



## A real time application for monitoring people in bank by background subtraction method

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**Abstract:** Surveillance video is an active field of research where need to monitor system in the real time. The proposed system work on real time monitoring video where only selected frames are store at backend applying threshold and after subtracting background moving object is detection. Result is carried further for tracking and counting the humans present in a video. Finally counting of humans is performed to get the total number of people in a video. The accuracy of detection obtained with this system is up to 100%.

**Keywords:** Background subtraction, blobs

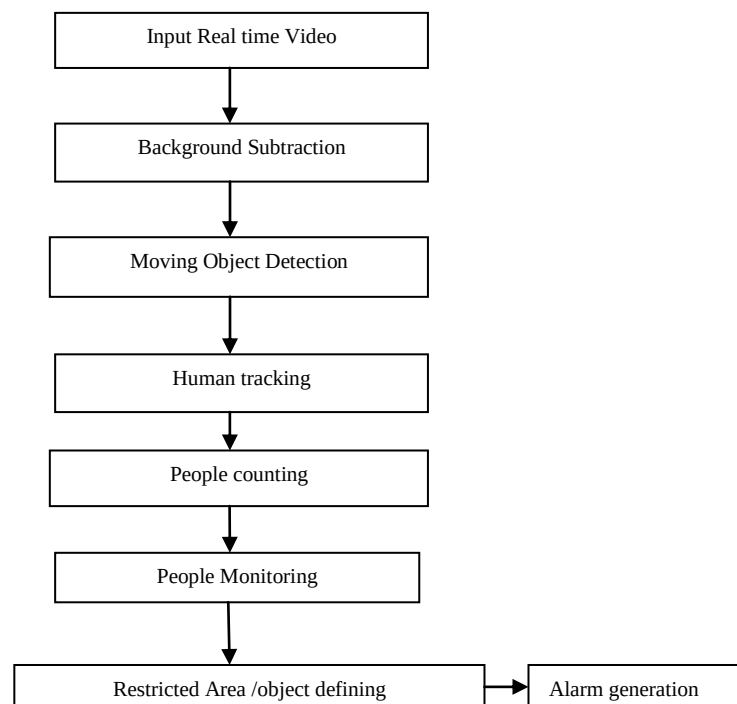
### I. Introduction

Insecurity incidents such as terrorism acts around the world have increased to a large extent. There are number of theft incidence, Terries act etc. This resulted in the need of intelligent surveillance and monitoring system consisting of real-time image capture, transmission, processing and observation. The proposed study is very useful for investigation before the incidence have been occurred. The proposed study not only monitor ongoing incidence but also alert regarding the unwanted incidents.

### II. Proposed Work

The proposed approach for the real time video. The system consists of extraction of frames that contain most significant visual information. Hence the video is reduced to less number of images known as key frames. The purpose was to design a new algorithm for surveillance system which will record the video feed and would detect motion in a live video feed. Accuracy is to be check. For achieving the above purpose foreground and background detection algorithms, object tracking algorithm and motion detection algorithms was be used by defining new formula.

### III. System Architecture of the System



#### IV. Algorithms

Major challenge is to detected human in various variations like shape, size, pose, clothing, dynamic background and moving cameras.

##### Various steps are involved in developing Algorithms

1. Acquiring real time video as input
2. Background subtraction
3. Human Tracking and counting using different techniques

##### A. Acquiring Real time video

In this work, we first acquire video by using algorithm

*Algorithm RealTimeVideo ( l )*

```
{
Step 1: Get access to webcam of the laptop
Step 2: Start the video acquisition process
Step 3: Show the real time video stream in a figure.
Step 4: Keep on acquiring the video until figure is closed
Step 5: Save the real time video sequence as an avi video.
}
```

*After acquiring video we are applying here Kalman filter for filtering image frame*

##### B. Background subtraction

Background subtraction, here frame differencing is considered for still background is in video, in this object are detected by comparing the statistical parameter of the modelled background with that of first frame.

*Algorithm Background Subtraction*

```
{
Step 1:
  for each video frame k = 1 to N
  {
    1. Read frame Vk and Vk+1
    2. Obtain the gray level image for Vk and Vk+1
       Gk = gray image of Vk
       Gk+1 = gray image of Vk+1
    3. Find the edge difference between Gk and Gk+1 using Canny edge detector.
       Let diff(k) be their difference.
```

$$\text{diff}(k) = \sum_i \sum_j (V_k - G_{k+1})$$

where i,j are row and column index

```
}
Step 2:
  Compute the mean and standard deviation
```

$$\text{Mean, } M = \frac{\sum_{i=1}^{N-1} \text{diff}(i)}{N-1}$$

$$\text{Standard deviation, } S = \sqrt{\frac{\sum_{i=1}^{N-1} (\text{diff}(i) - M)^2}{(N-1)}}$$

```
Step 3:
  Compute the threshold value
  Threshold = M + a x S
```

Where, a is a constant

```
Step 4:
  Find the key-frames
  for k = 1 to (N-1)
  {
    if diff(k) > Threshold
    {
      Write frame Vk+1 as the output key-frame
    }
  }
}
```

### **Outline of approach for Human Tracking**

Human can be detected by shape based, motion based and texture based study, we are considering here shape based study by using Blob function to detect human.

**Algorithm for Human Detection:** The algorithm, that have been designed for human detection is as described below.

**Input:** consisting of N frames

**Output:** frames contains subtracted Background

Algorithm Track Human

{

Step 1 : Use the first few frames of the video to estimate the background image.

Step 2: Separate the pixels that represent the people from the pixels that represent the background.

Step 3: Group pixels that represent individual people together and calculate the appropriate bounding box for each person.

Step 4: Match the people in the current frame with those in the previous frame by com

Step 5: plots the coordinates of the bounding boxes

}

*Algorithms Track and count*

**Input:** consisting of N frames

**Output:** frames contains box to track Human

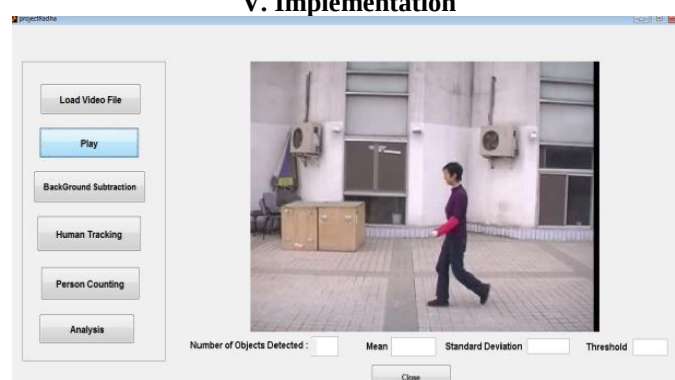
### **Algorithms Box to track**

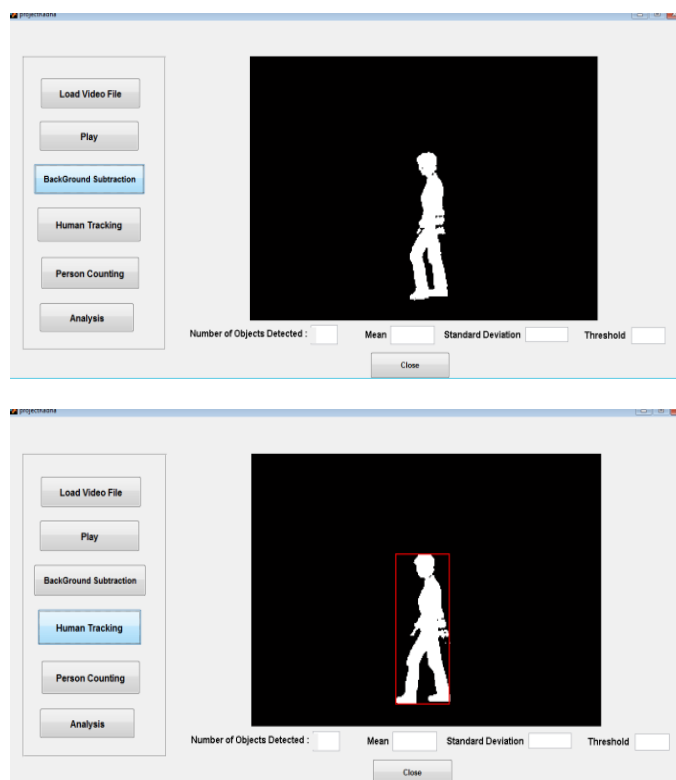
{

1. Get the boundary points  $\{x_i, y_i\}$  for each contour obtained from background subtraction.
2. Find  $Hs(end), Hs(1), H=Vs(end), Vs(1)$  values for each of the boundaries obtained in step1.
3. Obtain the height (**h**) and width (**w**)
4. Find distance  $Hs(end), Hs(1), H=Vs(end), Vs(1)$ ;
5.  $W=Hs(end)-Hs(1);$   
 $H=Vs(end)-Vs(1);$
6. `rectangle('Position', Height', 'Width', 'LineWidth',2,'EdgeColor','r')`

}

## **V. Implementation**

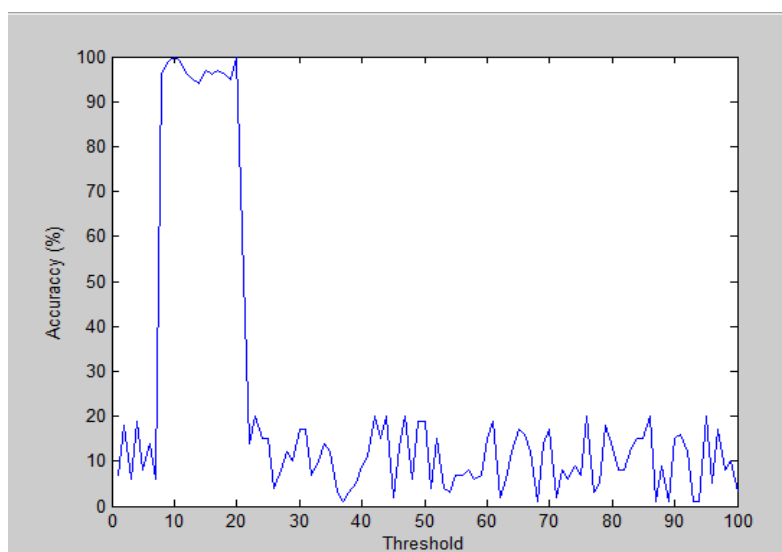




## VI. Result and Discussion

The Human detection and tracking is done efficiently using background subtraction technique. We use MATLAB 7.14(R2012A) software for this purpose. The Above figure shows the output window with the static background. In our paper, we are considering here 5 videos by calculating mean, standard deviation and threshold we are get result as per table 1.

|               | Mean | Standard dev | Threshold |
|---------------|------|--------------|-----------|
| <b>Video1</b> | 4.24 | 19.04        | 42.33     |
| <b>Video2</b> | 0.24 | 1.69         | 3.63      |
| <b>Video3</b> | 1.22 | 2.99         | 7.21      |
| <b>Video4</b> | 0.82 | 2.52         | 5.88      |
| <b>Video5</b> | 4.19 | 19.17        | 42.55     |



There experiments results are tabulate to show accuracy of the system. The results are shown by using five videos. Graph is considered by threshold verses Accuracy. Here it was observed that if threshold is between 8 to 15 then results are better and accuracy is 100%. If the threshold is greater than 40 then results are less accurate and performance is degraded.

## VI. Conclusion

It is to be concluded that Background subtraction is better than temporal differencing and optical flow for still background and our proposed work is for monitoring people in bank so speed of motion is remarkable so the Background subtraction is very effective and efficient techniques for still background.

## VII. Future Scope

In future The proposed study can be enhanced for moving background or on changed background. Due to movement of human in the video, it is possible that some parts of the human will appear separate. So trying to apply other techniques, if authorized person moving towards prohibited area then alarm will generate so to avoid this we need face detector algorithms so face detector should be involved. If person having small child with then we need to apply artificial neural network and pattern reorganization.

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