

# Deep Learning Approach for Suspicious Activity Detection from Surveillance Video

**Prof. Malan Sale<sup>1</sup>, Arvind Patkal<sup>2</sup>, Harshal Mahale<sup>3</sup>, Jyoti Lavhale<sup>4</sup>, Sunayana Apsingekar<sup>5</sup>**

Faculty, Department of Computer Engineering<sup>1</sup>

Students, Department of Computer Engineering<sup>2,3,4,5</sup>

Sinhgad College of Engineering, Vadgaon Bk. Pune, Maharashtra, India

Savitribai Phule Pune University, Pune, Maharashtra, India

**Abstract:** *Suspicious Activity is predicting the body part of a person from video. This project will entail detecting suspicious human Activity from video using neural networks. Suspicious human activity detection from surveillance video is an active research area of image processing and computer vision. Using visual surveillance, human activities can be monitored in public areas such as bus stations, railway stations, airports, banks, shopping malls, school and colleges, parking lots, roads, etc. to prevent terrorism, accidents and illegal parking, vandalism, fighting, crime and other suspicious activities. It is very tough to watch public places continuously, so we use an intelligent video surveillance, It is required to monitor the human activities from video and categorize them as usual and unusual activities; and can generate an alert.*

**Keywords:** Video Surveillance, Suspicious Activity, neural networks

## I. INTRODUCTION

Human behavior detection in the real-world environment finds plenty of applications including intelligent video surveillance, shopping behavior analysis. Video surveillance has vast application areas especially for all public places. Surveillance is an integral part of security. It gives CCTV Cameras the ability to detect suspicious activity, without human intervention. The main motto of this paper is to identify suspicious activity for surveillance and alert the owners when suspicious activity is detected. Today CCTV camera becomes part of life for the safety and security purposes. E-surveillance is one of the main agendas in Digital India, development program of Indian government.

### 1.1 Aim

The main goal of the project is to detect the suspicious activity using Video Surveillance and generate the alert message/notification to the users. This system takes videos from dataset as an input and pass it to the CNN model for recognizing our activity is suspicious or not??

### 1.2 Scope of the Project

Importance of the suspicious human activities recognition from video surveillance is to prevent the theft cases at highly sensitive areas such as banks, hospitals, malls, parking lots, bus and railway stations, airports, refineries, nuclear power plants, schools, university campuses, borders etc.

## II. DETAILED DESCRIPTION OF OUR PROJECT

We plan to build an application for detection of Suspicious activity of people in public places in real time. Our application can be used in surveillance at places like malls, airports, railway stations, etc. where there is a risk of theft or a shooting attack. For this purpose, we are using deep learning and neural networks to train our system. This model will then be deployed as a mobile and desktop app which will take videos from dataset as an input and send an alert on the administrator's device if some suspicious pose is found. Human Suspicious activity is related to identifying human body parts and possibly tracking their movements. Real life applications of it vary from gaming and, to healthcare and gesture recognition.

### III. LITERATURE SURVEY

Paper Name: Suspicious Activity Detection in Surveillance Footage

Author name: Satyajit Loganathan, Gayashan Kariyawasam

Abstract: Suspicious activities are of a problem when it comes to the potential risk it brings to humans. With the increase in criminal activities in urban and suburban areas, it is necessary to detect them to be able to minimize such events. Early days surveillance was done manually by humans and where a tiring task as suspicious activities were uncommon compared to the usual activities.

Paper Name: Suspicious Activity Detection from Videos using YOLOv3

Author name: Nipunjita Bordoloi; Anjan Kumar Talukdar; Kandarpa Kumar Sharma

Abstract: Human activity detection for video system is an automated way of processing video sequences and making an intelligent decision about the actions in the video. It is one of the growing areas in Computer Vision and Artificial Intelligence. Suspicious activity detection is the process of detecting unwanted human activities in places and situations. This is done by converting video into frames and analyzing the activities of persons from the processed frames.

Paper Name: Detection of Suspicious Activity and Estimate of Risk from Human Behavior shot by Surveillance Camera

Authors: Miwa Takai

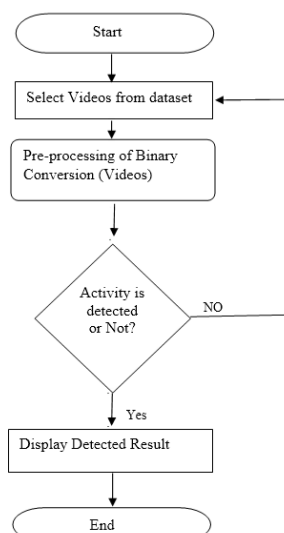
Abstract: In these days, surveillance camera system prevails as a security system at high speed because this system can monitor from remote places using Web camera attached to video monitor by network. Additionally, digital equipments such as Web camera, and hard disk drive are mass-produced, and are sold at low price. And, performance gain of these digital equipments improves at a rapid rate. Current surveillance camera system shows dynamic images from some oversight areas shot by multiple Web cameras at the same time. Then, this system makes observer's mind and body tired because he/she has to watch enormous number of dynamic images been constantly updated. Moreover, this system has a serious problem, which is an observer slips over predictor of crime.

Paper Name: Crowd Density Analysis and Suspicious Activity Detection

Authors: Shriya Akella, Priyanka Abhang, Vinit Agrharkar, Dr. Reena Sonkusare

Abstract: This is not just important for the convenience of the people but also for their security. Understanding a video footage and classifying an activity as normal or suspicious especially in densely packed regions is possible and has been demonstrated in this paper. The proposed system makes use of the YOLOv3 algorithm for object detection. First the features are computed from the image. Then based on the detected features, the classifier makes a prediction. Depending on the object detected, the algorithm classifies a frame as suspicious or normal. Crowd density has been calculated by detecting the number of people in a frame and suspicion detection has been performed by analysing a frame for suspicious objects like isolated bags, knives and guns.

#### 3.1 Flowchart



The working flow of flowchart is as follows :

1. Start the System Work Flow
2. We take one dataset as an input which is based on video.
3. Using pre-processing, we can convert Video Dataset into binary conversion like (Image->Frame->Pixel->bits)
4. Then, we check our activity is detected or not.
5. If yes then Go to the display detected Result and finish the process.
6. If no then again it goes to the select dataset and continue all the process till getting the suspicious activity.

#### **IV. IMPLEMENTATION ALGORITHM**

Machine learning (ML) is a sort of artificial intelligence (AI) that allows software applications to improve their prediction accuracy without being expressly designed to do so. In order to forecast new output values, machine learning algorithms use historical data as input. Machine learning is at the heart of many of today's most successful businesses, like Facebook, Google, and Uber. For many businesses, machine learning has become a crucial competitive differentiation.

##### **4.1 A Convolutional Neural Network (ConvNet)**

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics.

CNN is an efficient recognition algorithm which is widely used in pattern recognition and image processing. It has many features such as simple structure, less training parameters and adaptability. It has become a hot topic in voice analysis and image recognition. While basic approaches require hand-engineering of filters, ConvNets can learn these filters/characteristics

##### **Step1: Convolution:**

Convnets are simply neural networks that use convolution in place of general matrix multiplication in at least one of their layers.

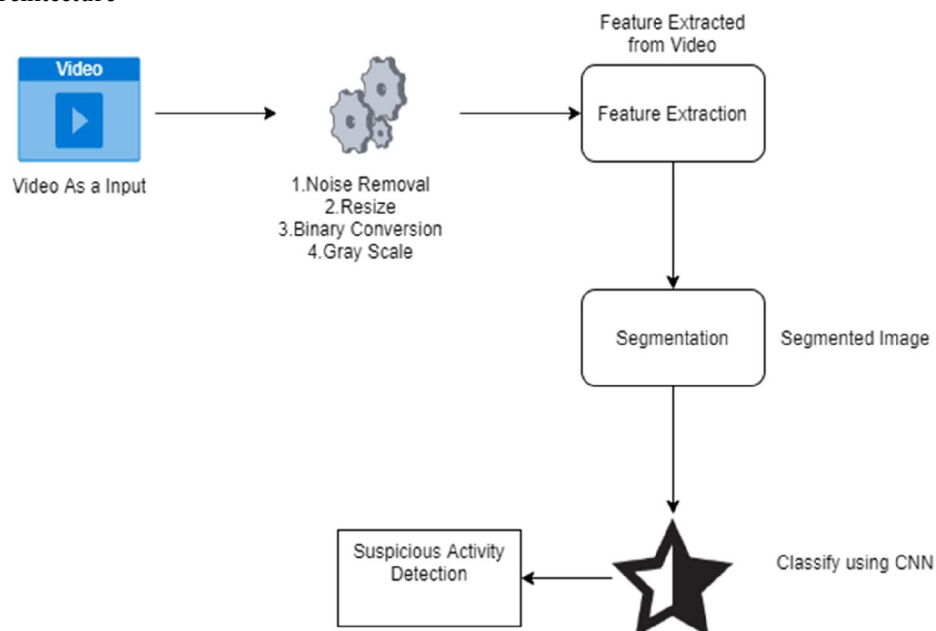
##### **Step 2: Pooling:**

The pooling operation involves sliding a two-dimensional filter over each channel of feature map and summarizing the features lying within the region covered by the filter. Pooling layers are used to reduce the dimensions of the feature maps. Thus, it reduces the number of parameters to learn and the amount of computation performed in the network.

The pooling layer summarises the features present in a region of the feature map generated by a convolution layer. So, further operations are performed on summarised features instead of precisely positioned features generated by the convolution layer. This makes the model more robust to variations in the position of the features in the input image.

**Step 3:** Flattening Input image (starting point) Convolutional layer (convolution operation) Pooling layer (pooling) Input layer for the Artificial Neural Network.

## 4.2 System Architecture



**Figure:** System Architecture

## V. RESULT



REGISTRATION FORM

### Registration Form

Full Name :	Arvind Patkal
Address :	Vadgaon Pune
E-mail :	arvindp@gmail.com
Phone number :	9876543210
Gender :	<input checked="" type="radio"/> Male <input type="radio"/> Female
Age :	22
User Name :	arvindp
Password :	*****
Confirm Password:	*****

**Register**

Success!

Account Created Successfully!

OK

Activate Windows  
Go to Settings to activate Windows.

Login

### Welcome To Login

Username:

Password:

**Login**



## VI. CONCLUSION

In present world, almost all the people are aware of the importance of CCTV footages, but most of the cases these footages are being used for the investigation purposes after a crime/incident have been happened. • The proposed model has the benefit of stopping the crime before it happens. The real time CCTV footages are being tracked and analyzed. • The result of the analysis is a command to the respective authority to take an action if in case the result indicates an untoward incident is going to happen. Hence this can be stopped.

## REFERENCES

- [1]. P.Bhagya Divya, S.Shalini, R.Deepa, Baddeli Sravya Reddy, "Inspection of suspicious human activity in the crowdsourced areas captured in surveillance cameras", International Research Journal of Engineering and Technology (IRJET), December 2017.
- [2]. Jitendra Musale, Akshata Gavhane, Liyakat Shaikh, Pournima Hagwane, Snehalata Tadge, "Suspicious Movement Detection and Tracking of Human Behavior and Object with Fire Detection using A Closed Circuit TV (CCTV) cameras", International Journal for Research in Applied Science & Engineering Technology (IJRASET) Volume 5 Issue XII December 2017.
- [3]. U.M.Kamthe, C.G.Patil "Suspicious Activity Recognition in Video Surveillance System", Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018.
- [4]. Zahraa Kain, Abir Youness, Ismail El Sayad, Samih Abdul- Nabi, Hussein Kassem, "Detecting Abnormal Events in University Areas", International conference on Computer and Application, 2018