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Gesture Recognition Technology to Annihilate Burglaries amid ATM Transactions

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Abstract - ***ATM Robbery and in addition to ruthless things on women is happening more often than not amid the ATM transactions due to the absence of security in ATMs. In order to avoid such things, gesture recognition provides a way to ensure by utilizing sensors along with stereo cameras that detects the body movements of gatecrashers and blow caution to warn security. 3D model-based and appearance based algorithms are used to detect the body language of the intruders who have entered the ATMs. In this paper, Pioneering Maneuver (PM) Algorithm is presented to detect such brutal activities using F-Measure that is for the most part event.***

Key Words: *Biometrics, Stereo cameras, Gesture recognition, ATM transactions security*

1. INTRODUCTION

Gesture Recognition Technology (GRT) [1] [2] is one among a variety of biometric technologies with a goal of interpreting human nature by mathematical algorithms. Gestures and distinct postures are able to originate from body motion or state but, commonly originate from face or hand. "Fig. 1" illustrates the image capturing unit of regular Gesture Recognition Technology and gestures of individuals either static or dynamic can be plotted in order to compare with that of in the database. The promising application of this technology is emotion identification with all the expressions and hand gesture detection while anyone got attacked during ATM transactions.

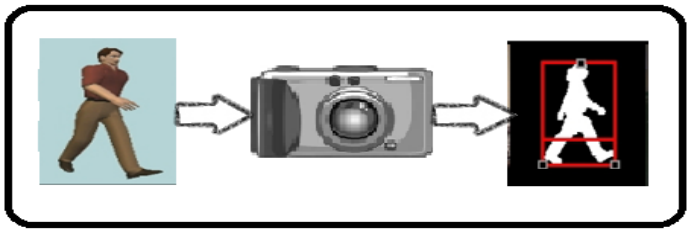
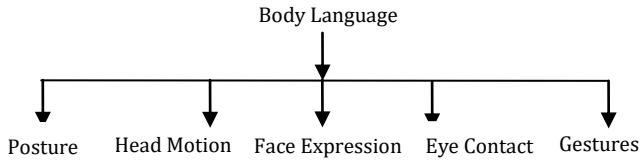


Fig-1: Image Capturing Unit of GRT



To interpret sign language [3], different methods have been geared up using cameras and computer vision algorithms. This gesture recognition can perceive a way for computers to identify with human body languages. Here, a range of features of body language are considered while dealing with gesture recognition. The classification and identification of way of walking attitude proxemics and individual behaviors be the sub-part of gesture recognition which builds a bridge between users and machines to identify the fierce thing and evade them up to some extent by cautioning. Various postures like pushing, striking, kicking and also motion picture regarding robbery in ATM are stacked in the database. Some of them are proffered in "Fig. 2".

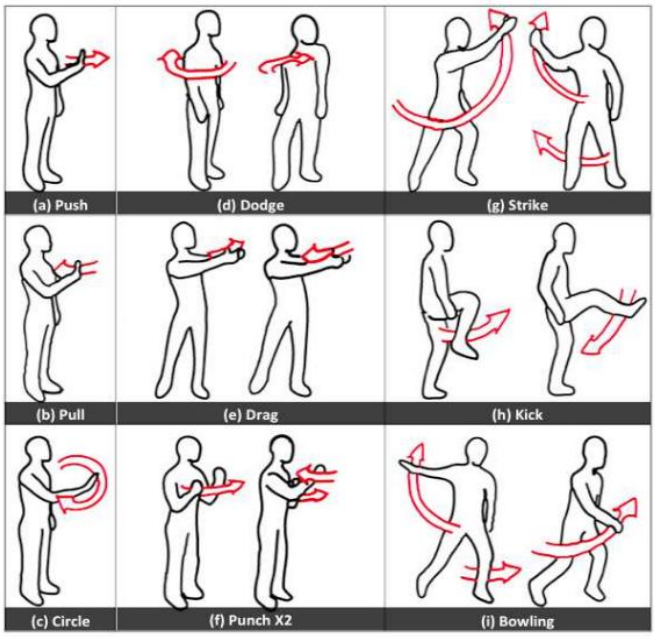


Fig -2: Various Postures of human to recognize in ATM

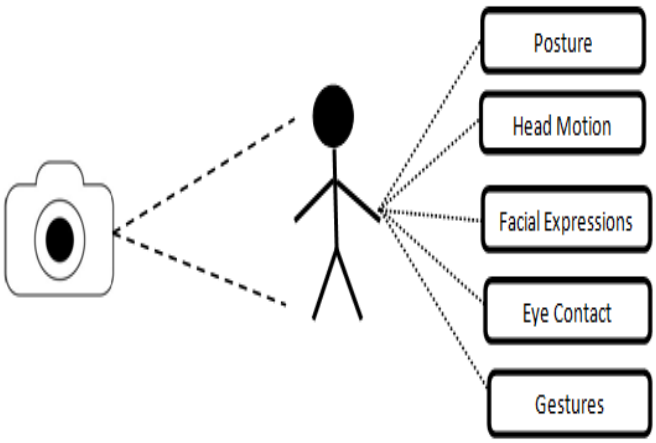


Fig -3: Features captured by camera

In gesture recognition technology, a camera reads the movement of the human body and imparts the information to a computer that uses the gesture as input to control devices or applications (especially while using stereo cameras). Case in point, an individual applauding together before a cam can create the sound of images was slammed by and large when the motion is sustained completely through a computer.

The inbuilt cameras of sensors capture all facial and speech expressions (lip reading) and eye moments along with handand body movement which are offered in "Fig. 3". The graphical user interface (GUI) will focus on all the characteristics of body language, unlike other interfaces which concentrates principally on this alone.

2. PIONEERING MANEUVER (PM) USING GESTURE RECOGNITION TECHNOLOGY

An assortment of applications of gesture recognition such as switching channels without a remote in a television or a music system, tuning out the lights by usual movements of people in house and now automobiles need sensor assistance for parking and blind-spot recognition. Gesture recognition also involves leap motion where one's gestures act as an input device to control their ones personal computer.

Of all the applications, this paper expounds a state-of-the-art technique which is an imminent application of gesture recognition technology in order to serve security over and above to eradicate fraudulent activities ensure more recurrently during ATM transactions. It is an enhancement for regular GRT and introduces an advent to capture the motion videos and transmitting through various modules to perform specific actions for indulging assurance at ATMs.

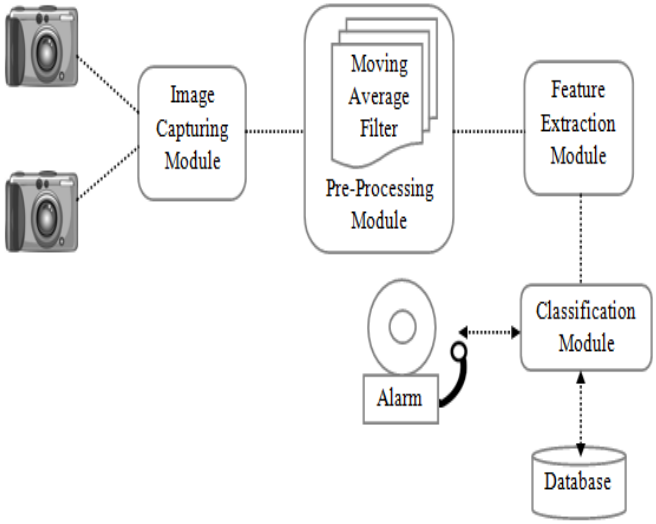


Fig -4: Architecture of PM

As in the "Fig. 4" the System design is in such a way that everything will be performed in terms of modules. Stereo cameras [5] are fixed in sensors to capture motion pictures as well as to find the appearance of the person who entered ATM. The output of the camera is approximated 3D representation by formulating in x, y and z dimensions with two lenses having a focal plane for each of them which are separated by a small baseline. Along with these cameras, the position reference such as lexican stripe or infrared emitters will give the direct motion measurement (6D vision) gestures.

Pre-processing module equipped with moving average filters to dispose of the high-frequency noise from 3-dimensional signals. After amputating the noise, lineaments are derived in feature extraction module and class label filter which is a useful post-processing module that relinquish enormous or sporadic prediction spikes that may be made by a classifier on continuous input stream of data ("Fig. 4"). The comparison is made with the extracted features and dynamic temporal gestures such as swiping or tapping which are stored in the database. If the match is not found then the alert message will be sent to ring alarm outside ATM and also to the control room to alert the force [6].

2. PM APPROACH DESIGN

Pioneering Maneuver (PM) is an innovative progress technique which combines the features of both appearances based and 3D-model based algorithms. The step by step procedure conferred in this paper. Firstly, Users are identified by their head motion, facial expressions including lip reading, static gestures in which a user has their hands in a specific posture and dynamic gestures like swiping or tapping can be captured using stereo cameras ("Fig. 5").

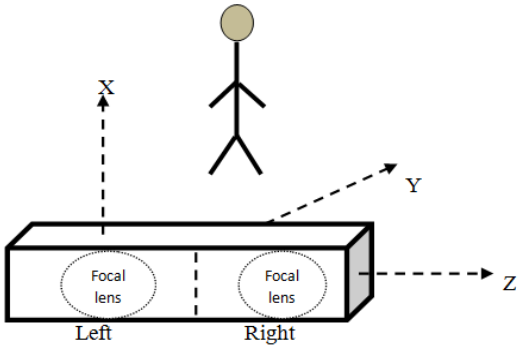


Fig -5: Internal process of the camera

In addition to that, appearance of individuals is also identified as some of the images regarding their outward show are loaded in database. This above technique will follow the underneath algorithm

Algorithm: PM

Begin

Step 1: Capture Motion Picture of individual entered in ATM
<Appearance> && <motion video>
Step 2: Pre-process the motion video using moving average filter for 3D
Motion video
Step 3: Post-Process the motion video by extracting features using class label
Filter
Step 4: Generate score for the video using F-measure.
Step 5: Compare the motion video to recognize the dynamic temporal gestures during the time of enrolment using the F-score obtained for the video.
If F-score > threshold
Then send alert message to ring the alarm outside ATM as well as to
Control room
Else no action will be taken.

End

Motion picture/ video will be pre-processed to remove high-frequency noise which moreover trapped during capture by means of moving average filter. The post processing techniques like feature extraction, as well as the classification, is done through a class label filter which acts as a classifier on an unceasing stream of input data. The correlation between motion video with that of dynamic temporal gestures are made using a statistical measure called F-measure. Hence by applying the algorithm to detect the moving object, the model needs to estimate the surroundings subtraction [7]. Evaluation will be done by estimating each and every frame by subtracting the second frame from the first. The background will be accurately detected and then, the moving object gestures of the body will be effortlessly detected. In this proposed model, the background will be motionless; hence it is to classify the pixels of the moving gesture of the human body.

F-score [8] gives the statistical analysis of binary classification and depends mostly on precision [1]and recall[2] [9] and it is measured by calculating the weighted average of precision and recall (harmonic mean of precision and recall).

$$F - Score = 2 \times \frac{precision \times recall}{precision + recall} \quad (1)$$

The value of the threshold is for the posture which is stored in the database and F-Score value for every motion video that is captured is calculated and both the values are collated with each other. If the score limit crosses the threshold then the alert message will be sent to alarm outside ATM and to control room. After receiving the alert message, the alarm will blow as caution/ warning.

3. STATISTICS AND ANALYSIS

ATM robbery is most often nowadays and there is no fortification for the people who are processing their transactions. “Chart. 1” shows the statistical report of various robberies in UK since 2005. To make certain security ordinary CC cameras in ATM centre are replaced with stereo cameras which will provide the approximated 3D illustration of the human and their gestures. In various places of the world these violent attacks are increasing day-by-day, according to the statistics of the world database shows the numerous increase. The main intention of this paper is to look forward about the attacks and to avoid the fatal counts by a technical approach using this model. As per the database from the ATM security and fraud prevention [4], one can easily understand the rising of robberies along with the attacks on the human beings.

The analysis about these ATM robberies using various explodes and with some gas assault to threaten the users are shown in “Chart. 1”. Since from 2005 the attacks have been increased, finally till year 2013 the rate has increased more than three times from year 2005. General ATM transaction comprises a provider which has internal protection. I.e., encrypting and decrypting the data at the data centre and providing money but this is not at all a sufficient amount to protect people from intruder who enters ATM centre suddenly and attacks the people who are processing their transactions.

[1] Precision Score gives the fraction of number of true positives and number of positives.
[2] Recall Score gives the fraction of number of true positives and number of positives that should have been returned.

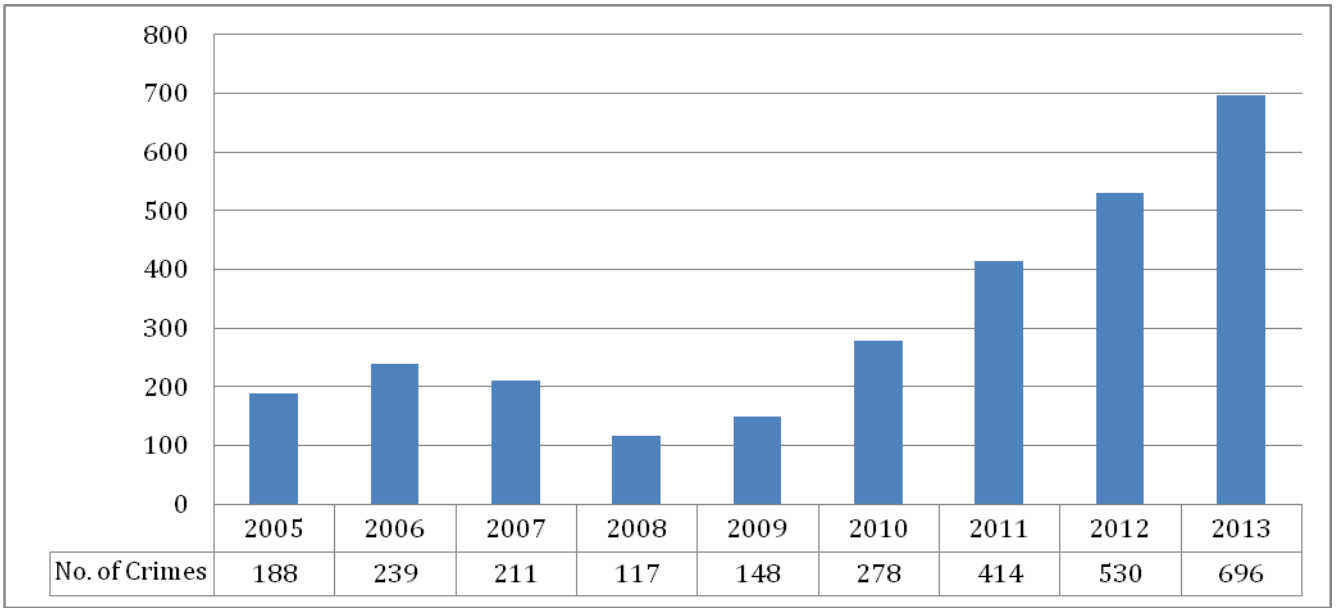


Chart -1: ATM robberies using Explosives and Gas attacks (By number of incidents) significant increase from 2009 to 2013-courtesy from ATM Security & Fraud Prevention

4. CONCLUSION

ATM robberies are increasing day by day and some of the brutal things happened to the humans mostly to the women takes place in ATM. Gesture recognition will show a path to avoid such activities which are its imminent application. In this paper, image/video capturing is conferred and a novel technique and its architecture was introduced which is an enhancement in security systems of ATMs to eradicate fraudulent activities. F-score is presented to measure the accuracy which depends on the precision and recall score in order to make the comparison between captured video and dynamic gestures stored in the database. Thus, it is ease to avoid the serious issues in the ATM by the intruders.

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