INTRUDER DETECTION SYSTEM IN AN A.T.M.

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ABSTRACT

In Real World Applications, tracking Targets in Low Resolution Video is a difficult task, in light of the fact that there is loss of discriminative Detail in the Visual Appearance of Moving Object. The current strategies are generally founded on the Enhancement of LR (Low Resolution) Video by Super Resolution Techniques. Be that as it may, these strategies require High Computational expense. This cost further if we are managing Events Detection. The Project presents an Algorithm which Detects Unusual Events without such kind of Conversion. Conventional Low Resolution Cameras are commonly utilized in ATMs because of their Low Cost. Proposed Algorithm uses Rolling Average Background Subtraction Technique to distinguish Foreground Object from Dynamic Background in a Scene. It further uses Viola-Jones Algorithm, to identify faces. The Proposed Algorithm can perceive the event of Unusual Events, for example, Overcrowding or a fight in the Low Resolution recordings. It is quick enough since it forms Low Resolution Frames and could be useful in Surveillance System for upgrading the Security of ATMs where Conventional Camera of Low Resolution is still used.

Keyword: *A.T.M., Background Subtraction, Security, Viola-Jones Algorithm.*

1. INTRODUCTION

Indian banks lost Rs. 109.75 crore to robbery and online extortion in ATM related incidents in the year 2018. In this previous decade, many attempts in the field of moving object detection and tracking have been done to make video surveillance dependable and efficient. There are numerous difficulties which cause problems in the improvement of this. These difficulties may incorporate light change, dynamic background, disguise, shadow and so forth. These obstructions become increasingly bulky when performing object following in low resolution video, where there is loss of discriminative details in the video.

In this paper, we present an algorithm which can identify Unusual Events in low resolution videos. Typical application of the algorithm is to upgrade the security of ATM without expelling ordinary low resolution camera. It utilizes background subtraction method to detect the foreground object and its movements. It likewise utilizes Viola-Jones method to distinguish number of individuals in the ATM, and to check if the camera is masked.

2. RELATED WORK

Prajwal B.K. proposes the use of GSM Module to alert the authorities immediately in the case of an Unusual Event [1]. Sudhir Goswami proposes the use of Background Subtraction Technique [2]. K.Srinivasan proposes the use of an improved Background Subtraction method [3].

3. METHODOLOGY

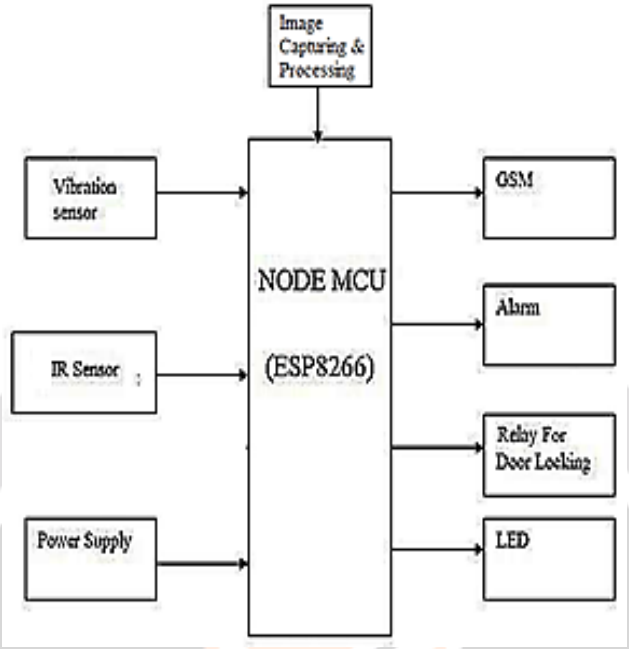

Fig -1: Block Diagram of Proposed Approach

Fig -1 shows the Block diagram of the proposed methodology. The main components of the block diagram are the PC with MATLAB & the NodeMCU. The PC is used to load the code (Algorithms) onto to the NodeMCU. GSM module is used to send message to the concerned authorities. Power supply exists to run the Relay and Vibration Sensor. A Vibration sensor exists to detect unusual force exerted. The alarm works to alert people nearby the ATM.

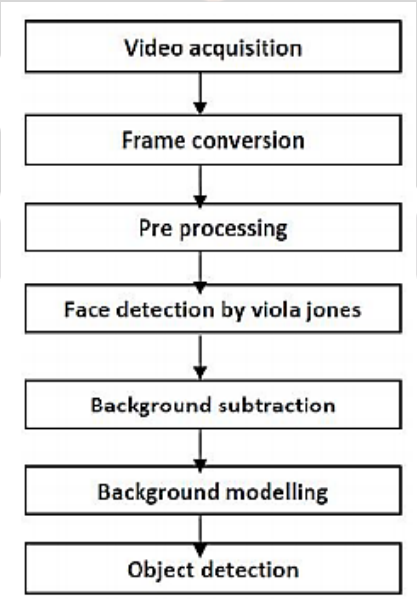

Fig -2: Image Processing Steps

Step 1: The video is acquired by web camera which is inbuilt within the PC. Webcam acquires video in YUY2 format.

Step 2: Frame conversion after capturing the video, it is converted into frames by get snapshot which is the inbuilt function of MATLAB.

Step 3: Pre-processing each frame is converted to RGB image.

Step 4: Face detection is performed by Viola Jones algorithm.

Step 5: Background Subtraction → in this step detects any noteworthy changes in the picture area from foreground model and then pixels comprising the regions experiencing change are set apart for additional processing. If the number of objects detected is larger than the threshold in the foreground, an Unusual Event is detected.

Fig -2 shows the Image Processing Steps Involved. After detecting unusual event the surveillance system can be automated in such a way that it automatically locks the door of that particular ATM and sends the alarming message to security personnel present in the common observation room such that necessary action could be taken. A panic switch can be used to alert the local people. IR sensor is used to auto switch lights inside the ATM. [4]

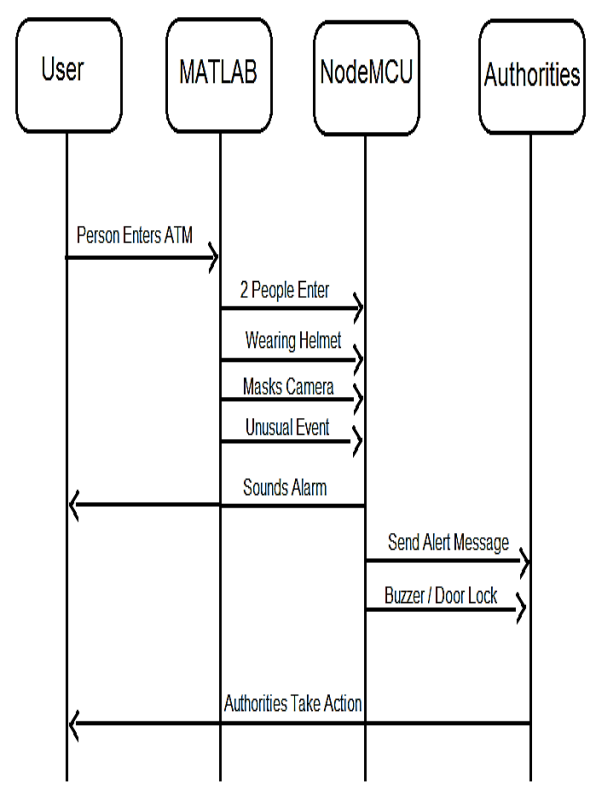

Fig -3: Sequence of Events

Fig -3 shows the Sequence of events involved in Unusual Event Detection in an ATM. It shows how MATLAB & the NodeMCU take action when an unusual event is detected. It can be seen that the NodeMCU sends an alert to the authorities, as well as sounds an alarm near the user to notify people passing by that there is something going wrong in the ATM. [5]

4. RESULTS

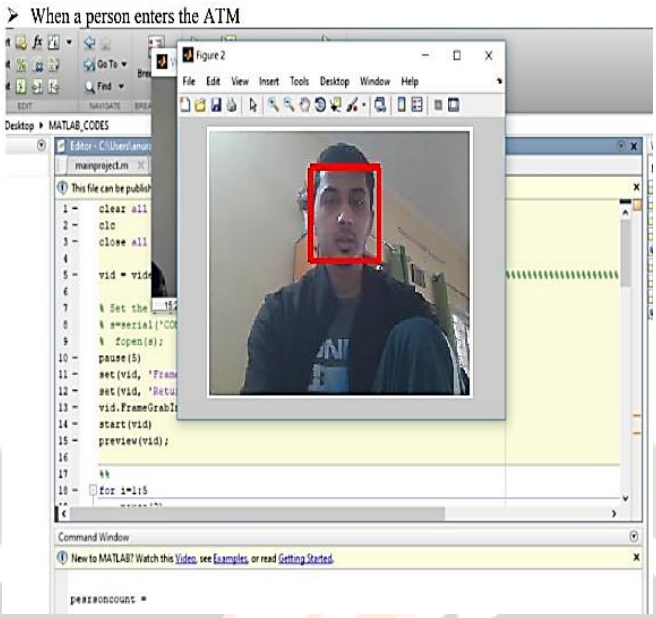

Fig -4: Usual Event

Fig -4 shows a normal, usual event. In a normal scenario there will be no action taken by the system. The person will just enter the ATM and withdraw money & leave. The person's face is detected, but since there are no unusual movements.

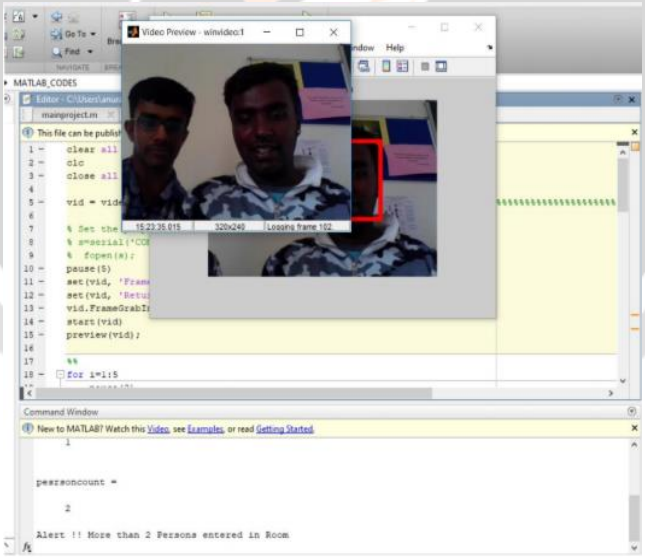

Fig -5: Overcrowding

Fig -5 shows the detection of 2 people in an ATM. In a case where 2 or more people enter the ATM and get very close to the camera, an unusual event is detected. Such overcrowding is generally not advisable in an ATM, as anything can happen in such case. Viola-Jones algorithm in MATLAB detects the faces of the people in the ATM and when the count is more than 1, it considers this as an unusual event.

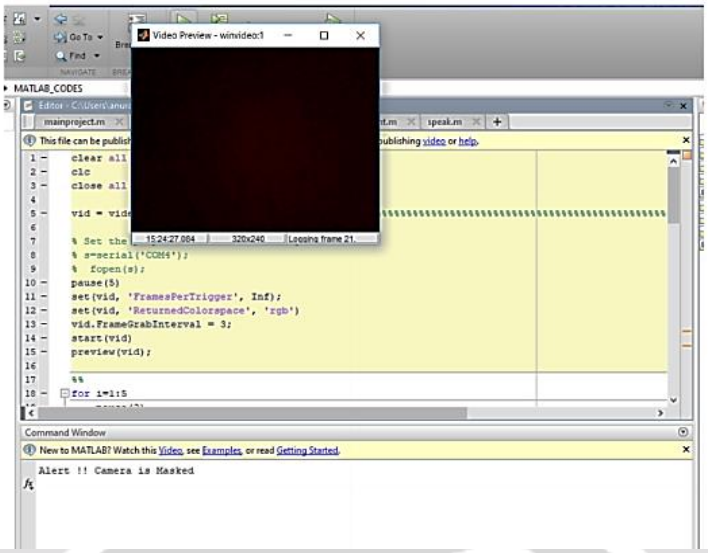

Fig -6: Masked Camera

Fig -6 shows a Masked Camera. Generally robbers are very smart. There is a chance that one of them will definitely try to cover the camera in the ATM. In such case, Viola-Jones algorithm is set to detect the dark/covered screen. This is detected as an unusual event, and it triggers the NodeMCU.

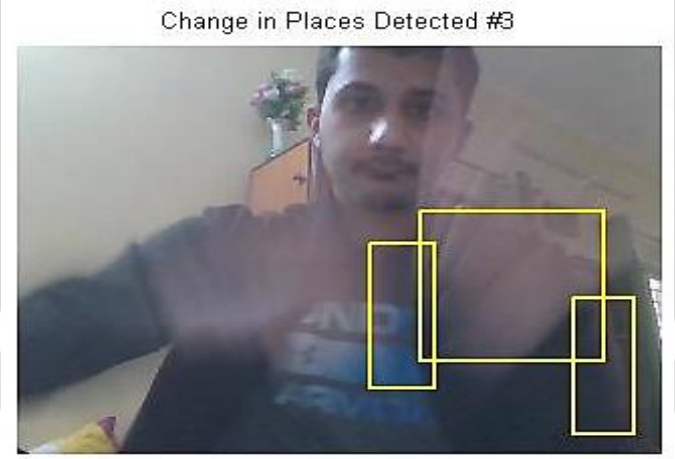

Fig -7: Unusual Event (Fight)

Fig -7 shows detection of unusual movements. The MATLAB code is able to detect unusual movements, such as fights or robberies in an ATM. When there is a fight or an attack, there will be many random movements. Thus there will be many "changes in place detection". Here we set the change in places to "3". Hence for 3 or more than 3 sudden movements the system will detect an unusual event and trigger the alarm.

Whenever an Unusual event is detected by MATLAB, it sends a signal to the NodeMCU. The NodeMCU triggers the GSM Module, which sends an SMS to the authorities and the bank. This will trigger an immediate response and the thieves can be caught. Fig -8 shows the message sent by the module.

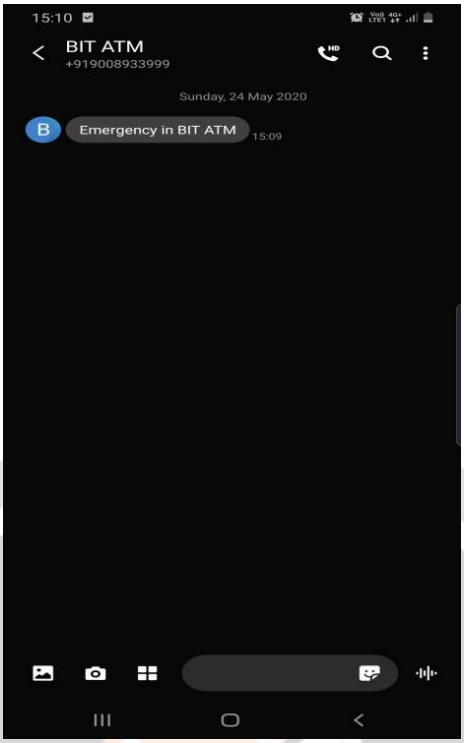

Fig -8: Alert Message sent to authorities.

5. CONCLUSIONS

The results show that the model used – Background Subtraction & Viola-Jones Image Processing methods as a single algorithm, which was efficiently applicable for low resolution videos. This design provides an intimation of unusual events that takes place inside the ATM centers. So with the help of the algorithm, complete surveillance for the ATM will be provided. The main purpose of the project that was to provide safety to the people inside the ATM centers is achieved.

In the future enhancement, Probability of false alarms due to normal activities (such as sneezing), can be reduced by improving the change in places detection method.

6. REFERENCES

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