

# Intelligent Surveillance System for Human Detection

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**Abstract** - “Intelligent surveillance system for human detection” focuses on video level processing techniques to identify human from video. Surveillance System have become increasingly popular in the globalization process. Intelligent Video Surveillance system based on image recognition is widely used to effectively help to provide security, safety and prevents many crimes. Due to the high Complexity in techniques such as real-time processing and image contents analysis/understanding. However detecting humans in images and videos still challenging task owing to their variable appearance caused by variety of clothes shadows, articulation and illumination situations, and unpredictable poses that they can adopt. In this paper there is a brief survey of different object detection techniques, as well as Human Detection techniques like fuzzy logic, Single Gaussian model, Mixture of Gaussian model(MOG), Background Subtraction technique, Human Body Pose Recognition ,Appearance Based ,Motion-Based and Hybrid methods.

**Keywords** - Human Detection, Background Subtraction, Intelligent Surveillance video system, Human Detection technique

## I. INTRODUCTION

Image processing is a technique to convert an image into digital form in order to get an enhanced image or to extract some useful information from images and videos. Image processing is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that images. Usually Image Processing system includes treating images or video as two dimensional signals while applying already set signal processing methods to them. Now a days it's become very important technologies, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too for extracting information from the images or videos. Intelligent Surveillance Systems' requires fast, robust and reliable algorithms for object detection and tracking.

The proposed definition aims to achieve the performance of the smart surveillance system to detect human in a prohibited area and automatically generate an alarm which will enable the human operators to take action quickly. For this work various method are analyzed to improve the performance.

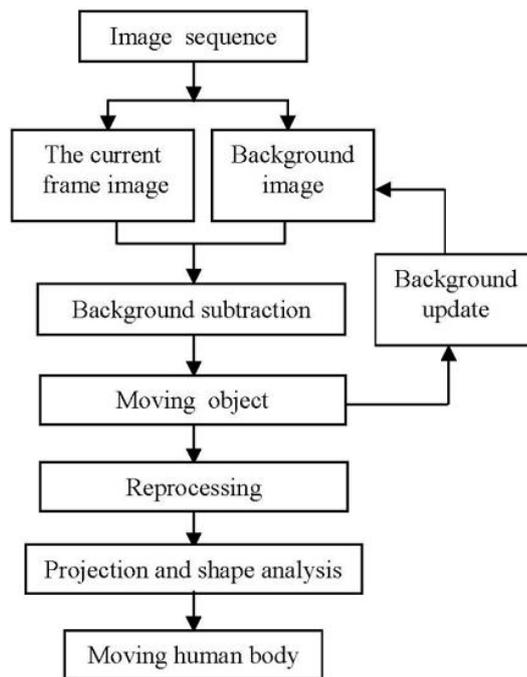
## II. LITERATURE SURVEY

### 1. Human Detection using Background Subtraction Techniques

Identifying moving objects from a video sequence is a fundamental and critical task in many computer-vision applications. A common method is to perform background subtraction, using Background Subtraction this technique [1] identifies moving objects from the portion of a video frame that differs significantly from a background model. There are following challenges in developing a good background subtraction algorithm.

- It must be robust against changes in lighting.
- It would avoid detecting non-stationary background objects such as moving leaves, rain, snow, and shadows cast by moving objects.
- Its internal background model would react quickly to changes in background such as starting and stopping of vehicles.
- For performing background subtraction, there are different approaches to this basic scheme of background subtraction in terms of foreground post processing, region detection and background maintenance.

Here some of the main techniques are surveyed for deciding that which method will be best suitable for Human Detection.

Figure 1 the block diagram of moving human body extraction<sup>[1]</sup>

## 2. Human detection Algorithm using Gaussian Mixture model (GMM)

The background of the scene contains many non-static objects such as tree branches whose movement depends on the wind in the scene. Such background motion causes the pixel intensity values to vary significantly with time. Therefore, a single Gaussian assumption for the pdf of the pixel intensity won't hold. Instead, a generalization based on a Gaussian Mixture Model (GMM)[2][3] has been used to model such variations. The pixel intensity was modeled by a mixture of  $K$  Gaussian distributions ( $K$  is a small number from 3 to 5). A mixture of three Gaussian distributions was used to model the pixel value for traffic surveillance applications, corresponding to road, shadow, and vehicle distribution. Although, in this case, the pixel intensity is modeled with three distributions, still unimodal distribution assumption is used for the scene background, i.e. the road distribution. Mixture of Gaussians is tremendous popular since it was first proposed for background modeling. The generalized Mixture of Gaussians has been used to model complex, non-static backgrounds. However, the Mixture of Gaussians (MoG) has its own drawbacks. First, its parameters require careful tuning and its computationally intensive. Second, it is very sensitive to sudden changes in global illumination. If a scene remains stationary for a long period of time, the variances of the background components may become very small. A sudden change in global illumination can then turn the entire frame into foreground. Backgrounds having fast variations cannot be modeled with just a few Gaussians accurately.

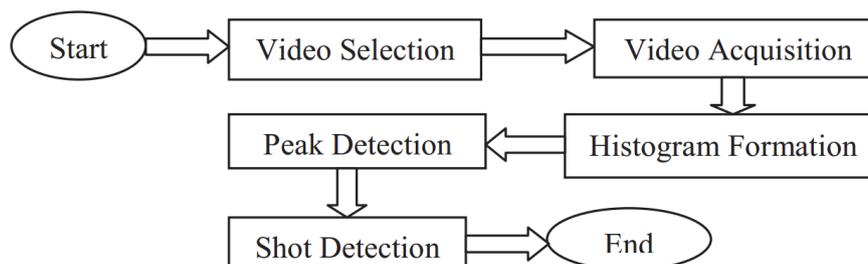
## 3. Human detection in video using Fuzzy Approach

Detection of the human is based on the skin of the human, skin detection is the preliminary step to a wide variety application such as personal identification and video surveillance system using fuzzy logic [4]. In this method human can be detected from the surveillance video by skin region from the selected frame. In this paper there are steps for detecting the human first by using histogram differences shot detection process is done. Then the process to select the key frame based on average pixel value of every shot. Then in next stage fuzzy logic rule is applied for the skin color identification.

### Shot Detection using Histogram Difference

HSV color model has a good linear Scalability where the color corresponds to the weight value proportional to the Euclid distance. HSV color space are independent and gives best result than RGB.

The following figure 3.3.2 shows flowchart of shot detection process:-

Figure 2 Flowchart of shot detection<sup>[4]</sup>

All the frames lying between the two transition frames are considered as single shot. Different gradual transition methods proposed by different researchers are fade in/fade out, wipe detection and dissolve detection.

**Frame selection**

With the reference to figure 3.3.3 frames are selected by the mean value of color pixels are calculated the mean value of gray level pixels can be calculated the mean value of gray level and R,B,G level and then find the frame which has the closed value to the mean.

The following figure 3.3.3 shows flowchart of Frame Selection process:-

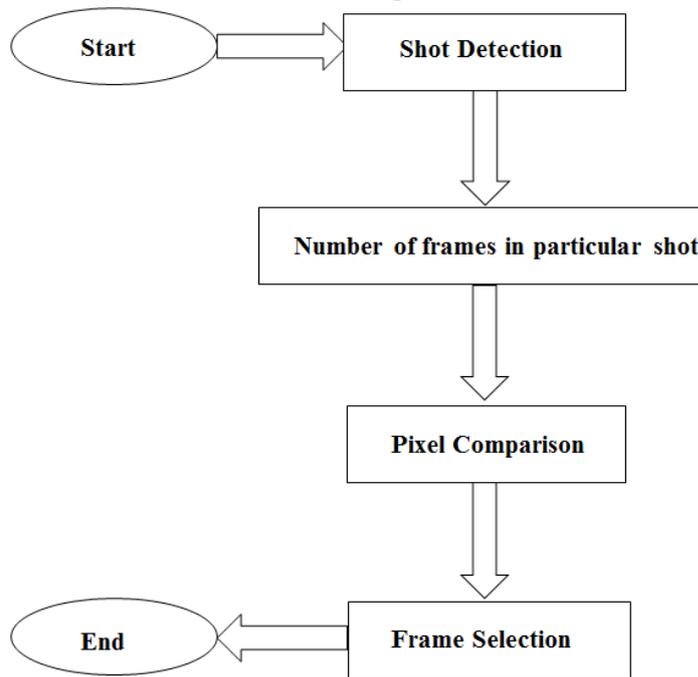


Figure 3 Flowchart of Frame Selection <sup>[4]</sup>

**Human skin detection using fuzzy logic**

The color of human detection is totally different from the color of many other objects and for this reason the statistical measurements of this area is very important for face detection gesture recognition and personal identification. The fuzzy rules are characterized by a collection of different fuzzy membership function, various types of logical operations logic is using the image luminance of the image intensity.

The following figure 3.3.4 shows flowchart of Skin Detection process:-

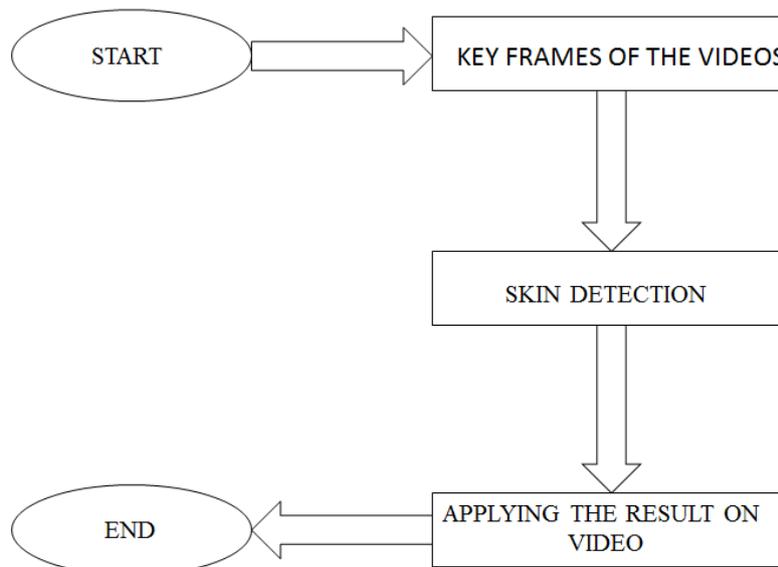


Figure 4 Flowchart of Skin Detection <sup>[4]</sup>

In this methods system has used to histogram based algorithm to detect shots, which has been compare to other for better results, after the frame section skin regions are Detected using the fuzzy membership function in HSV plane.

**4. A Quantitative & Qualitative Comparison of Real-time Background Subtraction Algorithms for Video Surveillance Applications**

This basic Gaussian model can adapt to slow changes in the scene like, gradual illumination changes by recursively updating the model using a simple adaptive filter. The main feature of modeling [5] the probability distribution of the pixel intensity that differentiates it from other ways such as predictive filters is that it ignores the order in which observations are made and focuses on the distribution of the pixel intensities. Then they use a clustering method to fit the data with an approximation of a mixture of Gaussians. At each pixel, one of the clusters (Gaussians) is selected as the background process, the others are considered to be caused by foreground processes. They are working on extensions which will allow dynamic background estimation based on the previous N frames.

### 5. Human Behavior Understanding

In Human Behavior Understanding [6] there are some detection technique based on appearance based, motion based, and hybrid methods.

**Appearance based human detection:** - In this method there are large pedestrian databases, this algorithm scan frame and searching the pattern which match with our pedestrian databases. This method can be directly applied to the Non-static cameras. Using Histograms of Oriented Gradients (HOG) the shape of the human can be represented by edge direction and intensity gradients, usually combined with Support Vector Machine (SVM). Appearance based people detection have rich database with videos and discuss evolution measures for perform training comparison.

**Motion based Human detection:-**In this method, it detects the cyclic motion of the legs and assume a static camera to identify the moving foreground. Discrete Fourier Transform(DFT) used to quantify pixel oscillation and variation of the method analyses the power spectral similarity in the walking patterns or the amount of changes in motion history image another algorithms are ARMA(Auto Regressive Moving Average Models) which used for theoretical performance bounds and MUSIC(Multiple Signal Classification) which used for frequency estimation .People detection can me improve by Considering scene modelling that helps reducing the search space. Knowledge of the scene can be used train specific area. But when the homograph between the ground and the camera is known size features can used for the detection.

**Hybrid Methods:-**this method is the combination of the Appearance based detection method and motion based detection. These two methods can be individually analyses the data, merging the final result according to a given function, or apply a still image detector to regions potentially containing pedestrians as indicated by object tracker. The various methods for implementing this methods are a Viola and Jones Detector ,2D head contour,3D head contour.by this methods detection of human was 85% in ranges up 8 m achieved .Data sets which used for the human detection are: MIT,CALTECH,INRIA,PETS,ETH used for this technique.

### III. PROPOSED WORK

From the literature survey it is clear that, Due to Gaussian Mixture Model (Background subtraction) human detection was not done if there is small changes in background this techniques is very sensitive to sudden changes in global illumination, false alarm of human being detection is occur and in the fuzzy logic if there is low light or high light it cannot work effectively.

From the literature survey, all the techniques are having some problems to detect the human effectively the system can improve the results by using the combination of two models for effect human detection

1. Gaussian Mixture Model
2. Fuzzy logic

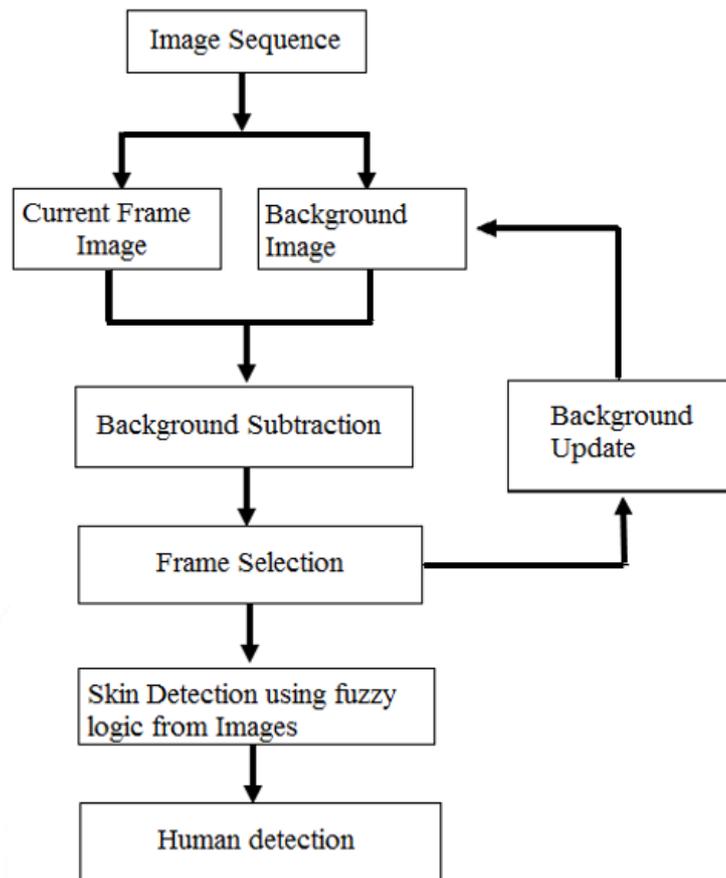


Figure 5 Block Diagram of proposed system

In the proposed model, system will first capture the current image from the real time video, then by using the background subtraction method Gaussian Mixture; the common background of Images will be subtracted t, consider the output from the GMM as input for the fuzzy logic and by selecting the frame, detect the skin and improve in detection technique for the human. When the human detect by the Camera, the alarm will be rang, notification will be given by the system.

Using the combination of this two model and take advantage of this two model can improve the speed of the detection as well as the efficiency for the detecting the human via Camera and it also reduce the false alarm notification.

#### IV. CONCLUSION

The paper includes survey on various system for Human Detection, and the problems for the detecting the human by the CCTV camera using the various algorithms. From literature survey, Conclusion is that if the combination of two algorithm which is used to detect the human, "Fuzzy Logic" and "Gaussian Mixture Model (GMM)" then system improve the model for human detection technique.

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