International Journal of Applied Engineering Research
ISSN 0973-4562 Volume 10, Number 7 (2015) pp. 17449-17457

http://www.ripublication.com

Comparative Study of Human Recognition For Video Surveillance

C. Chairmakani and J.P Ananth
[1]*PG student of DMI College of Engineering, chairmakanic@gmail.com*
[2] *Professor DMI College of Engineering, csehod@dmice.ac.in*
Department of Computer Science and Faculty of Computer Science,
DMI College of Engineering, Palanchur, Chennai, India.

Abstract

The endeavour focus on recognising human images from a Video Sequence captured by a Camera. The Algorithms to be used are: i) Background Subtraction (BGS), ii) Gaussian Mixture Model (GMM) and iii) Histogram of Oriented Gradients (HOG) finally the performance of the above three algorithms are compared. Recognizing human object in video streams is the first relevant step of information and background subtraction is a very popular approach for foreground segmentation.

Keywords: Object detection, Casing difference, Background subtraction Method, Gaussian mixture Model, Background modelling.

Introduction

The intend of entity tracking and detection is to establish a correspondence between objects or object parts in consecutive frames and to extract temporal information about objects such as trajectory, posture, speed and direction. Tracking detected objects frame by frame in video is a significant and complex task. It is a decisive part of video surveillance systems since without object tracking, the method could not extract unified temporal information about objects and higher level behaviour analysis steps would not be possible.

Human Recognition and Tracking

Video surveillance is an dynamic explore topic in computer vision that tries to detect, recognize and track objects over a sequence of images and it also makes an attempt to understand and describe object behaviour by replacing the aging old traditional method of monitoring cameras by human operators. Object detection and tracking are important and challenging tasks in many computer vision applications such as video

surveillance, vehicle steering and independent robot steering. Entity detection involves locate objects in the frame of a video sequence. Every tracking method requires an object detection mechanism either in every frame or when the object first appears in the video. Entity tracking is the process of locating an object or multiple objects over time use the camera. The high powered computers, the availability of high quality and inexpensive video cameras and the increasing need for automated video analysis has generated a great deal of interest in object tracking algorithms. There are three key steps in video analysis, detection interesting poignant objects, tracking of such substance from each and every frame to frame, and scrutiny of object tracks to recognize their behaviour. Therefore, the use of entity tracking is pertinent in the tasks of, activity based recognition.

On developing a framework to detect moving objects and generate reliable tracks from scrutiny video. Subsequent to setting up a basic system that can serve as a platform for further automatic tracking research, the question of variation in distances between the camera and the objects in different parts of the scene (object depth) in surveillance videos. A feedback-based solution to automatically learn the distance variation in static-camera video scenes is implemented based on object motion in different parts of the panorama. It gives more focus towards the analysis of detection and tracking of objects in video surveillance. The surveillance system is the process of monitoring the behaviour, deeds or other changing information, usually people for the purpose of influencing, managing, directing, and protecting. Most of the surveillance system includes static camera and fixed background which gives a clue for the object detection in videos by background subtraction technique.

In surveillance system three main important steps these are object detection, object tracking and gratitude. Some dispute in video processing Video analysis, video segmentation, video density, video indexing. In case of video analysis there are three key steps: detection of interesting moving object, tracking of such objects from frame to frame and analysis of objects tracks to recognize their behaviour. Next it comes video segmentation it means separation of objects from the background. It also consists of three important steps: object detection, object tracking and object recognition using different algorithms.

Narrative Study

Human object tracking has a lot of application in the real world. But it has many technological lacunas still exist in the methods of background subtraction. In this section, some previous works is discussed for frame difference that use of the pixel-wise differences between two frame images to extract the moving regions, Gaussian mixture model based on background model to detect the object and finally background subtraction to detect moving regions in an image by taking the difference between current and reference background image in a pixel-by-pixel, and previous works done for the background modelling.

After the detection scenario is over, tracking part is done. Once the interesting objects have been detected it is useful to have a record of their movement over time. So tracking can be defined as the problem of estimating the trajectory of an object as

the object moves around a scene. It is necessary to know where the object is in the image at each instant in time. If the objects are continuous observable and their sizes or motion does not fluctuate over time, then tracking is not a tough problem. In general surveillance systems are required to observe large area like airports, shopping malls. In these scenarios, it is not possible for a single camera to observe the complete area of interest because sensor resolution is finite and structures in the scene limit the visible area. Therefore surveillance of wide areas requires a system with the ability to track objects while observing them through multiple cameras. But here no discussion about multiple camera networks is done.

Lipton et al. [5] proposed frame difference that use of the pixel-wise differences between two frame images to extract the moving regions. In another work, Stauffer & Grimson et al. [6] proposed a Gaussian mixture model based on background model to detect the object. Liu et al. [7] ,proposed background subtraction to detect moving regions in an image by taking the difference between current and reference background image in a pixel-by-pixel. Collins et al. [8], developed a hybrid method that combines three-frame differencing with an adaptive background subtraction model for their VSAM (Video Surveillance and Monitoring) project. Desa & Salih et al [9], proposed a combination of background subtraction and frame difference that improved the previous results of background subtraction and frame difference. Sugandi et al. [10], proposed a new technique for object detection employing frame difference on low resolution image. Julio cezar ET al. [3] has proposed a backdrop model, and include a novel technique for silhouette detection in gray scale video sequences. Satoh et al. [11], proposed a new technique for object tracking employing block matching algorithm based on PISC image. Sugandi et al. [12], proposed tracking technique of moving persons using camera peripheral increment sign correlation image. Beymer & konolige et al. [2],1999 proposed in stereo camera based object tracking, use kalman filter for predicting the objects position and speed in x-2 dimension. Rosals & sclaroff et al.,1999 proposed use of extended kalman filter to estimate 3D trajectory of an object from 2D motion.

In object detection method, many researchers have developed their methods. Liu et al., 2001 proposed backdrop subtraction to perceive moving regions in an image by taking the difference between present and allusion background image in a pixel-by-pixel. It is extremely susceptible to change in energetic scenes derived from illumination and superfluous actions etc. In another work, Stauffer & Grimson, 1997 proposed a Gaussian mixture sculpt based on milieu model to perceive the object. Lipton et al., 1998 anticipated enclose difference that use of the pixel-wise differences between two frame images to extort the stirring regions. This method is very adaptive to dynamic environments, but normally does a deprived job of extracting all the pertinent pixels, e.g., there may be fissure left indoor moving creature. In order to overcome disadvantage of two-frames distinction, in some cases three-frames distinction is used. For occurrence, Collins et al., 2000 developed a hybrid method that combines three-frame differencing with an adaptive background subtraction model for their VSAM (Video Surveillance and Monitoring) venture. The hybrid algorithm successfully fragment moving regions in video without the defects of temporal differencing and background subtraction. Desa & Salih, 2004 anticipated a

combination of background subtraction and frame difference that improved the previous results of background subtraction and frame difference.

In object tracking methodology, this article will describe more about the region based pursuing. Region-based tracking algorithms to track stuff according to variations of the image regions corresponding to the poignant objects. For these algorithms, the backdrop image is maintained dynamically and motion regions are usually detected by subtracting the background from the contemporary image. Wren et al., 1997 discovered the use of small splodge features to track a single human in an indoor milieu.

Architectural Design For Proposed System

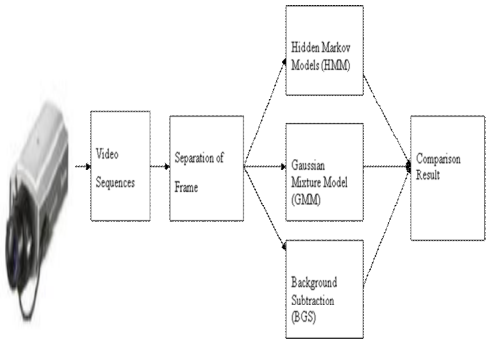


Figure 1: Comparative Study of Video Surveillance Framework

Techniques:

Video sequence

Human detection in a smart surveillance system aims at making distinctions among moving objects in a video sequence. Data detects humans in a video sequence, and extracts the position of their head, hands, legs and torso. A third derivative of the speed (referred to as jerk) of the person, is also calculated. Using these features and a rule based finite state machine, they can detect person-on-person violence. For example, if one person's hand is out stretched and another person exhibits a "jerk" action, there is a high prospect of violence.

Separation of frame

Every tracking system requires an entity detection mechanism either in every frame or when the object first appears in the video sequence. A general loom for object detection is to use information in a distinct frame. However, various object detection methods make use of the temporal information multiply from a sequence of frames to condense the number of forged detections.

Background subtraction Model

Human recognition and detection can be attained by building a demonstration of the scene called the milieu model and then finding deviations from the model for each arriving frame. Any important changes in an image province from the background model indicate a moving object. The pixels represent the regions endure change are marked for auxiliary processing. This procedure is referred to as the background subtraction. There are diverse methods of background subtraction as discussed in the survey [1] are Frame differencing Region-based (or) spatial information, Hidden Markov models (HMM) and Eigen space decomposition.

$$| I_t \quad -_t(x, y) | > T \qquad (1)$$

Where T is a pre-defined threshold.

The background image Bt

is updated by the use of a first order recursive filter as shown in equation

$$Bt+1 = \eta\ It + (1 - \eta)\ Bt\ a \qquad (2)$$

Gaussian Mixture Model (GMM):

To implement an existing Gaussian mixture model based on background model to detect the moving objects. For detecting moving objects in video surveillance system the use the Gaussian mixture model, is essential this model has the colour values of a particular pixel as a mixture of Gaussians. But the pixel values that don't fit the background distributions are considered as foreground. The detection of moving objects uses a background subtraction algorithm based on Gaussian mixture models. Morphological procedures are practical to the resulting foreground mask to eradicate noise. Finally, splodge analysis detects groups of attached pixels, which are likely to communicate to moving objects.

The association of detections to the same object is based solely on motion. The motion of each track is estimated by a Kalman filter. The filter is used to predict the track's location in every frame, and establish the likelihood of each detection being allocate to each track. In any given frame, some detection may be assigned to tracks, while other detections and tracks may linger unassigned. The assigned tracks are updated using the corresponding detections. The unassigned tracks are patent invisible. An unassigned detection begin a new way.

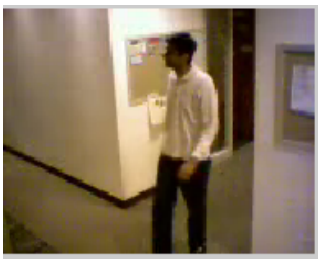
$$P(p_t) = \sum_{i=1}^{k} \omega_{i,t} \eta(p_t, \mu_{i,t}, \sum i, t) \qquad 3$$

Histogram of Oriented Gradients (HOG):
Histogram of Oriented Gradients (HOG) is feature descriptors used in computer vision and image processing for the purpose of human recognition. The technique counts incidence of gradient orientation in localized section of an image. This process is similar to that of boundary bearing histograms, scale-invariant feature convert descriptors, and silhouette contexts, but fluctuate in that it is calculate on a opaque grid of uniformly spaced cells and uses overlapping local contrast normalization for improved accuracy.

Experimental Result:

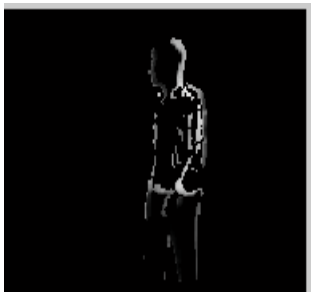
Background subtraction Model (BGS):

a) Original Frame:



b) Gray scale Image:

c) Result of background frame:



Gaussian Mixture Model (GMM):

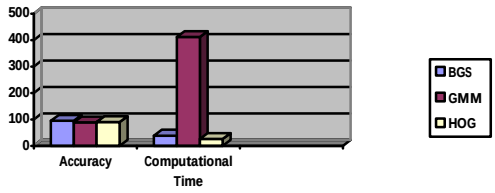
a) Reference Frame:

b) Camouflage Mask video of gray scale image:

c) Result of Gaussian Mixture Frame:

Histogram of Oriented Gradients (HOG):

Evaluation Result:



Conclusion

Human recognition and object detection methods are being evaluated. This venture has scrutinize methods to progress the performance of motion segmentation algorithms and Block matching technique for object tracking applications and examined methods for multi-modal fusion in an object tracking system. Background subtraction model is a key step in many tracking algorithms as it forms the basis of object detection. Improving segmentation results as well as being able to extract additional information such as frame difference, Gaussian of mixture model, background subtraction allows for improved object detection and thus tracking. However a strength of Hidden Markov Models is their ability to track object in adverse situation. Integrating a canny filter within a standard tracking system allows the Hidden Markov Models is to use progressively updated features and aids in main training identity of the tracked entity, and afford tracking system with an successful means. The simulator and the simulation parameters used for the experiments are discussed. We have shown the simulation results in the form of images.

Bibliography Reference

[1] Alper Yilmaz, Omar Javed, and Mubarak Shah. Object tracking: A survey. *Acm Computing Surveys (CSUR)*, 38(4):13, 2006.

[2] Gary Bishop and Greg Welch. An introduction to the kalman filter. *Proc of SIGGRAPH, Course*, 8:27599–3175, 2001.

[3] J Cezar Silveira Jacques, Claudio Rosito Jung, and Soraia Raupp Musse. Background subtraction and shadow detection in grayscale video sequences. In *Computer Graphics and Image Processing, 2005. SIBGRAPI 2005. 18th Brazilian Symposium on*, pages 189–196. IEEE, 2005.

[4] Budi Sugandi, Hyoungseop Kim, Joo Kooi Tan, and Seiji Ishikawa. A block matching technique for object tracking employing peripheral increment sign correlation image. In *Computer and Communication Engineering, 2008. ICCCE 2008. International Conference on*, pages 113–117. IEEE, 2008.

[5] Alan J Lipton, Hironobu Fujiyoshi, and Raju S Patil. Moving target classification and tracking from real-time video. In *Applications of Computer Vision, 1998. WACV'98. Proceedings., Fourth IEEE Workshop on*, pages 8–14. IEEE, 1998.

[6] Chris Stauffer and W Eric L Grimson. Adaptive background mixture models for real-time tracking. In *Computer Vision and Pattern Recognition, 1999. IEEE Computer Society Conference on.*, volume 2. IEEE, 1999.

[7] Ya Liu, Haizhou Ai, and Guang-you Xu. Moving object detection and tracking based on background subtraction. In *Multispectral Image Processing and Pattern Recognition*, pages 62–66. International Society for Optics and Photonics, 2001.

[8] Changick Kim and Jenq-Neng Hwang. Fast and automatic video object segmentation and tracking for content-based applications. *Circuits and Systems for Video Technology, IEEE Transactions on*, 12(2):122–129, 2002.

[9] Shahbe Mat Desa and Qussay A Salih. Image subtraction for real time moving object extraction. In *Computer Graphics, Imaging and Visualization, 2004. CGIV 2004. Proceedings. International Conference on*, pages 41–45. IEEE, 2004.

[10] Budi Sugandi, Hyoungseop Kim, Joo Kooi Tan, and Seiji Ishikawa. Tracking of moving objects by using a low resolution image. In *Innovative Computing, Information and Control, 2007. ICICIC'07. Second International Conference on*, pages 408–408. IEEE, 2007.

[11] YUTAKA Sato, S Kaneko, and SATORU Igarashi. Robust object detection and segmentation by peripheral increment sign correlation image. *Trans. of the IEICE*, 84(12):2585–2594, 2001.

[12] Mahbub Murshed1=2, Md Hasanul Kabir1=2, and Oksam Chae1=2. Moving object tracking-an edge segment based approach. 2011.

[13] Weiming Hu, Tieniu Tan, Liang Wang, and Steve Maybank. A survey on visual surveillance of object motion and behaviors. *Systems, Man, and Cybernetics, Part C: Applications and Reviews, IEEE Transactions on*, 34(3):334–352, 2004.

[14] Zhan Chaohui, Duan Xiaohui, Xu Shuoyu, Song Zheng, and Luo Min. An improved moving object detection algorithm based on frame difference and edge detection. In *Image and Graphics, 2007. ICIG 2007. Fourth International Conference on*, pages 519–523. IEEE, 2007.

[15] Ismail Haritaoglu, David Harwood, and Larry S. Davis. W¡ sup¿ 4¡/sup¿: real-time surveillance of people and their activities. *Pattern Analysis and Machine Intelligence, IEEE Transactions on*, 22(8):809–830, 2000.