# Surveillance Using Ml

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**Abstract**

There is a strong demand for smart vision based surveillance systems owing to the increase in crime at a frightening rate at various public places. As crime increases at a disturbing rate, public security violations and high cost of security personnel have motivated the strategic survey of existing vision and image processing based techniques. It discusses the system to analyze human's normal and abnormal activities recognition along with various feature selectors and detectors.Deep learning approach is used to detect suspicious or normal activity in an academic environment, and which sends an alert message to the corresponding authority, in case of predicting a suspicious activity. Monitoring is often performed through consecutive frames which are extracted from the video. The entire framework is divided into two parts. In the first part, the features are computed from video frames and in the second part, based on the obtained features, the classifier predicts the class as suspicious or normal.We have implemented the problem with ensemble learning techniques which will detect suspicious activities. An automated alert system is also set up to detect, record and report suspicious activities to the concerned authorities.

**Keywords:** suspicious activity, video surveillance, deep learning,Ensemble learning, anomalous activity, machine learning.

## I Introduction

Human behavior recognition in the real-world environment finds plenty of applications including intelligent video surveillance, shopping behavior analysis. Video surveillance has vast application areas especially for indoor outdoor and places. Surveillance is an integral part of security. Today security camera becomes part of life for the safety and security purposes. E-surveillance is one of the main agendas in Digital India, development programme of Indian government. Video surveillance remains as a part of it. Advantages of video surveillance are effective monitoring, less manpower required, cost effective auditing capability, adopting new security trends etc. Currently, the tracking has been performed by human. Since we are dealing with huge amount of video data, this is easy to make people feel tired and the manual intervention will also produce omissions. It greatly affects the efficiency of the system. This has been solved by the automation of video surveillance. Today, manual monitoring of all the events on the CCTV (Closed Circuit Television) camera is impossible. Even if the event had already happened, searching manually the same event in the recorded video wastes a lot of time. Analyzing abnormal events from video is an emerging topic in the domain of automated video surveillance systems.

Human behavior detection in video surveillance system is an automated way of intelligently detecting any suspicious activity. Number of efficient algorithms is available for the automatic detection of human behavior in public areas like airports, railway stations, banks, offices, examination halls etc. Video surveillance is the emerging area in the application of Artificial Intelligence, Machine Learning and Deep Learning. Artificial intelligence helps the computer to think like human. In machine learning, important

components are learning from the training data and make prediction on future data. Nowadays GPU (Graphics Processing Unit) processors and huge datasets are available, so the concept of deep learning is used. The combination of computer vision and video surveillance will ensure public safety and security. Computer vision methods involves the following stages: modeling of environments, detection of motion, classification of moving objects, tracking, behavior understanding and description, and fusion of information from multiple cameras. This method requires lot of pre-processing to extract features in different video sequences. The classification techniques are supervised and unsupervised classification. Supervised classification uses manually labeled training data whereas unsupervised classification is fully computer operated and do not require any human intervention.

Ensemble learning in artificial intelligence is one of the best architecture used to perform difficult learning tasks. Deep Learning models automatically extract features and builds high level representation of image data. This is more generic because the process of feature extraction is fully automated. From the image pixels, convolutional neural network (CNN) can learn visual patterns directly. In the case of video stream, long short term memory (LSTM) models are capable of learning long term dependencies. LSTM network has the ability to remember things. The proposed system will use footages obtained from CCTV camera for monitoring the human behavior in a campus and gently warn when any suspicious event occurs. The major components in intelligent video monitoring are event detection and human behavior recognition. Automatic understanding of human behavior is a challenging task. In a campus, different areas are under video surveillance and various activities are to be monitored. The video footage obtained from campus has been used for testing.

The proposed system uses ensemble machine learning techniques consisting of SVM, XGBoost and Random Forest Classifier is used to detect anomaly with the help of a camera during the beginning stages of the input footage securely, and as well set alarms to prevent damage or subsequent events from happening. The proposed system will get the respective frames from the mass gathering footage as input so as to identify anomalous activities and then the respective frames will be retrieved from the footage for finding the location of the anomalous activity. The anomalous activity detection system will sound alarms for that specific area of the anomalous activity. Using an IoT module, messages are sent to the controllers. The anomaly videos will be stored in MongoDB with the use of FASTA format, so that the huge size of the video is stored into a very small size.

## II. RELATED WORKS

The research paper "Deep Learning Approach for Suspicious Activity Detection from Surveillance Video" [1]suggests different approaches for detecting human behaviors from video. The objective of the works was to detect any abnormal or suspicious events in a video surveillance. Advance Motion Detection (AMD) algorithm was used to detect an unauthorized entry in a restricted area. In the first phase, the object was detected using background subtraction and from frame sequences the object is extracted. The second phase was detection of suspicious activity. Advantage of the system was the algorithm works on real time video processing and its computational complexity was low. But the system was limited in terms of storage service and it can also be implemented with hi-tech mode of capturing of videos in the surveillance areas..The captured video data was processed and the foreground objects were identified using background subtraction. After subtraction, the objects are classified into living or non-living using Haar like algorithm.

Objects tracking were done using Real-Time blob matching algorithm. Fire detection was also detected in this paper. Based on the motion features between the object, suspicious activities were detected . Semantic approach was used to define suspicious events. The object detection and correlation technique was used to track objects . The events are classified based on motion features and temporal information. The computational complexity of the given framework was less.

The paper "Abnormal Activity Recognition on Surveillance:AReview"[2] explores different approaches for detecting human behaviors from video. The objective of the works was to detect any abnormal or suspicious events in a video surveillance. Advance Motion Detection (AMD) algorithm was used to detect an unauthorized entry in a restricted area. In the first phase, the object was detected using background subtraction and from frame sequences the object is extracted. The second phase was detection of suspicious activity. Advantage of the system was the algorithm works on real time video processing and its computational complexity was low. But the system was limited in terms of storage service and it can also be implemented with hi-tech mode of capturing of videos in the surveillance areas. A semantic based approach was proposed .The captured video data was processed and the foreground objects were identified using background subtraction. After subtraction, the objects are classified into living or non-living using Haar like algorithm. Objects tracking were done using Real-Time blob matching algorithm. Fire detection was also detected in this paper. Based on the motion features between the object, suspicious activities were detected. Semantic approach was used to define suspicious events. The object detection and correlation technique was used to track objects. The events are classified based on motion features and temporal information. The computational complexity of the given framework was less.

The research paper"Suspicious Human Activity Recognition using 2D Pose Estimation and Convolutional Neural Network"[3] proposes an architecture with pose estimation and a CNN model for suspicious human activity recognition. We focused on two suspicious activities, fall and wall climbing or trespassing. The pose generated on the video frame is used to classify activities. We tested it on a custom dataset prepared using mobile cameras. When suspi-cious activity is detected an alarm is produced and an email is sent to the desired person. Further work on the application of the proposed model to real-world data using CCTV visuals is recommended. More activities can be implemented by training the model with real-world data. More advancements can be introduced, by adding a face recognition system to identify and check the face of a person doing an unusual activity in the criminal database and can be used for further criminal procedures. Also, we can add more features to the system, like calculating the height and features of the human subjects by using pose estimation techniques like OpenPose, MediaPipe,and all those estimation techniques now available. Further improvements can be made by adding multiple layers in pooling and convolution layers. Moreover, we are planning to evaluate the performance and accuracy of our proposed system by preparing and using larger datasets. Overall, our work contributes towards proposing a real-time, low-cost, highly secure, and accurate model for recognizing suspicious human activities.

This paper"Anomaly and Activity Recognition Using Machine Learning Approach for Video Based Surveillance" [4]researches in the field of video surveillance in terms of object tracking and human behavior. Machine learning provides the ability to learn from a trained dataset. Video surveillance applications such as abnormal event detection or activity recognition provide better results by using machine learning. For instance, one of the most standard techniques such as CNN has been designed to

handle even the three-dimensional data of the video input. For example, CNN can be used to extract the features of an image, classify images etc. CNN can extract the features and patterns in a video faster than traditional image processing techniques. The standard Support Vector Machines technique for abnormal events performs poorly when used independently whereas, when used with classification after converting features using deep learning algorithms it performs far better.The novelty of the proposed approach is the combination of anomaly detection at the frame level with that at the sub-frame level. While detecting which frames have activity different from the baseline it is equally important to detect which part of the frame has the anomalous activity happening in and to classify the activity.After the model is formed the new set of frames are processed, for abnormal event detection, it is given as an input to the SVM model. The motivation to do this work is the idea that Machine Learning can improve the results of video surveillance in terms of accuracy and cost.The cost can be reduced in terms of less manual operation,less storage for processing as compared to traditional image processing techniques. Automated detection of abnormal events and recognition of activities of humans in the video can be helpful.

This paper "Review of Face Recognition Techniques for Secured Cloud Data Surveillance using Machine Learning"[5] proposes of attack identification is enhanced in IoT networks by using a machine learning algorithm and a bijective soft approach. The hybrid machine learning-based model helps detect intrusion activities by using a feature selection method. However, the increased computation complexity of machine learning-based model has increased the energy consumption.Evaluation metrics can be integrated with the machine learning-based model for increasing the attack identification efficiency in a cloud environment. The machine learning-based emotion classification model increases the efficiency of an individual specific model in detecting the classification indicators in input parameters. However, the duration of emotions cannot be evaluated that affects emotion recognition accuracy . The multi-resolution approach helps in estimating the physiological signals in emotion recognition. Emotion recognition accuracy can be enhanced by using Multi-model based approach..

Feature dimensions are reduced by using a machine learning-based support vector machine algorithm in information classification. The feature of subset samples is optimized with classification parameters in the cloud computing environment.The filtering of information helps in increasing the processing speed of information recognition in the cloud environment. However, the information on large-scale data can be deleted in the classification that affects information accuracy . An information recognition algorithm helps maintain multiple dimensions of information.

This paper "Designing an Efficient Framework for Violence Detection in Sensitive Areas using Computer Vision and Machine Learning Techniques"[6] propose an efficient framework to detect violence in sensitive areas using feasible computer vision and machine learning techniques.Thus, there is a need of an automated system which can give automated and accurate alerts of the violence activity without any human intervention, by monitoring and analyzing the video streams collected from the surveillance cameras.To address such problems, computer vision field has grown with various methods for recognizing normal and abnormal human activities like running, clapping, jumping, fighting, screaming etc. Violence detection in real-time using computer vision techniques can have promising research outputs for maintaining public safety in sensitive areas. It takes the video streams from the surveillance cameras and performs the motion analysis of human objects in the video stream by calculating the change of flow-magnitude over relevant consecutive frames as Violent Flow (ViF) descriptors. These descriptors are

applied to different machine learning techniques to identify violence activities.For the feasibility analysis, we test different machine learning techniques viz; Linear Support Vector Machine (SVM) , Quadratic SVM], Cubic SVM], logistic regression and ensemble methods such as Random Forest,Bagging Trees, Adaboost+Decision trees.

## III. EXISTING  SYSTEM

To ensure safety of human, the existing measure is by over viewing the basic surveillance camera manually. Then it is reported to the officials for further actions. This system uses machine learning algorithms for safety surveillance camera where the controller of the cameras check for problems manually and the problem is reported. Internet of things is used for sharing of information for the nearby cameras so as to follow and check the person in need of help. Cloud stores the information and passes them to the neighboring cameras of certain distance which are of not with the main fundamentals.

## IV. PROPOSED SYSTEM

The main objective is to propose and implement a security surveillance system with camera, microphone and sensor for securing any premises. This project seeks to analyze and discuss the security techniques that are prominent for human safety at night. This project mainly uses machine learning algorithms for the construction of detection camera.

It monitors each area to detect any problem using combination of HD cameras. It has the ability to monitor sound in the premises and it captures and starts transmitting the images of the situation immediately to the application. Here we use IOT for receiving transmitted images and displaying them to user with alert sounds.

It becomes highly difficult for one to surveillance over a N number of cameras and check for problems. So to overcome this , the machine learning algorithm is used so that if a human in danger raises his/her hand and curls her thumb into the palm and fold her fingers over it, that camera pops up with red light in the controlling area. The controller checks for realness of problem and reports to the officials. Inorder to have the consecutive followup, the information stored in the cloud of first phase is shared with the cameras nearby and focused on the same person.

## V. CONCLUSION

The aim of the project is to provide help for human at night using surveillance camera mounted with light and sound sensors and alert sensors , GPU. This is an on going project. The model is developed by using Machine Learning Algorithms using Iot and cloud computing. The main phase of the project is constructed using machine learning algorithms for alert system at the time of danger. The input video is preprocessed and detected using motion detection algorithm and extracted using feature extraction and if any abnormal activities found it is alerted using alert system. Machine learning in association with Internet of things and cloud computing helps to collect data of human in danger and in need of help and save them. This project needs manual power to ensure the realness of problem.

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