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# Suspicious Activity Detection of Moving Object in Video Surveillance System

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**Abstract:** Video surveillance systems are plays a vital role in ensuring the security at various public places like banks, shopping malls, military areas, etc. Suspicious activity recognition helps to prevent from threats and identify the causes after threat. In this paper we have reviewed different moving object detection techniques and analyzed frame differencing technique. In surveillance system for video captured by single camera is considered for space under observation. Method is capable for detecting moving object clearly and results are quite satisfactory.

**Keywords:** video, surveillance system, frame differencing , object detection.

## I. INTRODUCTION

A video is a group of basic structural units, such as scene, shot and frame associated with audio data. A frame is defined as a single picture shot of movie camera, lead by many successive frames for seamless video. Moving object detection is the act of segmenting non-stationary objects of interest with respect to surrounding area or region from a given sequence of video frames. Determination of the moving target forms the basic step for classification and tracking process of object in motion. The main aim of moving object detection and tracking activity is to find out foreground moving target(s) either in every video frame or at very first appearance of moving target in video. In any video analysis activity there are three major phases: identification of the moving object, tracing of identified moving object in a given series of video frames and analysis of the moving target (object) in order to determine its behavior.

Moving object detection has always proved to be challenging task due to number of factors like dynamic background, illumination variations, and misclassification of shadow as object and bootstrapping problems.

Moving object detection has become a central topic of discussion in field of computer vision due to its large range of applications like video processing, monitoring of security at airport, law enforcement, video data compression, automatic forground identification, marine surveillance and human activity recognition

Detecting and tracking objects are very important topics of research in surveillance and monitoring applications. Many methods have been proposed for moving object detection with a stationary camera. Section 2 focuses on existing techniques/algorithms in moving object detection. Specifications of methods result and their drawbacks are listed in section 3. Experimentation is explain in section 4.

## II. EXISTING TECHNIQUES/ALGORITHM

### A. Preprocessing of Video

Image (or video frame) preprocessing is the term for operations on frames at the basic level of analysis. There are different types of preprocessing which as follows:

**a) Color-Based Preprocessing:** Gray or intensity plays an important role in video analysis. For a binary video frame, it is relatively easy to combine the pixels in the foreground into blocks which are adjacently linked together and thus segment them from the background for succeeding object recognition.

**b) Image Cropping and Local Operators:** Image cropping is generally the first step which is used after taking a first frame. In this step, irrelevant parts in the image will be cropped such that further processing focus on the

ROI and thereby the computational cost is reduced. Examples of local operators include brightness adjustment, contrast enhancement and histogram equalization.

**c) Neighborhood Operators:** Neighborhood operators are basically designed to remove noise, sharpen image details, or accentuate image edges. The principal objective of image sharpening is to highlight details in a video frame or enhance the details that have been blurred. The most commonly used neighborhood operator are linear filter, median filter, laplacian filter, sobel operator, robert operator, canny edge operator and so on.

**d) Morphology Operators:** The morphological operators change the shape of an underlying object to facilitate further video text detection or optical character recognition. To perform those operation, we required first convert a colorful video frame into a binary image. Standard operator for binary morphology operations are dilation, erosion, majority, opening and closing.

**B. Video Segmentation**

Video segmentation is the process of dividing a video sequence into disjoint sets of consecutive frames.Detection of foreground objects from background has a lot of applications in human computer interaction, video compression, multimedia content editing and manipulation.

**a) Spatial-Temporal method:** Spatial and temporal features in video are exploited and elaborating the Spatio-temporal methods. Accurate segmentation results are obtained by global motion of background segmentation, but increases complexity. Moving objects (MO) have distinct motion patterns from the background hence they can easily recognize moving object in the Temporal segmentation. If contain objects have a different visual appearance (color, luminance, etc) from background, spatial segmentation can determine object boundaries accurately. Here drawback is in classification motion estimation (ME) is applied for each region to classify into foreground and background

## III. LITERATURE REVIEW

In [1], authors solve the problem of environmental illumination changes in the background model and classify pixels of the current image as foreground or background. Author worked on the to identify the spatial and temporal extents of the action of interest in training videos. They use the pixel level localization result to find the purpose of the local features for action detection. This paper contains the split and merge algorithm for finding the background and several separated moving objects. By using this algorithm the inherent temporal smoothness of human action is analyzed for segmentation. Also result of action detection with learned spatial and temporal extents with state of art method is compared.

In [2], Review of recent method for moving object detection is presented. moving object detection basically used to find out the physical movement of an object in a specific region. In a recent year the object detection technique used to detecting and analyzing the nature of object which is used in many applications like in video surveillance, human motion analysis, robot navigation and in video analysis and security etc.So in this paper brief classification of classical approach for moving object detection having a single stationary camera is presented.

In recent the multimedia application demands the contents based video processing. Basically video segmentation is used to find the object and background. In [3] the different gaps will focus which is available between present and past method of video segmentation.

In [4], novel crowd motion representation method is presented which can characterize crowd behaviors. Also simple framework is developed which can detect and localize abnormal behavior. Also Generate an ROC curve by varying the threshold in the classification. Equal error rate (EER) and area under curve (AUC). But Computational efficiency is less.

For detecting the object various background subtraction method is used, when object and camera moving. In [5], robust method is used to detect moving object by a camera on moving platform. Basically in this paper a two level registration is applied to estimation of camera motion for motion compensation. Also the noise removal techniques are used by using hidden markov model (HMM) for classifying pixel. And implemented algorithm used in complex environment also.

## IV. EXPERIMENTATION

Fig.1, shows schematic representation of system

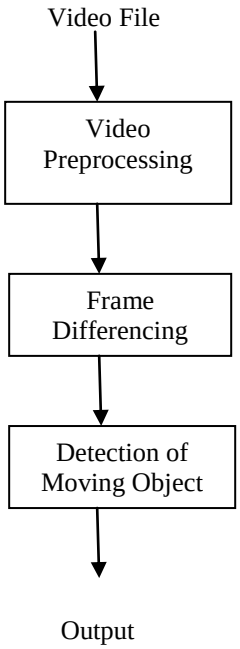


Fig. 1. Block Diagram of System

- Preprocessing of video: Convert RGB frame into gray scale format.
- Frame differencing : This approach makes use of image subtraction operator that obtains output image by taking the subtraction of second image frame from first image frame in corresponding consecutive frames such as:

  | frame I – Frame (I -1) | > Th

  Here Th is threshold value. Threshold value can set by user manually or generated automatically by using thresholding algorithm.
- Detection of moving object: Detect moving object and that moving object will be displayed on the screen.

### A. Algorithm

**Input** -Video having .avi extension

1) Read video from database
2) Extract Video information and display
3) Store each frame into database folder
4) Traverse and process frames 1 to last frame using loop : For (t=1 to No. of frames)
5) Convert RGB images into gray scale
6) Detect moving object from video using frame subtraction operation
7) Display detected moving object.

**Output** – 1) Moving object which is present in video will be displayed.
2) All information about video will be displayed.

### B. Commands

1) Video Reader - To call the video from database
2) get – To obtain the stored video information such as its length, size etc
3) mov. number of frames – For getting number of frames
4) read (mov, t) – Read video frame data from file individually
5) rgb2gray – Convert RGB image or color map to grayscale
6) uint8 – Convert 8 bit unsigned integer
7) double – Convert to double precision
8) imshow – To display the image

## V. RESULTS

- **Video Information**

Fig.2 shows the screenshots which shows the all information about video like number of frames in video, path where video is save etc.

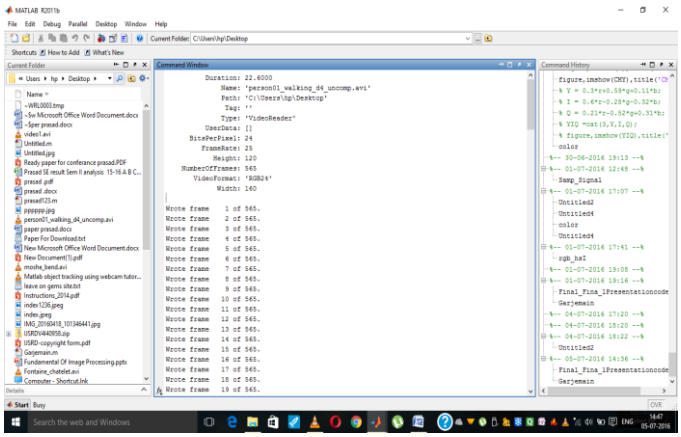

Fig.2. All Information about video

- RGB to Gray Conversion

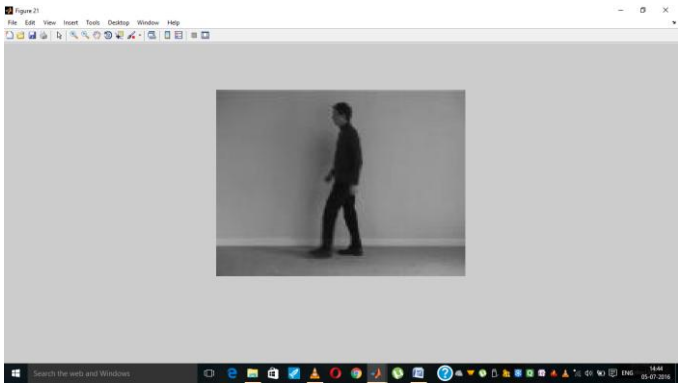

Fig.3. Original RGB frame

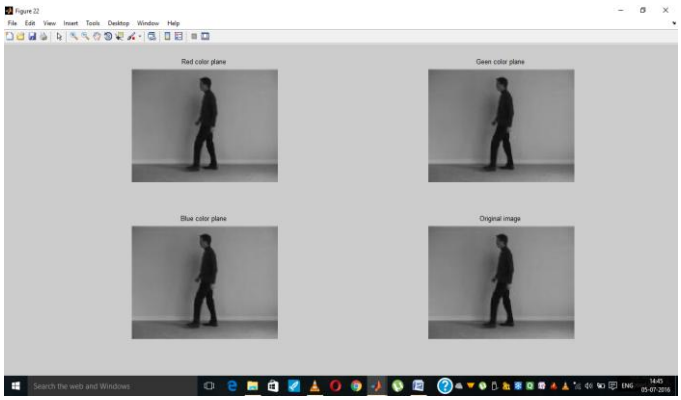


Fig.4. Converted Gray scale frame

Fig.3 shows the original RGB frame from the video. This is the first frame of video. This original RGB frame is converted into Gray scale image as shown in Fig.4, which is used for frame subtraction operation.

- Moving Object Detection

Fig.5, shows the original first frame of video. Moving object which is presented in that frame will be detected as shown in Fig.6.

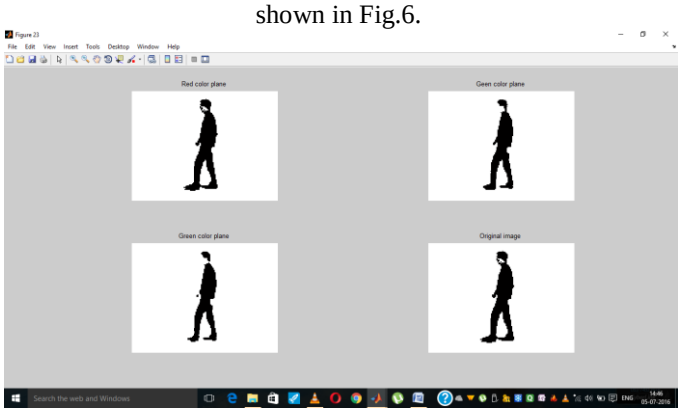


Fig.5 Original RGB frame

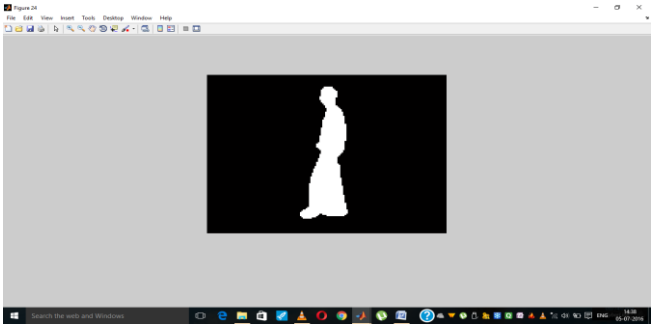

Fig.6 Moving Object detected

## VI. FUTURE WORK

Detecting and extraction of moving object plays a crucial role and is highly challenging task due to variation in brightness, lightning, complex background etc. Video segmentation is important part in object detection algorithm. Carry out study on video segmentation and implement the existing algorithm.

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