
INTELLIGENT VIDEO SURVEILLANCE SYSTEM USING CNN

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ABSTRACT

This paper presents a system for detecting suspicious activities in public areas. Intelligent Video Surveillance System will alarm when the observed activities of particular surveillance area matches any of the predefined suspicious behavior programmed in the system. Video surveillance system is of utmost importance in the case of security. It is the task of surveillance to detect moving objects in the video sequence and therefore can help in object classification as well as behavior understanding. Generally, video surveillance system consists of a video camera for capturing video footage and a monitor to see the capturing footage.

KEYWORDS: Surveillance, Background Subtraction, Detection, Classification, CNN.

I. INTRODUCTION

Video Surveillance system is an innovative approach. We can normally find video cameras everywhere that continuously record and save the recorded video for days and months. This results in the utilization of battery and storage capacity. In this presented system, the camera continuously monitors the activities but only records the suspicious activities. As soon as the system detects any unusual activity it takes steps and informs using alarm and notification on the system. Video Surveillance System functions as miniature computers, offering number of features and automatic notification on mobile or system. Surveillance is the monitoring of different activities or information for the purpose of managing. This can include observation from a distance using electronic equipment, such as closed-circuit television (CCTV). Government uses this surveillance system for intelligence gathering, crime prevention and also investigation of crime. Video surveillance is an active area of research.

Video Surveillance even has different applications at commercial sector, military, hospitals, industries and so on to monitor the different activities. Benefits of Video Surveillance Systems are less manpower, effective monitoring, prevent quality failure, violation of working conditions, safety rules; have full and recorded data about production accidents; prevent thefts and damage. The main advantage of the system is that it instantly alerts the user about any suspicious activity and requires much less or no storage space as compared to the traditional surveillance system.

II. RELATED WORK

In recent years the field of detecting suspicious activities and related searches draws the attention of many researchers. In paper [1] the authors suggest anomalous recognition system which is capable of recognizing multiple activities in single video and also perform behavior understanding. It also signifies the labelling of the anomalous activity. Here the author uses Gaussian Mixture Model (GMM) for object detection and some problem domain rules are used to distinguish different types of behaviors. Gaussian Mixture Models is a powerful tool and are widely used in diverse tasks that involve data clustering. This system considers crawling, walking and running as main activities. In paper [2] the author transforms the video surveillance from a data acquisition tool to information and intelligence acquisition system. It uses real time video analysis that helps in acquiring relevant information at much higher resolution. The system comprises the function of object detection, tracking, recognition and classification. Here the author has stated different algorithms like background subtraction algorithm for detection, people tracking algorithm for tracking, KNN for classification. In paper [3] author presents Universal Background Subtraction Algorithm for motion detection that consists of several innovative mechanisms. In this proposed technique, it stores a set of values for each pixel. It compares this set to current pixel value in order to determine whether that pixel belongs to the background or not.

III. METHODOLOGY

The present system contains three independent, but interacting modules: detection, tracking, classification. To perform the detection task a robust algorithm has been selected which is background subtraction algorithm. Classification module uses the CNN algorithm to classify the suspicious and non-suspicious activity.

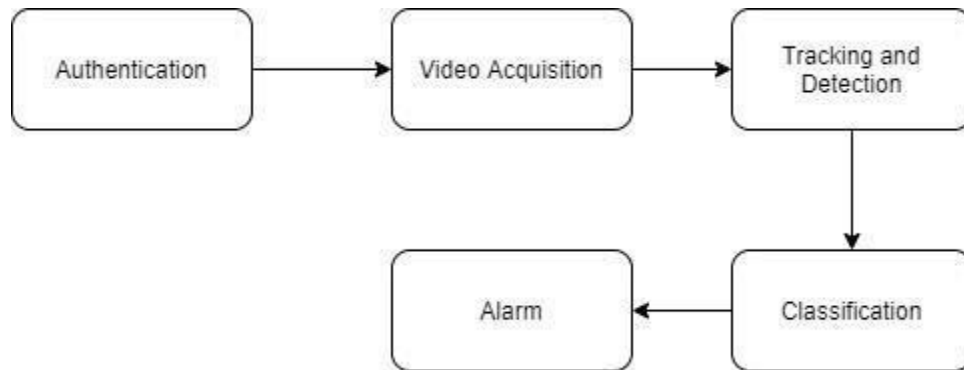


Fig. 1: System block diagram

A. Admin Login

Authentication is the process of providing something that is valid. Here the user system is authenticated so that no one other than the user or admin can log into the system. Only the system admin is allowed to login and to access the system. This feature helps to provide security to the system.

B. Video Acquisition

The video can be provided using two ways that is using input video and by the live streaming. If no input video is provided the system can switch to live streaming. In this process we convert the analog video signal into digital signal and then sending it to local storage. In this local storage is then stored in the form of frames or images.

C. Tracking and Detection

Object detection serves as a means of focusing attention. Using Universal background subtraction, we can detect the moving objects. In this proposed technique, it stores a set of values for each pixel. It compares this set to current pixel value in order to determine whether that pixel belongs to the background or not. Bounding box is provided to all the moving objects depicting detection and tracking.

D. Classification Method

There are many methods of classifications like k-nearest neighbors (KNN), Neural networks (NN), Naive Bayes classifier. Here we are using Convolution Neural Network (CNN) algorithm. Convolution is the first layer which extract features from an input image. CNN algorithm is a deep learning algorithm which takes an image as input, assigns importance and then differentiate from others. CNN automatically extracts the features and process them. CNN image classifications take an input image, process the image and then classifies it under certain category. In order to train and test CNN models, each input image will pass it through a series of convolution layers with filters (Kernels). Here the algorithms help in distinguishing the suspicious and non-suspicious activity according to the predefined dataset.

The objective of this system is to monitor all activity in the selected area. It also helps to detect unusual or suspicious activities, uncommon behaviors, or irregular events in a scene. Another objective is to set an alarm when the observed activities match any of the predefined suspicious behavior. It also helps to support security personnel in monitoring and tracking activities.



Figure (a)



Figure (b)

In the above figures there are some of the samples of suspicious activities that can be detected using the Intelligent Video Surveillance System. Fig (a) shows suspicious activities like pushing and punching and Fig (b) shows suspicious activities like shooting and punching. As these activities are detected using the system, an alarm rings notifying about the suspicious activity.

IV. CONCLUSION

Our Surveillance systems contribute significantly to situation control. Such systems transform the video surveillance from a data acquisition tool to information and intelligence acquisition system. Real-time video analysis provides surveillance systems the ability to react to activity in real-time and therefore acquiring relevant information at a much higher resolution. Video surveillance is one of the active areas of research. Our present system detects suspicious activities. It prevents from entering the forbidden person to secure zone. Video analysis provides surveillance systems with the ability to react to an activity that is suspicious. Background detection still remains a challenging problem in applications having difficult circumstances such as changing illumination, waving trees, rotating fans, etc. The problem of remote surveillance is receiving growing attention in recent years. This is especially regarding the public infrastructure monitoring for transport applications, the safety of quality control in industrial applications, and improved public security.

V. REFERENCES

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