To Detect Abnormal Event ATM System using Image Processing and IOT

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Abstract- **Image processing has been very fast growing and vast technology in many applications such as remote sensing and fraud detection investigation.Digital Image Processing along with IOT can give an optimal solution to the proposed problem. Where, the Internet of Things, is a linkage of all the physical items on the planet each such tool is embedded with sensors and network connectivity chips for the motive of information exchange among special devices. In India, Automatic Teller Machine is playing a vital role for anytime money transactions. The motivation behind proposed work is to make financial activity free from fraudulent behavior. The video surveillance is captured and stored in storage device converted into multiple frames by using OPENCV python. Frame conversion results in multiple frame generation of the video input. Later in preprocessing scenario, techniques such as gray scale conversion, emitting unusual frames and noise removal is done. The proposed work uses Scale Invariant, Position Invariant and Rotation Invariant features. A CNN classifier classifies fraudulent or non fraudulent images. A fraudulent image from classifier output is taken as input for IoT module and the sensed data will be set for threshold value for actuator aoperation and the in turn triggers servomotor in order to lock door of the ATM and at the same time buzzer get activated to send an alarm to the concern authorized user. These operations are implemented using using Node MCU of IOT. Message received by authorized user can be serially monitored using Adafruitio. Reliable Preventive Action and Advanced ATM Monitoring Ecosystem are the major outcomes of proposed work.**

Keywords: Image processing, IOT, Python, OpenCV, Anaconda Prompt, SPYDER Anaconda 3, AdaFruit IO

I. INTRODUCTION

Nowadays, ATM are playing a very important role in day to day life as it is available anytime and anywhere, it prohibits to go to bank and waste time there. Automatic Teller Machine helps humans for financial transaction emergency. One of most difficult problems in computer vision is figuring out what people are doing in a busy situation. Crowd scene analysis is critical in computer vision since analysing individual human activities is still a challenging challenge. Detection of anomalous behaviour has become more significant, with applications ranging from prisons and fire departments to public safety agencies and financial institutions. Shortcomings of standard monitoring systems are becoming more and more apparent as monitors become more widely used and strange occurrences occur. Typical monitoring system, on other hand, can't alert us to suspicious activity until it's too late. The proposed work is designed to implement the Digital image processing (DIP) for security reasons as the robbery , theft has been drastically increasing. The proposed work usually implemented in both software and hardware implementation with some amount of accurate result.

A Objectives

The goal of the proposed work is to design and improve a wireless communication link to monitor highly sensitive places that require high security like bank officers etc. Following are the objectives of the proposed work of image processing based module.

1. Design and image processing based solution to identify normal as well as abnormal events from the surveillance input. Making an application to automate ATM camera monitoring and identify any possible illegal activity will greatly reduce the inefficiencies now present in existing systems.

2. Send an alert message after detecting abnormal event using IOT technology. The study makes use of ubiquitous Internet of Things technologies to document harm. IoT is the greatest option for reporting the incident to the authorities since ATMs already have internet technology installed. To complete the work, embedded system is linked to the Internet of Things.

B Existing System

Research into motion pattern analysis and modelling has taken place in a variety of industries, including graphics, civil engineering and robotics. For learning scene activities, Buxton offered a comprehensive evaluation of models that have been utilised so far. Vector quantization was used to learn pedestrians' normal paths in the image. Investigate the detection of high-level semantic happenings in video sequences with a motion-based approach Detect anomalous occurrences in picture sequences using object-tracking. At the moment, present ATM guard system is a real-time monitoring system that uses a USB camera put inside room to detect intruders when a vibration occurs. An object detection system is activated when vibration level exceeds a pre-determined threshold. When system detects any things, it immediately sends a message or calls by GSM, and door locks automatically. In such cases, there is a chance of

false assumption, image processing, Vibration sensor counts are developed according to the research.

C Proposed Method

During ATM's transaction processing by a person if his/her intentions are illegal then he/she will try to perform unusual behavior in ATM's. To take it as serious our proposed work is designed to take appropriate action such as locking the door, Buzzer indication, informing to nearby Police station/Authorized users suing GSM technology. There is a novel strategy suggested in the article that uses various models to identify anomalous behaviour in crowd. An integrated multiple-behavior model is introduced to identify abnormalities in a crowd situation that is very complicated. Personal and social behaviour models are part of our approach. Each model of behaviour is based on motion data rather than actions or events. As each pedestrian moves, so does their social conduct, which is then fashioned by that person's immediate surroundings. It is based on an energy function that communicates need for movement in each region. In determining how fast a pedestrian moves, energy function considers both walker's individual and social actions. Anomalous crowd dynamics are very good at simulating energy components of individual and group activity.

II. RELATED WORK

Static video surveillance may be improved by using an unique framework for learning motion patterns and object sizes. For anomalous event identification and scene model feedback, a new high-level layer has been added to typical surveillance pipeline. Proposed work studies peer tracking in complicated circumstances is addressed in the study by the authors. Prior information is becoming more important in scene analysis in order to provide flexibility and resilience, both of which are required to have trustworthiness in complicated settings. In most cases, a dynamic model is used to anticipate object's current position based on its previous trajectory. Because smaller search zones are possible with more accurate predictions in congested circumstances, a robust dynamic model is critical. Abnormal Detection of crowds in computer vision has been most popular and active research area. For identification of abnormal occurrences, it is necessary to automate monitoring of irregularities in surveillance video sequences. Supervision and security are two of primary functions of these systems. Fairs, temples, and other venues may be alerted to abnormalities by the automated system. Nowadays, computer vision's most active and popular research field is crowd analysis. When it comes to study, term "crowd" refers to a distinct group of people or anything that is part of a larger community or civilization, where crowd phenomena are well-known. There are a plethora of oddities to be found among the mass of people. As a general rule, certain anomalous crowd behaviours, such as fights, tumbles, and stampedes, are linked. Often, these abnormalities occurred in conjunction with one another. While some studies regard these combined anomalous behaviours to be merely one behaviour, other behaviours shown in movie are often ignored by those same experts.
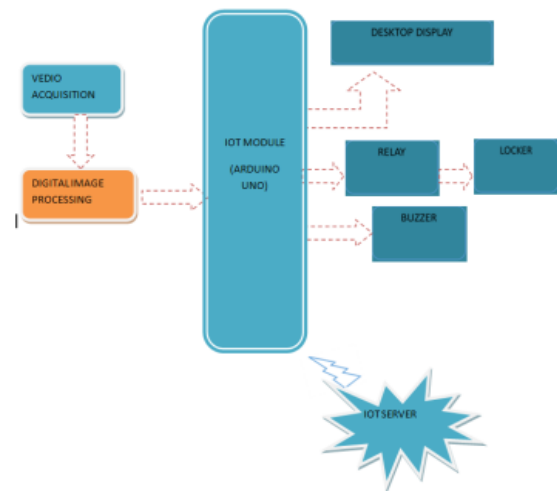
III. PROPOSED WORK

Fig.1 Block diagram for Implementation of proposed work

I. Video Acquisition- Digital image processing involves acquisition of video data. Retrieving video from a hardware-based source for processing is known as retrieval in image processing. As initial stage in workflow cycle, video input is required for processing to begin. Footage that is captured is raw and unfiltered when it is taken.

II. Digital Image Processing-Digitization and Post-Processing of Images An image processing computer system is the centre of DIP. S ystem receives a digital picture as input, processes it using efficient algorithms, then outputs a new image as result of processing.

III. IOT Module- Primarily, it's used as a central hub to centrally modify protocols and data models for data collection and communication management across many devices and models.

IV. Desktop Display-There are billions of pixels on a display screen. Monitor quality is sometimes measured in terms of pixels; for instance, a 4K display has pixels that measure 3840 x 2160 or 4096 x 2160, depending on display manufacturer. There are three sub-pixels that make up RGBcolour system: red (the primary colour), blue (the secondary colour), and green. A uthorised user will be able to see final product in proposed work.

V. Servo Motor (Locker)-Rotational or linear actuators, such as servomotors, offer precise control of angle, velocity, and acceleration. It's made composed of a motor and a sensor for feedback. Robotics, CNC equipment, and automated manufacturing all employ servo motors.

VI. Buzzer-An audio model is converted into a sound signal via a buzzer, a kind of speaking device. In most cases, it serves as a warning or a nudge. It may generate a variety of sounds, including melody, flute, buzzer, alarm, electric bell, and more, depending on the design and

intended use. An electric buzzer or beeper is a mechanical or electromechanical audio signalling device.

VII. IOT Server- Organizations must have real-time monitoring, reporting, and alerting to manage their IoT risks. Take a different tack, please. Real-time monitoring of all network-connected IoT endpoints may be achieved by seamlessly integrating with your current security posture and next-generation firewall investment. D ata signals and gadgets are constantly monitored by an IOT server in research technique.

IV. MODULE DESCRIPTION

A Working

Input Module

1) Video Acquisition: As name suggests, the phase is all about getting a hold of some kind of video capture gear in order to record the video.

Processing Module-

1) Frame Generation: In order to make future processing easier, video is converted to frames of an appropriate kind once it has been captured.

2) Preprocessing: 'Point of interest,' or distinct frames in a movie, are identified during preprocessing. All of these traits are constant throughout several frames of same video, but their value changes as scenario changes. As a result, we use a variety of approaches, including feature extraction and algorithms, to identify characteristics in a digital picture or video.

3) Feature Extraction on image datasets-An initial collection of raw data, such as the test and training datasets, is split into more manageable groupings during dimensionality reduction process. These characteristics are simple to process, yet they are nonetheless accurate and unique enough to characterise real data set.

4) Classification Algorithms- In the proposed work we use suitable classification algorithm to define actual dataset by appropriate accuracy. Algorithms may include Convolution Neural Network

5) Accuracy of each folds in multiple raw inputs- Each raw inputs has multiple folds which consist of train and test datasets which calculates actual accuracy of each folds.

6) Average accuracy- The is final stage of calculating the average accuracy of multiple raw datasets.

7) Abnormal event – When it is declared as abnormal by calculation the ARDUINO starts working.

8) Digital Image Processing- Message is sent to take action to catch the unusual behavioral person inside ATM.

- Door locks using DC motor- ARDUINO indicates to lock the door of ATM through DC motor.

- DC motor has the 5 volts for output.
- So to handle the maximum output volt the relay must be used.
9) Buzzer indication- After door gets closed the buzzer must be indicated to know that unusual event has happened inside ATM room.

10) IOT server- after buzzer indicated IOT server gives the message to authorized user/ nearby authorized police station.

Output Module-

When the IOT server sends message. NODE MCU module helps to send message as text with attached image when abnormal event is detected in ATM systems to authorized user/nearby police station.
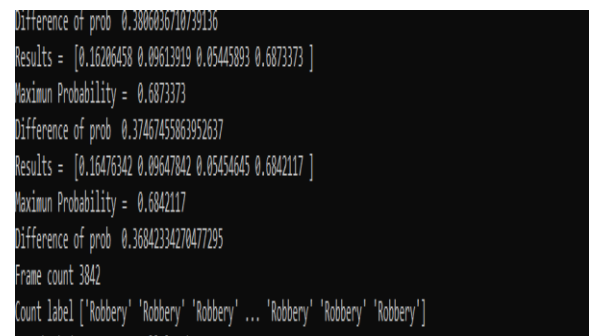
V. RESULTS AND DISCUSSION

Fig 2 Predicting Video As Normal And Abnormal

Fig 2 shows the probability of frame count which results in normal and abnormal event. The regular CNN takes a shorter time to run and achieves better accuracy, compared to the Bayesian CNN using the same model structure. However, the one advantage that Bayesian CNN brings in is an uncertainty measure of the weights and predictions.
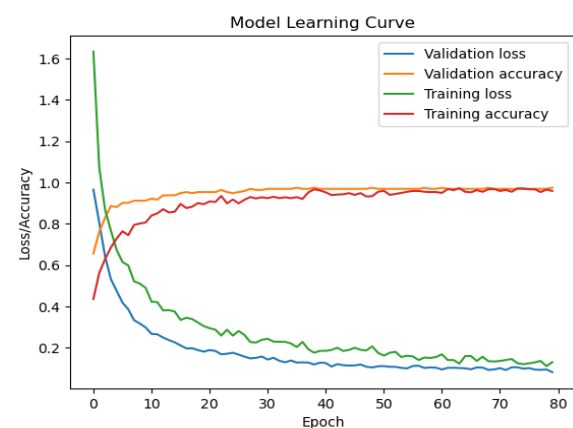

Fig 3 Model Learning Curve

Fig 3 shows Model Learning Curve with determined Epochs and Loss/Accuracy.Learning curve is used to plan model training / validation exactnessas well as training / validation loss vsepochsLearning curve graphs, loosely defined, are plots of model performance over experience or time with respect to a controlled parameter. Epochs where validation accuracy is worse than training accuracy reflects overfitting Epochs when validation loss is more than than training loss indicates overfitting.

Fig 4   IOTBased Module For ATM Systems

Fig 4 shows the model designed for ATM systems based on IOT system for taking appropriate action Keeping a close eye on the ATM system will help catch any intruders in the act. Notifying controller that sensors have been activated and that safety measures must be taken is first step in process. Burglars will be deterred from attempting to break into a vehicle by a loud beep. Controller then triggers motor locking down, securing perpetrators inside building.

Fig 5 Serial Monitoring Through AdafruitIO

Fig 5 shows Adafruit.io is a cloud service, which simply means that we handle it for you. It's accessible over the Internet. Its primary function is to store and retrieve data.Adafruit IO is a cloud service available on network as well as with which it is possible to connect our devices, such as an Arduino board. Adafruit IO utilizes NODE MCU for serial monitoring and continuous reporting to authorized users/admin. All that required is creating an account by email id.

VII. CONCLUSION AND FUTURE SCOPE OF THE WORK

One of the most modern and cost-effective ATM security measures has been put into place. A thief-proof ATM might be put in a secret location inside the machine. A TM intrusion & theft control systems now in use are quite different from this one in many respects. Either the current systems are too costly or they are untrustworthy. System that has been put in place is dependable, affordable, and suitable. To identify anomalous behaviours in a crowd environment, we used an integrated multiple behaviour model in this research. On basis of numerous behaviour models, we demonstrated how our technique was able to capture crowd dynamics without requiring individual item tracking or segmentation. According to results of our experiment, we have a successful strategy for detecting unusual actions in a crowd. An explicit model of pedestrian behaviour that addresses more personal and social property would be fascinating to include into our model. Aside from pedestrian behaviour and scene items like benches, we will also take into account in our future work. Automatic Teller Machine (ATM'S) are the main reason for financial organizations of rapid transaction processing , so the security of ATM system are the main concept to overcome with all the theft and robbery. Existing system can be implemented in real time applications to enhance or develop the ATM system Security.Many researchers encounter challenge of mixed behaviours when anomalous crowd behaviours are combined with other abnormal crowd behaviours. At same moment, all of these strange occurrences are taking place. Examples include a quarrel resulting in a tumbling or a stampede resulting from fear and tumbling. It's dubbed mix inappropriate behaviour when just one abnormality is seen and other is overlooked.

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