enhance the quality of frame and track the object into that enhance frame. We have evaluated the performance of the algorithm using sample videos. As can be seen, the proposed method is faster and efficient.

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