IJREAT International Journal of Research in Engineering & Advanced Technology, Volume 2, Issue 2, Apr-May, 2014
ISSN: 2320 – 8791 (Impact Factor: 1.479)
www.ijreat.org

Motion Based Background Subtraction and Extraction Using Decolor and K-Means Clustering for Providing Security

V.Eswari[1], T.Amruthavalli[2]

[1, 2]**Department of Computer Science and Engineering, SKR Engineering College, Chennai, Tamil Nadu, India**

Abstract

Video surveillance systems have long been in use to monitor security sensitive areas. The making of video surveillance systems "smart" requires fast, reliable and robust algorithm for moving object detection, classification, tracking and activity analysis. Moving object detection is the basic step for further analysis of video. It handles segmentation of moving objects from stationary background objects. Object classification step categorizes detected objects into predefined classes such as human, vehicle, clutter etc. It is necessary to distinguish objects from each other in order to track and analyse their actions reliably. In previous system we have performed background subtraction by using Canny Edge Detection. In Canny Edge Detection process we are taking background image and foreground image for comparison. In previous strategies we are conducting background subtraction only for images. In proposed system the background subtraction is done for moving objects, we propose a pixel wise background modeling and subtraction technique using multiple features. Hence, in this colour, gradient and digital image features are integrated to handle the variation pixel. Then the detected image is send to the mobile through GSM modem as a message and the detected image can be viewed through mobile using the IP address.

Keywords: DECOLOR, Moving object detection, Alert system

1. INTRODUCTION

Moving object detection is the basic step for further analysis of video. It handles segmentation of moving objects from stationary background objects. This not only creates a focus of attention for higher level processing but also decreases computation time considerably. Commonly used techniques for object detection are background subtraction, statistical models, temporal differencing and optical flow. Due to dynamic environmental conditions such as illumination changes, shadows and waving tree branches in the wind object segmentation is a difficult and significant problem that needs to be handled well for a robust visual surveillance system.

The video analysis is nothing but tracking, which can be simply defined as the creation of temporal correspondence among detected objects from frame to frame. This procedure provides temporal identification of segmented regions and generates cohesive information about the objects in the monitored area such as trajectory, speed and direction. The result of tracking step is generally used to support and enhance motion segmentation, object classification and higher level activity analysis.

In previous scenario two static images are selected for comparison those are background image and foreground image. These images are selected and converted into gray scale image and then the images are clustered and compared. The compared image produce a output like similar pixels of the compared image will be in the shades of black and dissimilar pixels in the shades of white. It has a drawback only the static images will be used for comparison.

In previous scenarios the images are just compared with different techniques like Principal Component Analysis (PCA), Robust Principal Component Analysis (RPCA), Markov Random Fields (MRFs), Gaussian mixture, probability density function etc[13].An alternative motion-based approach is background subtraction[11],[12]. Background subtraction[14] compares the images with a background model and detects the changes as objects. The most natural way for motion-based object detection is to classify pixels according to motion patterns, which is usually named motion segmentation[2],[16].

In this we propose a novel algorithm for moving object detection in real time. In this the web camera will be turned on and it will start capturing the video (i.e., sequence of frames). The different movements of images are stored in the server. If there is movement detected it will send a alert message to the owner through the GSM modem who is located in

different place and can also view the image through the mobile through the IP address provided or it can also send a image to the mobile through the mail.

In this we use Detecting contiguous outliers in Low Rank in representation (DECOLOR)[15] and K - Means clustering techniques are used. DECOLOR is used for motion segmentation and K – Means clustering is used for comparing the previous images with the current images. This improves the efficient detection. It uses less memory and power consumption. It also provides low maintenance when compared to CCTV.

2. RELATED WORKS

Many techniques have been suggested for moving object detection in which motion segmentation, background subtraction[14]. In the previous strategies the images are compared and different movement if found will be highlighted using a eclipse[16]. The exact movement cannot be viewed.

In some images are been compared with different techniques like PCA, RPCA[13] etc,. In adaptive kernel density estimation in which the static images are in shades of black and moved objects are differentiated in the shades of white.

In other technique the static images like foreground image and background images are selected for comparison and produce a output. The output image will be like similar images will be in the shades of black and dissimilar images will be in the shades of white.

In this moving object detection is done in real time. Where the images are detected it sends a alert message to the user saying Intruder found and the image can be viewed immediately.

3. SYSTEM DESIGN

Fig.1 shows the system design. In which the web camera is first initialized and it starts capturing the video. The video is nothing but sequences of images. It is real time moving object, the collection of images are called video. The video is given as input and frames are separated.

The current image and background images are separated using k-means clustering then the image is compared and the detected image is stored in the server.

When the images are detected it sends a message to the owner through the GSM modem as a alert message and the image link can also be send to the mail.

The other user who wants to see the image can view it with the help of the IP address provided which provides security for home, office etc.

It uses DECOLOR and K – Means clustering techniques for comparing and segmenting the images. After segmenting and comparing the message will be send to the mobile.

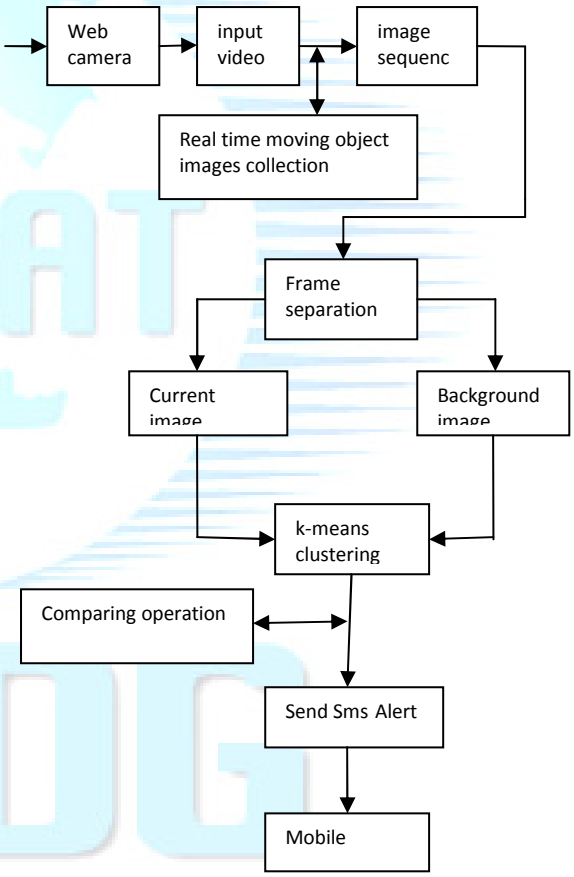

Fig 1: Over All System Architecture

3.1VIDEO CAPTURING

Digital video refers to the capturing, manipulation, and storage of moving images that can be displaced on computer screens. First, a camera and a microphone capture the picture and sound of a video session and send a analog signals to a video – capture adapter board. Fig 2: shows the normal block diagram of video capturing.

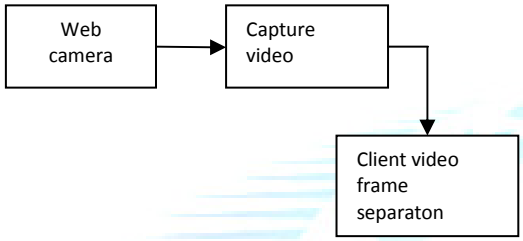

FIG.2: VIDEO CAPTURING BLOCK DIAGRAM

In fig.2 shows how the web cam is initialized and video is captured. The video is sequence of images. The client video frames are separated and this is used for detecting.

```
Public webcam()
{
Pan=new jpanel();
Pan.setLayout(null);
Srtbut=new JButton("start CAM");
Stcbut=new JButton("stop CAM");
Qubut=new JButton("Quit");
Head=new JLabel("REMOTE MONITORING");
getContentpane().add(pan);
}
```

Fig 3: Example code of web cam panel

3.2MOVING OBJECT DETECTION

In an open area the objects will be able to move in any direction, and with a camera setup typical of surveillance systems, this will give movement in all directions of the surveillance video, and objects will enter and leave the field of view on all its boundaries. Furthermore the video will show some perspective, i.e. the size of an object will change when it moves towards or away from the camera. The objects freedom of movement also implies that they can move in a way from the camera. The objects freedom of movement also implies that they can move in a way where they occlude each other , or they may stop moving for a while. In the case of people the occlusion and stopping and talking to each other and then shaking hands or hugging before departure. People may also be moving in groups or form and leave groups in an arbitrary fashion. These challenges could be solved by restricting the movement of the objects, but this would limit the system from being applied in many situations. Different types of objects: In some areas many different types of objects will be present. A surveillance video of a parking lot for example will contain vehicles, persons and maybe birds or dogs. People may also leave or pick up other objects in the scene. The most general surveillance system would be able to distinguish between these objects, and treat them in the way most appropriate to that type of object. Constraints in this respect would limit the system to area with only a certain type of objects.

In fig.4 it shows the moving object detection, in which the images are captured by the web camera and when there is movement in the image, the detected image will be stored in the server.

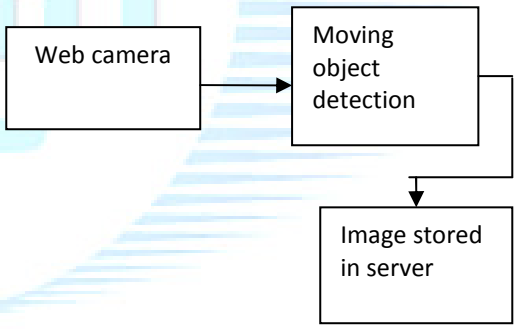

Fig 4: MOVING OBJECT DETECTION BLOCK DIAGRAM

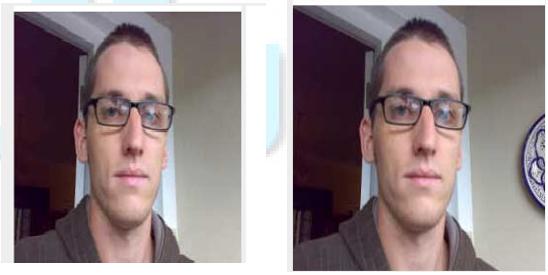

Fig 5: a) original image b) moved image

In fig.5 the web cam is focusing the room or hall or the place. 5.a) is the first captured image after sometime the person have moved a little so that image is also captured. The moving object detection sense the movement of object.

3.3MOTION SEGMENTATION

Background subtraction is the first step in the process of segmenting and tracking people. Distinguishing between foreground and background in a very dynamic and unconstrained outdoor environment over several hours is a challenging task. The background model is kept in the data storage and four individual modules do training of the model, updating of the model, foreground/background classification and post processing. The first k video frames are used to train the background model to achieve a model that represents the variations in the background during this period. The following frames (from k +1 and onwards) are each processed by the background subtraction modules to produce a mask that describes the foreground regions identified by comparing the incoming frame with the background model. Information from frames k + 1 and onwards are used to update the background model either by the continuous update mechanism,the layered updating, or both. The mask obtained from the background subtraction is processed further in the post processing module, which minimizes the effect of noise in the mask.

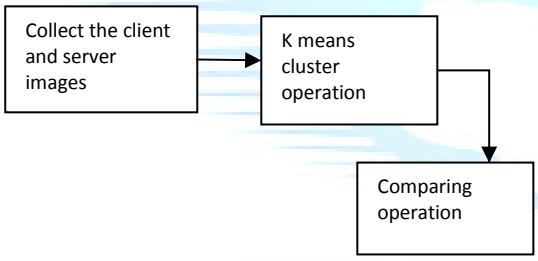

FIG.6 MOTION SEGMENTATION BLOCK DIAGRAM

Fig. 7 For comparison the images are converted into gray scale

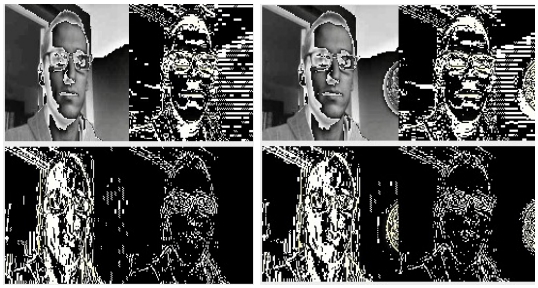

Fig.8 Both the images are clustered

Fig 6 shows the motion segmentation of the image. In which the image is collected from the client and server. Those images are segmented using K – Means clustering. Then the clustered images are compared with the current image and previous image. After comparison when the images are found to be moved then a alert message is sent to the mobile.

In Fig.7 the image which are captured are taken as input and check of any movement for this it first convert the images into gray scale. After the images are converted it is then clustered using K-Means clustering it is shown in fig.8.

3.4SMS ALERT SYSTEM (short message service)

After detecting the changes in video frames, we are altering the central control unit or the user through SMS using the GSM Modem. A GSM modem is a wireless modem that works with a GSM wireless network . A wireless modem behaves like a dial-u p moem. The main difference between them is that a dial-u modem sends and receives data through a fixed telephone line while a wieless modem sends and receives data through radio waves. Typically, an external GSM modem Is connected to a computer through a serial or a USB cable . Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

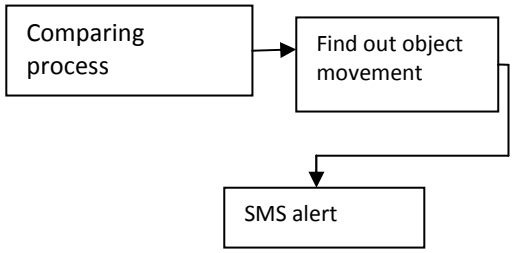

FIG.7 SMS ALERT SYSTEM BLOCK DIAGRAM

Fig 7 shows the alert system in which when the images are compared using k-means clustering, then it finds the object movement. If the object is found moved then a alert message will be send to the mobile through GSM modem and the image can be viewed through the mobile when IP address is provided.

4. IMPLEMENTATION

Here the implementation is performed in java platform jdk environment in both client and server side. This is done purely to provide security at home. In this when the owner goes out from home to provide security he turns on the web cam in which it will start monitoring the house. For every different movement at home the web camera will sense and capture the picture. The captured image will be stored in the server for segmentation and comparison, they are done by using DECOLOR and K – Means Clustering. By this when it finds the object movement it will send a SMS alert to the owner through the GSM modem and the image can be viewed through the browser using Web Logic server.

The image can be viewed through the mobile when IP address is know which provides security. Once the image is detected and send as SMS it also sends the image to the mail. People with smart phones can view the image immediately. The SMS can also be send to many user who belong to the same home so that immediate action can be taken. Thus it provides security for home.

5. CONCLUSION AND FUTURE WORK

In this paper a novel framework named DECOLOR to segment moving objects from image sequences is proposed. It avoids complicated motion computation by formulating the problem as outlier detection and makes use of the low-rank modeling to deal with complex background. Video is captured and given as input for comparison. The image which is moved is detected and sent to the owner as a alert message through GSM modem and the owner can view the image through IP address provided by the server. By this the owner can know the unauthorized moment happening, hence providing security.

In the future , we have plan to use the sensor device so that the capturing image can be sensed as easily s possible so that the owner can view the image and they can also track the image . Tracking between different image is possible in real time.

In addition to it we can also calculate the speed, intensity and distance between the image is possible. Which give us more information how fast the object has been moved. So that it can be used in many applications.

ACKNOWLEDGEMENT

As the very outset, I wish to express my sincere thanks to all those who were involved in the completion of the work. I express my immense thanks to Dr.Suguna, Professor and Dean of Department of Computer Science and Engineering, SKR Engineering College for giving me support an encouragement for carrying out this project. I also express my thanks to my family and friends.

REFERENCES

[1] Constantine P. Papageorgiou, Michael oren, Tomasso Poggio, "A General Framework for Object Detection," proc. IEEE int'l conf. computer vision, p.555, 1998.

[2] Daniel Cremers and Stefano Soatto, " A Variation Approach to Piecewise Parametric Motion Segmentation," International Journal of Computer Vision vol. 62 no.3. pp. 249–265, 2004.

[3] Kentaro Toyama, John Krumm, Barry Brumitt, Brian Meyers, "Wallflower: Principles and Practice of Background Maintenance,"proc.IEEE Int'l Conf. Computer vision, September 1999.

[4] Anurag Mittal, Nikos Paragios, "Motion-Based Background Subtraction using Adaptive Kernel Density Estimation," Proc.IEEE Conf. Computer Vision and Pattern Recognition, March 2004

[5] Zihan Zhou, Andrew Wagner, Hossein Mobahi, John Wright, Yi Ma, "Face Recognition With Contiguous Occlusion Using Markov Random Fields," Proc.IEEE Int'l Conf. Computer vision, October 2009

[6] Boris Babenko, Ming-Hsuan Yang, Serge Belongie, "Robust Object Tracking with Online Multiple Instance Learning," IEEE Trans. Pattern Analysis and machine Intelligence, vol.33 no.8. pp. 1619 - 1632 2011.

[7] B. Han, D. Comaniciu, and L. Davis, "Sequential Kernel Density Approximation through Mode Propagation: Applications to Background Modeling," Proc. Asian Conf. Computer Vision, 2004.

[8] D.S. Lee, "Effective Gaussian Mixture Learning for Video Background Subtraction," IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 27, no. 5, pp. 827-832, May 2005.

[9] Z. Zivkovic and F. van der Heijden, "Efficient Adaptive Density Estimation Per Image Pixel for Task of Background Subtraction," Pattern Recognition Letters, vol. 27, no. 7, pp. 773-780, 2006.

[10] B. Han, D. Comaniciu, Y. Zhu, and L.S. Davis, "Sequential Kernel Density Approximation and Its Application to Real-Time Visual Tracking," IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 30, no. 7, pp. 1186-1197,July 2008.

[11] D. Gutchess, M. Trajkovics, E. Cohen-Solal, D. Lyons, and A. Jain, "A Background Model Initialization Algorithm for Video Surveillance,"
Proc. IEEE Int'l Conf. Computer Vision, 2001.

[12] V. Nair and J. Clark, "An Unsupervised, Online LearningFramework for Moving Object Detection," Proc. IEEE Conf.Computer Vision and Pattern Recognition, vol. 2, pp. 317-324, 2004.

[13] E. Candes, X. Li, Y. Ma, and J. Wright, "Robust Principal Component Analysis?" J. ACM, vol. 58, article 11, 2011.

[14] M. Piccardi, "Background Subtraction Techniques: A Review," Proc. IEEE Int'l Conf. Systems, Man, and Cybernetics, 2004.

[15] B. Babenko, M.-H. Yang, and S. Belongie, "Robust ObjectTracking with Online Multiple Instance Learning," IEEE Trans.Pattern Analysis and Machine Intelligence, vol. 33, no. 8, pp. 1619-1632, Aug. 2011.

[16] R. Vidal and Y. Ma, "A Unified Algebraic Approach to 2-D and 3-D Motion Segmentation," Proc. European Conf. Computer Vision, 2004.