Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 3, Issue. 5, May 2014, pg.673 – 680

RESEARCH ARTICLE

VIDEO SURVEILLANCE FRAMEWORK FOR REMOTE MONITORING

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Abstract— Video Surveillance has been used in many applications including elderly care, Offices, Shopping malls, Showrooms and home nursing etc. This paper intends to develop an intelligent video surveillance system to enable remote monitoring of real time scenarios. This system introduces intelligent analysis of single person activity to enhance the security system in shopping malls, showrooms, offices, home and also enriches the current video surveillance systems through an automatic identification of abnormal behavior of the person. The relevant data is recorded and alert is given to the user by calling PHONE Calls of the owner as well as nearest police station and also sending MMS, SMS or mail to the owner. The user can view the particular video. This system maintains the security situation at offices, shopping malls, showrooms, home and this reduces the incidence of burglary cases and enhances social stability.

Key Terms- Activity detection, Motion tracking, Video Surveillance

I. INTRODUCTION

As we know that, the world is growing faster like never before. Everyone is rushing for their ultimate goals. This thirst results into the development of almost every sector. Video Surveillance is one of them.

Machine learning and understanding of human actions is a challenging area that has received much attention within the past ten years (2001–2011).Video Surveillance is one of the active research topics in Image Processing. Video Surveillance started with analogue CCTV systems, to gather information and to monitor people, events and activities. Existing digital video surveillance systems provide the infrastructure only to capture, store and distribute video, while leaving the task of threat detection exclusively to human operators. Human monitoring of surveillance video is a very labor-intensive task. Detecting multiple activities in real-time video is difficult in manual analysis. Thus the Intelligent video surveillance system is emerged. The analytics software processes video flow images to automatically detect objects (peoples, equipment's, vehicles) and event of interest for security purposes. In real time, video surveillance systems detect situations in video flow that represent a security threat and trigger an alarm.

While applying video analytics to provide real-time alerting based on predetermined event definitions, such as "tripwire," has been explored both in the research literature and in commercial systems, the challenges of searching through surveillance video remains largely unaddressed. While video analysis and pattern recognition technologies are at the core of "intelligent" or "smart surveillance," effective search of surveillance video requires research into searchable meta-data representations for video based features, data models for indexing and correlating diverse types of meta-data, and architectures for integrating technologies into large scale systems. Searching surveillance video essentially revolves around the following key search criteria:

- Specific search for people and vehicles
- Generic search for objects and events of interest

Search applications require a combination of these criteria to create composite queries and the ability for the search to be applied across multiple cameras distributed over a spatial region.
Video surveillance systems are divided into three main categories:-

(a) Operator controlled video surveillance systems.
(b) Basic automated video surveillance systems.
(c) Intelligent video surveillance systems.

In the first approach, the person in charge observes the video to determine if there is ongoing activity that warrants a response. In the second approach, automated video surveillance systems attempts to reduce the burden on the user by employing motion detectors to determine the motion in a given scene. But in the current scenario, an intelligent video surveillance system is required to extract the relevant information from generic motion

accurately. In general, the processing framework of an automated visual surveillance system includes the following stages: Motion/object detection, object classification, object tracking, behavior and activity analysis and understanding, person identification and data retrieval.

II. LITERATURE SURVEY

Current research in these automated visual surveillance systems were surveyed. Numerous statistical methods have been developed over the recent years. In automatic video surveillance applications, one of the main thing is to separate the moving objects from the static part of the scene. M.Hedayatiet, suggested Gaussian-based approach is the best approach for real-time applications. He evaluated and compared five well known background like Median filtering, Approximate Median, Running Gaussian Average (RGA), Gaussian Mixture Modal (GMM) and Kernel Density Estimation (KDE). After comparing these methods author focused there is not a perfect system at present, because the perfect system has to solve many problems such as bootstrapping, illumination changes and small movement in background. Gaussian based approached (RGA, GMM) give well balanced results in issues of speed, accuracy and memory usage for real time application. In outdoor surveillance, moving backgrounds (waving trees, clutter) and illumination changes (weather changes, reflections, etc.) are the major challenges for background modeling. A Single background approach model cannot fulfill these requirements. Eduardo Monari et al introduced an enhanced architecture for change detection in outdoor scenes. The author implemented two complementary background stimation approaches as system modules. Each algorithm fulfills special requirements for the complex modeling task. Object detection and Tracking is a second step in video processing. To track objects and analyze the behavior, it is essential to correctly classify moving objects. There are two different categories of approaches for classifying moving objects like, shape based and motion based classification. The objective of video tracking is to associate target objects in consecutive video frames. The association can be especially difficult when the objects are moving fast relative to the frame rate. Blob tracking, kernel-based tracking, Contour tracking are some common target representation and localization algorithms. Kong Chien Lai et al[8] proposed an algorithm to detect and classify the single and group moving object. Yu Du et constructed a hybrid moving object detection system. The author proposes two hybrid methods: Improved Optical Flow method and Improved HSV Background Subtraction method. Many research papers were analyzed in action recognition. The different human activities in a video such as walking, standing, bending, sleeping and jumping were analyzed and the abnormal behavior is identified. Automatic human activity recognition in video using background modeling and station temporal template matching based technique is popular method. To detect moving objects from complicated backgrounds, the author employs improved Gaussian mixed model, which uses K-means clustering to initialize the model and it gets better motion detection results for surveillance videos. The behavior patterns are measured based on modeling each pattern using a Dynamic Bayesian Network (DBN). To handle recognition with flexible or varying number of group members, and use an Asynchronous Hidden Markov Model (AHMM)[3] to model the relationship between two people. A Group activity detection algorithm is introduced, which can handle symmetric and asymmetric group activities. A further study of

some research work that provides additional improvement in implementing shadow removal, quick lighting change adaptation, reduction of fragmented foreground regions and Intelligent Video surveillance systems

III. OVERVIEW OF THE PROPOSED WORK

The overview of the given model is as follows,

A) Capturing the live video feed is the first step in video surveillance. We cannot process the video as it is. Video sequence is composed of series of video images. Images are preprocessed which contains features of containing geometry information of the target.

B) Analyzing images, we can classify the target and extract relevant information to analyze the motion of targets.

C) Activity/ Behavior of the human is analyzed in the intelligent analysis module. If the abnormal behavior is found in the scene, the system automatically stores the images and executes the alarm according to the user settings.

D) Video encoder can improve the efficiency of compression algorithms and reduce the transmission rate. The video is compressed by H.264 coding by adjusting the QP value.

E) The compressed video is sent to the mobile phone of the user. The mobile phone can decode them and play the surveillance video.

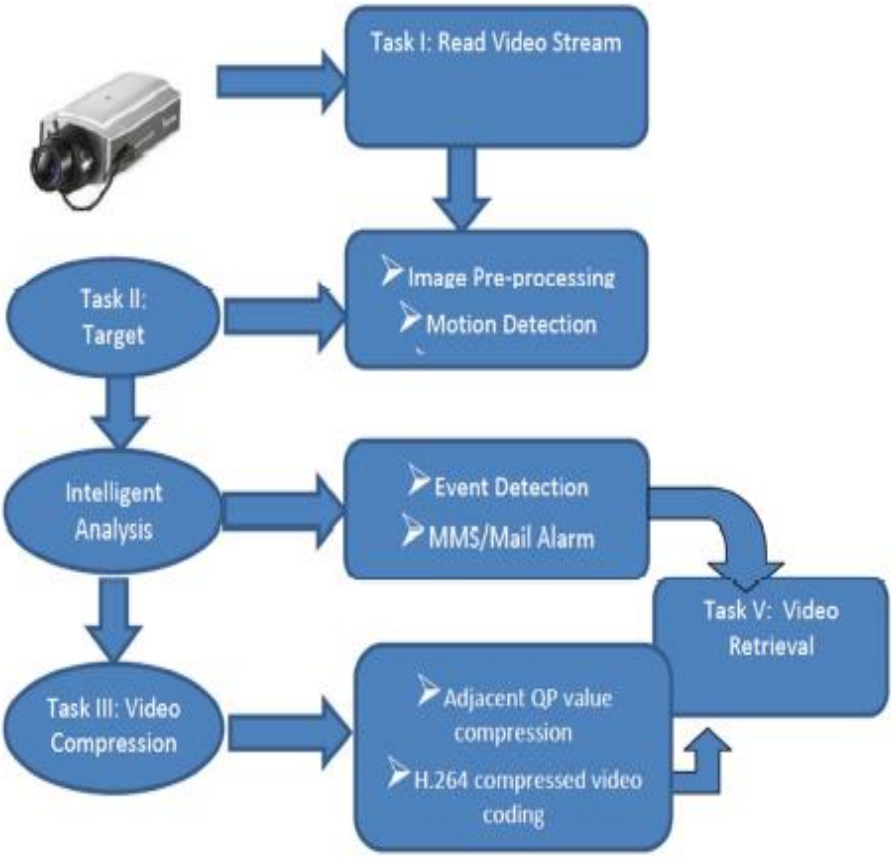

Fig 1: Intelligent Video Surveillance System Framework

IV. VIDEO PROCESSING TECHNIQUES

A. Pre-Processing: First, the videos are separated as frames and pre-processing method is used for color conversion to subtract foreground objects from the background. Pre-processing is mainly used to enhance the contrast of the image, removal of noise and isolating objects of Interest in the image.

B. Target Detection: Analysis of Motion detection is an important step. In this step, we have to extract the foreground object from the background. Then classify the object whether it is human or non-human. Once the object classification is done, object tracking is next step. The Tracking is done based on region and contours. There are three conventional approaches to Moving object detection: temporal differencing, optical flow and background estimation methods. Background subtraction is a popular method for human detection in static background. Temporal differencing method is very adaptive to dynamic environments.

Optical flow can be used to detect independently moving targets. This method is very complex and inapplicable to real time algorithms. From the above three human detection methods, temporal differencing method is used in our system. The image is expected to contain some noises. Noise should be handled before the subtracted image is sent for further Processing. This can be done by performing morphological filter operations. As observed in, automatic moving object detection algorithm is suited to our model. Automatic moving object detection algorithm is based on frame difference and region combination. Moving regions were obtained automatically by frame difference with an adaptive threshold. Then region combination was done according to the nearest distance. The proposed algorithm is automatic and efficient in moving objects detection for video surveillance application.

C. Intelligent Analysis: Intelligent analysis module is the core of the video surveillance system, which mainly includes the number of target identification and extraction of statistics. Automatic activity recognition plays a key part in video surveillance. Recognition accuracy is always a major concern for automatic event recognition. Activity Recognition can be achieved through body part modeling and pose estimation. Many algorithms have been proposed which try to detect human activities with high accuracy. Models such as hidden Markov model (HMMs) or dynamic Bayesian network (DBN), Adaboost, and SVM are widely used in these works for activity recognition. However, most of these methods only work well in their assumed scenarios and have limitations or lower accuracy if applied to other scenarios. For flexible classification, activities can be described by a combination of feature attributes. For example, a set of human activities (inactive, active, walking, running, fainting) can be differentiated using a combination of attributes of two features: change of body size (CBS) and speed. Each feature can have attributes high, medium, and low. Over the last decade many techniques have been applied to activity recognition, such as template matching, dynamic Bayesian networks, syntactic techniques, *etc*. Among different kinds of DBNs, hidden Markov models have become the most popular approach. As observed in [9], HMM model is proposed to our model. The System is able to recognize the abnormal activities (such as hitting, lying down, got hurt, gone away, etc.,) of the person and alarm is triggered to the user in the MMS, SMS or mail.

D. Video compression: The video is compressed by H.264 coding. The quantization parameter value and extent of data loss are associated with the picture quality. Less important

information can be lost compression of in the surveillance video background. The area containing the moving object is the important information, so lossless compression or appropriate lossy compression is used.

E. Video retrieval: In the video analysis, the systems first segments video objects (VO) from surveillance videos, and the fundamental semantic information is then extracted and indexed into the database. Content-based retrieval capability[14] is included in the system in order to recover the interesting video shots for obtaining information about the cause of the alarm. The proposed system automatically recovers the sequence in which abnormal activity is found. This sequence is characterized by a key frame, represented by the image that shows the maximum movement around the object. In most cases, the key frame is sufficient to recover the sequence. If it is not sufficient the whole video shot can be retrieved and visualized

V. PROPOSED ALGORTIHM

Canny Edge Detection

The purpose of edge detection in general is to significantly reduce the amount of data in an image, while preserving the structural properties to be used for further image processing.

The aim of JFC was to develop an algorithm that is optimal with regards to the following Criteria:

1. Detection: The probability of detecting real edge points should be maximized while the probability of falsely detecting non-edge points should be minimized. This corresponds to maximizing the signal-to-noise ratio.
2. Localization: The detected edges should be as close as possible to the real edges.
3. Number of responses: One real edge should not result in more than one detected edge (one can argue that this is implicitly included in the first requirement).

Implementation of Canny Edge Detection

All images in this worksheet (except the original) are produced by our implementation. A few things should be noted with regards to this:

1. The (source) image and the thresholds can be chosen arbitrarily.
2. Only a smoothing filter with a standard deviation of sigma= 1.4 is supported.
3. The implementation uses the "correct" Euclidean measure for the edge strengths.
4. The different filters cannot be applied to edge pixels. This causes the output image to be 8 pixels smaller in each direction.

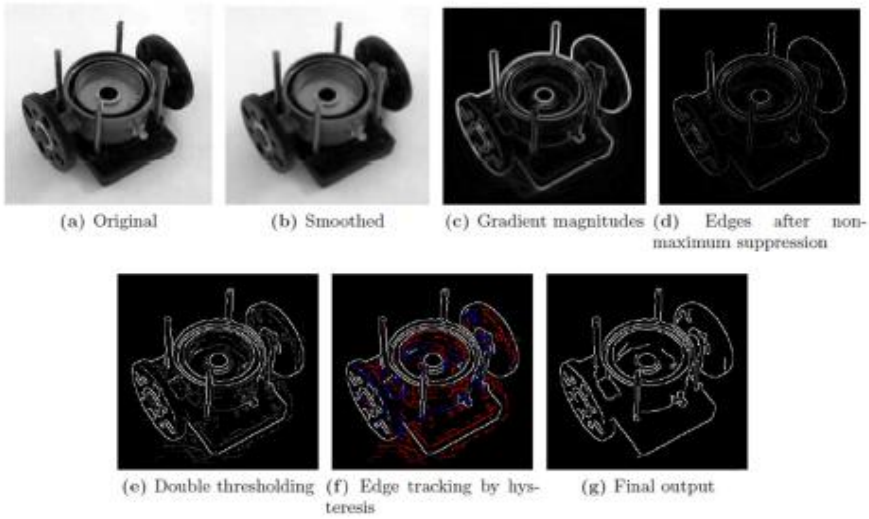

Figure 3: All steps of the edge detection.

VI. CONCLUSION

Nowadays, surveillance system is very much useful in all public and private sectors due to increased global security concerns and for effective monitoring of public places such as airports, railway stations, shopping malls, crowded sports arenas, military installations, etc., or for use in smart healthcare facilities such as daily activity monitoring and fall detection in old people's homes. In this current scenario, abnormal human behavior analysis without false alarms plays a crucial role and is highly challenging. This paper concludes with the solutions for automatic discrimination of relevant data recorded related to an individual whose suspicious behavior is noted and an alert is triggered. Relevant data not only corresponds to video scenes capturing individuals' suspicious behavior (smart video surveillance), but also automatically extracting images on these individuals recorded before and after the suspicious event and across the surveillance network.

REFERENCES

[1] Atif Ali Khan, MuneebIqbal: " A Motion Detection based surveillance systems(MDSS)",First International conference on Informatics and computational Intelligence,IEEE,2011.

[2] Eduardo Monari, Charlotte Pasqual: "Fusion of Background Estimation Approaches forMotion Detection in Non-Static Backgrounds", Proceedings of IEEE,2007.

[3] Feng Chen, Wei Wang, "Activity Recognition through Multi-scale Dynamic BayesianNetwork", Proceedings of IEEE, 2010.

[4] Fang Zhang, Yunhong Wang, Zhaoxiang Zhang, "View-invariant Action Recognition in Surveillance Videos", Proceedings of IEEE, 2011.

[5] HajerFradi and Jean-Luc Dugelay: "Robust Foreground Segmentation using ImprovedGaussian Mixture Model and Optical flow", International conference on Informatics, Electronics and vision, 2012.

[6] HedayatiM,Wan Mimi Diyana Wan Zaki, AiniHussain: "Real-Time BackgroundSubtraction for video Surveillance: from research to reality", IEEE 6th International colloquiumon signal processing and its applications,2010.
[7] HellyPatel,MaheshP.Wankhade, " Human Tracking in Video Surveillance", InternationalJournal of Emerging Technology and Advanced engineering(ISSN 2250-2459,Vol 1,Issue 2,Dec2011).
[8] Kong Chien Lai, YeowPeng Chang, Kin Hoe Cheong, Siak Wang Khor : "Detection and Classification of Object Movement - An Application for Video Surveillance System, 2nd International Conference on Computer Engineering and Technology,2010.
[9] RuiquanGe,Zhenfangshan,Haokou,"An Intelligent Surveillance system Based on Motiondetection", Proceedings of IEEE, IC-BNMT 2011.
[10] Sreedevi M, Yaswanth Kumar Avulupati,AnjanBabu G, Sendhilkumar R," Real TimeMovement Detection for Human recognition", Proceedings of the world congress on Engineering and Computer Science 2012,vol 1.
[11] M.H. Sedky, M. Moniri, C.C. Chibelushi," Classification of Smart Video Surveillance Systems for Commercial Applications".
[12] WeiyaoLin,Ming-Ting Sun,RadhaPoovendran and Zhengyou Zhang, "Group EventDetection for video surveillance", IEEE International Symposium on circuits andSystems,P.2830-2833,Taipei,2009.
[13] XiaoshiZheng, Yanling Zhao, Na li, Huimin Wu: "An Automatic Moving Object DetectionAlgorithm for Video Surveillance Applications", International Conferences on Embedded Software and Systems, 2009.

