HUMAN DETECTION FROM VIDEO SURVEILLANCE USING SILHOUETTE - BASED METHOD

Mr. T. MohanRaj
Electronics and Communication Engineering,
Saveetha Engineering College,
Chennai, Tamilnadu , India.

Ms. A. Nandini
Electronics and Communication Engineering,
Saveetha Engineering College,
Chennai, Tamilnadu ,India.

Abstract— Video surveillance is rapidly increasing meaningful approach for deterrent to crime, and ability to apprehend a suspect when a crime occurs. Before few years video surveillance paired with security guards which means security guards should watch surveillance TV at 24/7 days it made more pricy. But nowadays it's turned into automatic which gives good safety with low budget. Normally Surveillance system is unification of three phases Object segmentation, Object classification, Object Tracking and Our proposed system design is directed on automatic classification of objects in video surveillance. In this paper, mainly we magazine previous research on object classification and analyze experimental results, finally provide our conclusions for improved performances. One stationary camera has been used for retrieve input.

Keywords— Video surveillance, background subtraction, contour formation, object classification.

I. INTRODUCTION

With the increasing danger of crime, video surveillance attracts much more attention and it has been adopted in different applications for crime controlling and detection of doubtful person. The advanced video surveillance system requires analyzing the behavior of the people in order to detect the incident of the possible dangerous cases. In this paper we examined object classification for indoor and outdoor environment in video surveillance system. In recent years, the growth of object classification has been going forwards for several years; many real time systems have been developed [1].

Framework of our proposed work is shown in Fig 1. First the input video is converted into frames. First module is background subtraction which is used to detect the moving objects or person in a given video file, background of the frame should be rejected. Next module is contour formation which gives the boundary pixel of the object. Before we start our object classification we should find the contour of all objects. In our proposed method moors algorithm has been used. Contour formation module makes to easy for feature selection. After classify the objects, surveillance systems generally track moving objects from one frame to another in

an image sequence. The tracking algorithms usually have considerable intersection with motion detection during processing. Tracking over time typically involves matching objects in consecutive frames using features such as points, lines or blobs.
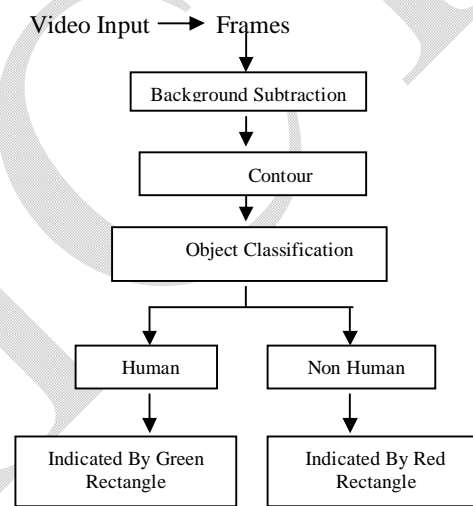
Video Input → Frames

Fig1. Framework of proposed work

This proposed method is structured as mentioned below, Section II explaining the literature survey. Section III explains the proposed methods of all the modules. The results of the proposed system explained in the Section IV. Section V concludes the paper and discusses future work.

II. RELATED WORK

Most visual surveillance systems start with motion detection or background subtraction. Motion detection methods attempt to locate connected regions of pixels that represent the moving objects within the scene; different approaches include frame to frame difference, background subtraction and motion analysis using optical flow techniques. Motion detection aims at segmenting regions corresponding to moving objects from the

rest of an image. Several widely used approaches for motion segmentation include [1, 2].

Temporal differencing, Background subtraction and Optical flow. Authors H. Kim, B. Ku, D.K. Han, S. Kang and H. Ko, explains about Block-based background subtraction methods [1], use block textures to model a background. These methods are known to deal robustly with dynamic backgrounds with short-term illumination changes, resulting in a gradual transition of pixel values.

Jae Kyu Suhr and Ho Gi Jung, explains about Mixture of Gaussians-based background subtraction for Bayer-patterns image sequences [3], which method models the background in a Bayer-pattern domain using a mixture of Gaussians (MoG) and classifies the foreground in an interpolated red, green, and blue (RGB) domain.

Object classification is categorizing the type of a detected video object with the help of object type information. Typical video scenes may contain a variety of objects such as people, vehicles, and animals. Different moving regions may correspond to different moving objects in natural scenes. To further track objects and analyze their behaviors, it is essential to correctly classify moving objects. For instance, the moving objects are humans, vehicles, or objects of interest of an investigated application.

Object classification can be considered as a standard pattern recognition task. There are two main of approaches for classifying moving objects [2]: Shape based classification & Motion based classification. Dedeoglu et al.[5] Explains objects classification and human action recognition using Silhouette-Based method , This method presents an instance based machine learning algorithm and system for real-time object classification and human action recognition which can help to build intelligent surveillance systems.

III. PROPOSED WORK

Our proposed system consists of three modules such as background subtraction, contour formation and object classification. Following section explain all proposed algorithms.

3.1 Background subtraction

Before we start classify and track the human blob, we should extract the moving objects from the background. For detect moving object, first we should make background model and take difference between current input frame and background model. In our proposed method, moving objects separated by using statistical background model. Here, Background model,

mean intensity $\mu(x,y)$ at location (x,y), corresponding to the "N" initial frames is computed as

$$\mu(x,y) = 1/N \underline{\hspace{3cm}} (1)$$

Where $p(x,y,i)$ is the pixel value at location (x,y) in the i'th frame. Foreground extracted each pixel of the current frame is the sholded against the corresponding pixel of the background model to extract foreground information. The threshold for each pixel in the background model is calculated using the following equation:

$$T(x,y) = \max\{|\ \mu(x,y) - p(x,y,i)|\} \underline{\hspace{2.5cm}}(2)$$
$$\text{for } 1<=i<=N$$

Finally foreground and background pixel is updated using following formula

If $|p(x,y;k) - \mu(x,y)| < T(x,y)$

Pixel is background $p(x,y;k) = 0$

Else Pixel is foreground $p(x,y;k) = 255$.

Advantages of this algorithm are more robust to noise, shadow, and change in light conditions than simple background subtraction. Fig 2 shows output of Background subtraction module

Fig 2 : Result of background subtraction for indoor environment
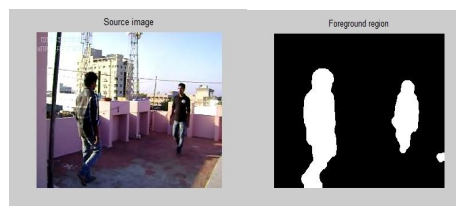

Fig 3 : Result of Background Subtraction for Outdoor Environment

3.2 Contour formation

Contour formation is used to find out the boundary pixel of each and every object. Contour of an image is mainly used to train the particular image with certain feature [4]. It is a pre-processing step of object classification. In our proposed system we are using Moore's algorithm. The idea behind the

Corresponding Author: Mr. T. MohanRaj, Saveetha Engineering College, Coimbatore, Tamilnadu , India

formulation of Moore neighborhood is to find the contour of the given binary image. Given a binary frame (i.e. a group of black pixels, on a foreground of white pixels), first find a black pixel and declare it as a "start" pixel .By using this black pixel we have to trace all the boundary pixel of an image.

Algorithm:

1. *Input: Binary image*
2. *Output : Contour of given object*
3. *Begin*
   Set B to be empty
4. *From bottom to top and left to right scan the cells of T until a black pixel, s, of P is found*
   Insert s in B
5. *Set the current boundary point p to s i.e., p=s*
6. *Backtrack i.e., move to the pixel from which s was entered*
7. *Set c to be the next clockwise pixel in M(p)*
   While c not equal to s do
   If c is black
   Insert c in B
   Set p=c
8. *Backtrack (move the current pixel c to pixel from which p was entered)*
   Else
9. *Advance the current pixel c to the next clockwise pixel in M(p)*
   End While
   End

Termination condition is to stop after visiting the start pixel for the second time. Fig 3 shows result of contour formation of given binary image.

Fig 4 : Contour formation

IV. OBJECT CLASSIFICATION

Object classification in video surveillance is categorizing the type of a detected video object is a crucial step in achieving this goal. With the help of object type information, more specific and accurate methods can be developed to recognize the actions of video objects [6]. In our proposed system, makes use of object silhouettes to classify objects in a scene monitored by a stationary camera. First step of classification is collecting the different object's different poses and train these sample with certain feature and find out the threshold value for human blob. And check this threshold value with all objects blob while testing with real time video. Fig 4 explains set of Sample human poses
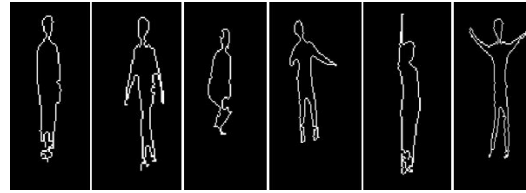

Fig 5 : Sample human poses

Algorithm

Input: All Objects' blob

Output: Human blob

- Calculate the centre point of each object Cm.

- Find points S={p1,p2,p3…pn} of an each object O, Fix n points ordered from top centre point of the detected region in clockwise direction.

  S= {p1, p2, p3…pn}

- Then find the distance signal DS={d1,d2,d3…dn}

  di = Dist(Cm,pi)

- Dist function is the Euclidean distance.

  $di = \sqrt{(xi - xc)2} + \sqrt{(yi - yc)2}$

- Find the fix-sized distance signal

  $\overline{DS} = DS [i * N/C] ; i=1…..C$

  Then do normalization

  $\overline{DS} [i] = \overline{DS} [i]$

Threshold value of our set of samples is 45. Greater than threshold value 45 is separated as human other objects are mentions by non-human. Fig 5.1 differentiate human and non-human objects with different color.
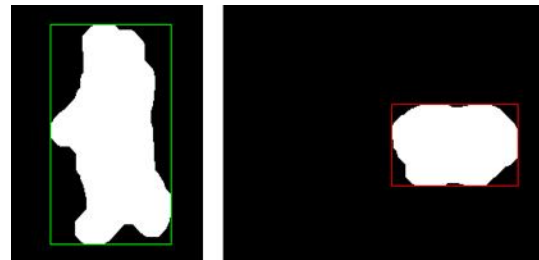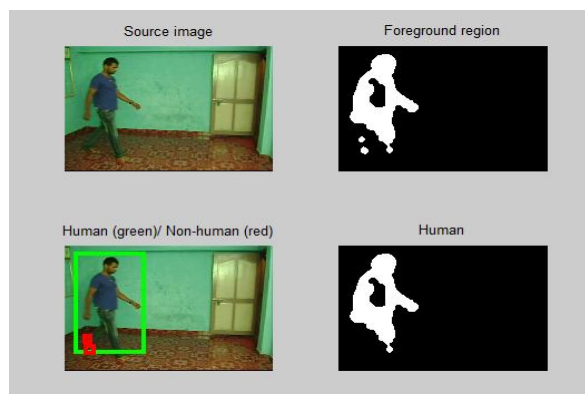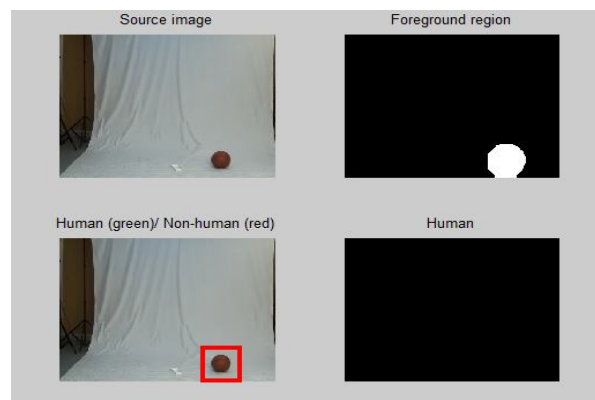

Fig 6 : Human and Non-human objects

Fig 7 : Result of Human Classification

Fig 8 : Result of Non-Human Classification

V.   CONCLUSION

The goal of this proposed system was to give overview of object classification and how does it work in indoor and outdoor environment. Hence, it acted as a way to introduce concept of object classification as a start point to readers who are unfamiliar with this area and to provide a review for more advanced researchers. Multiple human classification systems proposed in the thesis it works efficiently in real time video. For background subtraction module adaptive Statistical background model is used. To draw the contour for all image objects Moore's algorithms has been used. Silhouette based method is used to separate the human and other objects.

According to the performance evaluation, the proposed method for automated human classification is successful in classifying a human from a non-human. The future work can focus on human tracking and understanding the behavior of the particular human and also using data from different environmental and physiological sensors. Another main problem is we have to change the threshold value according distance between camera location and human's distance. Suppose if we use automatic threshold value method with this method means we can get good accuracy result.

References

[1]   H. Kim, B. Ku, D.K. Han, S. Kang and H. Ko "Adaptive selection of model histograms in block-based background subtraction" Electronics Letters Vol. 48 No. 8, 12th April 2012.

[2]   Wonjun Kim, ChangickKim "Background Subtraction for Dynamic Texture Scenes Using Fuzzy Colour Histograms" IEEE Signal Processing Letters, VOL. 19, NO. 3, March 2012.

[3]   Jae Kyu Suhr, Ho Gi Jung, Gen Li, and Jaihie Kim "Mixture of Gaussians-Based Background Subtraction for Bayer-Pattern Image Sequences" IEEE Transactions on Circuits And Systems for Video Technology, Vol. 21, NO. 3, pp.365-370, March 2011.

[4]   Prof. Rekha Lathi, Kashmera Khedkkar Safaya, "Contour detection and Extraction methods for medical images ", International Journal of VLSI & Signal Processing Applications ,Vol. 2,Issue 2,pp. 102-107,April 2012.

[5]   Yigithan Dedeoglu, Ugur Toreyin and Ugur Gudukbay, "Silhouette-Based Method for Object Classification and Human Action Recognition in Video" European Commission Sixth Framework Program, June 2008.

[6]   Masamitsu Tsuchiya and Hironobu Fujiyoshi, "Evaluating Feature Importance for Object Classification in Visual Surveillance" , " Proc. of the Ninth IEEE International Conference on Computer Vision, Vol. 2, 2003.