Trajectory Movement Detection on ATM Survillance

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Abstract - *Video surveillance is an important application that helps in monitoring different areas which require high security, thus video surveillance is a very important concept which plays a vital role in safety and security. Video surveillance system is used in detecting, analyzing, and tracking any unusual activity also it is used for public safety and other highly security needed areas. Many times there are cases of burglary in ATMs and the current video surveillance system is incapable of tracking such activities and is just for the recording purpose mainly. Therefore, to overcome the incapability's of the existing system a system is proposed, which is going to track the trajectory of the user in the ATM using the background subtraction algorithm. Along with that there will be some prohibited areas declared by us for the user to enter. In case someone tries to enter prohibited area a message will be sent to the administrator the ATM. There will also be a feature of human face detection; in case the user's face is covered scarf or helmet the ATM will not be accessed by the user until the face is uncovered.*

*Key Words***:** Video Surveillance, Motion History Images, Classification, Background subtraction Algorithm, haar Classification.

1. INTRODUCTION

Surveillance technology ordinance and its installation are increasingly being used in public facilities and organizations, to the common places of criminal acts. The environments monitoring has been expanded to protect residents in places, such as elementary schools and other care facilities, city parks and ATM system. The installation of the Smart surveillance technology helps prevent crime and may aid in the solution of cases. This Project is fundamentally for the ATMs surveillance. Currently, the video surveillance in ATMs is just for the purpose of capturing the video or recording only. They lack the ability to detect and analyze the activities performed by the user inside the ATMs. Due to which they the security of the ATM is limited. The system proposed by us will be programmed to overcome all those shortcoming of the current video surveillance.

2. MOTIVATION

The motivation towards implementation towards the idea is to prevent the malicious activity happening in ATM system, provide a reliable and user friendly and secured ATM to improve the standards of the security. Along with that, it will also be helpful in tracing the culprit in case of a burglary.

3. LITERARTURE SURVEY

The authors Sambarta Ray,   Souvik Das, Dr. Anindya Sen in the paper[1] presents an automated Currently, a camera attached with the ATM unit, records and transmits the video feed to the main server of the bank. Around the clock, this manual surveillance utilizes a lot of bandwidth for transmission. According to the paper it is possible to detect whether a person is wearing a mask or not. The proposed system is also capable of counting the number of people present inside the ATM kiosk and generate a warning signal, thereby removes a constant human supervision.

The authors A K Singh Kushwaha, Maheshkumar H Kolekar, A Khare, [2] paper presents an algorithm for real-time object classification and human activity recognition which can help to made intelligent video surveillance systems for human behavior analysis. The proposed method makes use of object silhouettes to classify objects and activity of humans present in a scene monitored by a dynamic camera. Astatically background subtraction method is used for object segmentation. The matching templates are constructed using the motion history images for classify objects into classes like human, human group and vehicle; and object shape information for different human activities in a video. Experimental results demonstrate that the proposed method can recognize these activities accurately.

The idea proposed in paper[3] improve the security in ATMs, they have come up with various techniques which combined together to give a better result .The purpose of this paper is to present a survey about different techniques used for ATM security purpose and about confrontations facing in it. Various types of attacks on ATM are discussed in the paper which

includes the following type's Somatic attack, ATM fraudulence, etc. The methods to prevent these attacks are described in the paper some of them are, protection of ATM putting CCTV protection cameras and Emergency sirens. Other strategies include to put in force at low price embedded internet server.

The method discussed in paper [5] by author Zhang, Y, Liu Z presents a novel method for judging irregular behavior based on treading track. First we use the background subtraction method to detect moving body, and then we judge whether someone is suspicious or not on the basis of treading track. The experimental result has shown the method present in this paper having the superiority of simple algorithm, fast recognition speed and high accuracy rate. Meanwhile, this method has certain robustness.

A strategy is presented for trajectory tracking and path following of generic paths for under-actuated marine vehicles [6]. In particular, it uses the definition of the hand position point, introduced for ground vehicles, autonomous surface vehicles and autonomous underwater vehicles, and then use the hand position point as output for a control strategy based on the input–output feedback linearization method. The proposed strategy incorporates the external disturbances affecting the vehicle, e.g., constant and irrotational ocean currents using the Lyapunov analysis. Finally, a simulation case study and experimental results were presented in order to validate the theoretical results.

The author Zhiming Ding, Bin Yang, Ralf Hartmut Güting, and Yaguang Li in paper [7] propose a mechanism and a traffic flow analysis method using which the locations of moving objects are tracked through a dense sampling and batch uploading strategy, and a novel edge-centric network matching method, which is running at the server side, adopted to efficiently match the densely sampled GPS points to the network.

Another paper by Amir H. Meghdadi, Pourang Irani proposes a novel video visual analytics system for interactive exploration of surveillance video data [8]. It's approach consists of providing analysts with various views of information related to moving objects in a video by extracting each object's movement path. Each movement is visualized by creating a single action shot image, plotting its trajectory in a space-time cube and displaying an overall timeline view of all the movements. The action shots provide a still view of the moving object while the path view presents movement properties such as speed and location. After all this the analyst is able to filter out large amount of movement activities whereas the action shot representation summarizes the content of each moment.

4. System Architecture

A Block chain database is a distributed database that records and stores transaction data in the form of time stamped "Blocks" linked to each other in such a way that no one can alter any transaction data. Below figure shows the architecture of the proposed system.
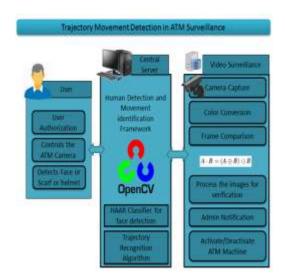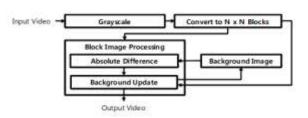

Fig.1. System Block Diagram

5. Algorithm

A. Motional Region Detection Structure:

The new motion detection method we proposed uses a technique like BSM. That is, it uses the subtraction between the current frame image and the background image. The background image used at this time is not a background image prepared in advance. However, it creates the background screen in real-time when video shooting. The motion detection method proposed in this study can divided into three steps:

a. blocking the input image and preprocessing the image by block zoning
b. Obtaining the difference image between the background image and block zoning.
c. Updating the background image.

In Figure, the initial input image is a TV input method proposed in the NTSC standard. This is the YIQ method. It is converted to grayscale using following formula. Herein, F represents the frame image, and r, g, b indicates Red, Green, Blue value, respectively, to the pixel corresponding to the position of x and y.

$$G(x,y) = 0.299 \times F_r(x,y) + 0.587 \times F_g(x,y) + 0.114 \times F_b(x,y)$$

The images obtained after converting to grayscale are segmented into the square block with the entire number of pixels, *N*. Subsequently, the absolute difference image of the block is divided in the front using formula.

$$D_n(x,y) = \begin{cases} 1, & |W_n(x,y) - B_n(x,y)| > t_T \\ 0, & otherwise \end{cases}$$

$$(x, y = 0,1,2,\ldots,N\text{-}1 \qquad N: \text{window block size})$$

In above formula, *n* represents the number of blocks, *W* the block corresponding to the current image, *B* the block corresponding to the background image, and *D* the value of the absolute difference between *W* and *B*.

B. Background Image Update:

Step 1: One-dimensional array is declared to store each difference image luminance change rate by block R(n), and initialized to 0. This step is performed only once during the first run.

Step 2: Integer variable C to calculate the degree of change for the entire block is declared and initialized into 0. Here in, C represents the number of blocks with a change. For the block difference image (Dn). Steps 3 and 4 are performed repeatedly.

Step 3: The number of pixels that have 1 as a value within the block difference image (Dn) is put together. At this time, the sum of pixels represents the change in the luminance within the block. If it is equal to or greater than t, it is considered to have a change in the movement in the block, and the value of R(n) increases by 1. In addition, the value of C increases by 1. Conversely, if the sum of the pixels is less than we consider there is no change, the value of R(n) reduces by 1,and all the values of Dn are initialized to 0. The image with no change in the luminance value in the block is initialized into0 to eliminate noise. Herein, t uses an arbitrary threshold value i.e. block size N.

$$R(n) = \begin{cases} R(n)+1, & C = C+1, \quad \sum_{k=0}^{N^2} D_n(k) > \Delta t \\ R(n)-1, & D_n = 0,...,0., \quad otherwise \end{cases}$$

Step 4: In above formula, if the value of $R(n)$ is less than '-1',the background image of the block is updated. Otherwise, it is not updated and remains as the previous background image.

C. Working

1) Video Recording

If any suspicious activity happens in the ATM area or any intrusion occurs in the system then system is recording the video of the activity.

2) Scarf or Helmet Detection

System needs to capture if the user is covering his/her face using scarf. System should deactivate ATM if the user is not showing clear face.

3) Image Capture and Template Recording

When system will start it will set or record the targeted area which means we store the particular target area from capture area.

4) Template Matching against mentioned region

Selected target area is compare with the current image frame region and analysis on it. If the mismatch found play alarm and sends a notification.

5) Trajectory Recognition

A trajectory is the path that a person moves as a function of time. The trajectory in a scene is recognized using background subtraction algorithm.

6) Admin Notification

If any mismatch found at the time of image comparison system will notify the admin by sending SMS that suspectful person is there in ATM area & plays alarm. If the person is suspectful then Admin can stop him from using ATM machine.

6. Advantages

* Provides high security to the ATM centers from fraud or theft.
* The whole system can be implemented in very low cost.

7. Applications

* To detect intrusion within the real time image frames.
* To provide affordable and quality Surveillance system to user with cost effectiveness.

8. Conclusion

In proposed system, our method for trajectory recognition is based on obtaining the Motion History Image (MHI) of the centroid of the moving person and classification based on human moments. This method produces accurate results even when tracking is not very robust. This is because a few stray points won't affect the MHI much and the human moments will be fairly the same. In addition to this, our system can detect whether a person is entering a prohibited area where he/she is not supposed to enter.

9. References

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