

# CCTV Theft Detection and Remote Alerting System

Suyash Kardile, Omkar Ghorpade, Suraj Gondhali, Shubham Jogdand

Department of Computer Engineering, ZCOER, Pune, Maharashtra, India

## ABSTRACT

### Article Info

Volume 8, Issue 3

Page Number : 532-535

### Publication Issue :

May-June-2022

### Article History

Accepted: 10 May 2022

Published: 30 May 2022

Continuous recording of CCTV footages takes up large amount memory in hard disk that result in unnecessary usage of memory. So, we have proposed a system which the theft or intervention in the surveillance area which will help in a making CCTV camera smart and more efficient and powerful in terms of security and memory optimization. This system is a webapp which uses YOLOv3 algorithm for detection of the theft with the help OpenCV python library to integrate computer vision, the system includes remote alerting that is why an SMS provider is incorporated using API in this project. As the system is more reliable and has many features unlike traditional CCTV management software it can be a solution to many surveillance problems and a has many applications in various fields other than security in the future.

**Keywords:** Algorithms, OpenCV, YOLOv3, API, CCTV.

## I. INTRODUCTION

There has two key modes in surveillance, one is to watch for the threat happening and other is to search for that threat. Shop owner nowadays use CCTV which only records all the activity going on in the shop. Continuous recording so much footage takes up large amount memory in hard disk that result in unnecessary usage of memory. And CCTV only records the data, so one must go through all the video recordings and search for the video when theft happens. This method consumes a lot of time and takes a lot of efforts. Even there are many most shop owners use trip wire Sensor, this is also a good and traditional method for monitoring crime, but it costs more for installations and these take lot of extra efforts at the time of installation. In this technique

false alarm can be generated if a wire is cut by anything.

So, a system should be designed which can overcome all the drawbacks of the existing systems in practice currently. This project overcomes the shortcomings of above mention technique to find of crime taking place. The proposed system eliminates the additional installation cost needed and no upgrading of the system is required. So now the people in commercial businesses as well as residents in the premises does not have to spend a lot of money in installation and upgrading.

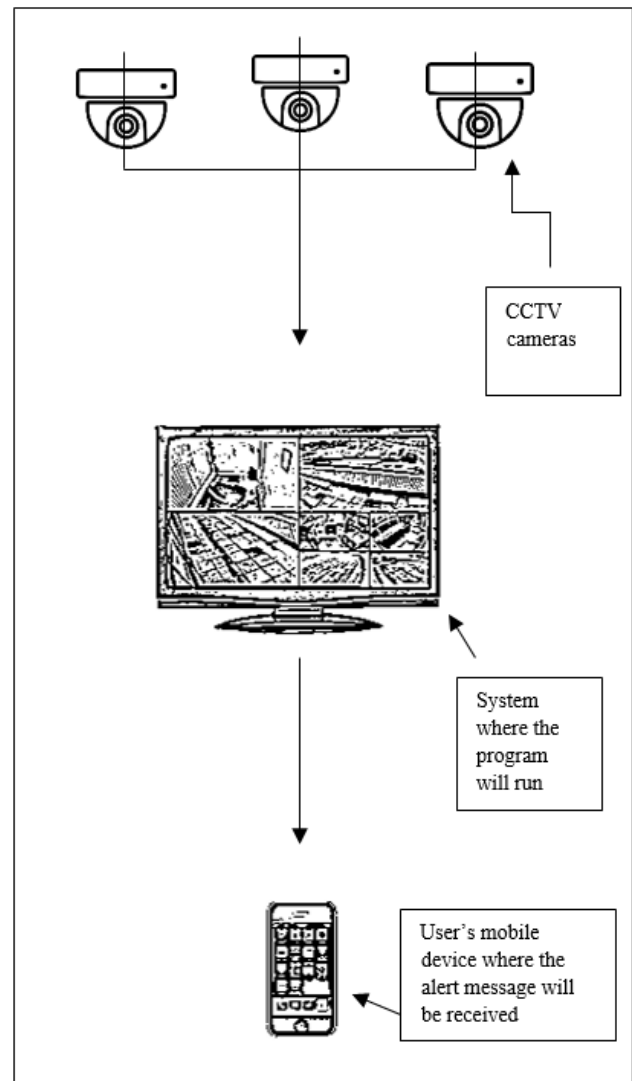
Let's now see how the system will actually works, consider an example where a thief enters in a diamond factory to steal diamond and the factory has a camera installed with our system included to monitor the activity. Then after the theft has enter the factory the algorithm detects the person, so the

intrusion is detected by using YOLOv3 detection algorithm. And when intrusion is detected, alert is raised by sending a message to owner.

## II. METHODS AND MATERIAL

The system will include a computer and an external CCTV camera which will be recording video continuously and also the algorithm will keep detecting the objects in the video and if the object is detected as person the system will alert the user using a messaging service which will keep alerting until the person opens the application and stop the alarm to reduce false alarming we are including set-time feature where you can set the time and days for which you need the alert service so that other time the system will not keep alerting reducing false and unnecessary alerting. As the system is very simple to setup and use, the user will just need the login credentials and camera plugged into the system and that is it will just be like regular camera management software with including more features of theft and detection and alert message with the help of machine learning.

As explained in the implementation plan to understand the system more clearly refer to the below figure:



**Figure 1: The system implementation plan**

The system includes webapp which developed in Python language using Django framework for backend and HTML, CSS for frontend where user have to create an account with the signup form provided if the user already has an account the user can login and will be redirected to homepage where the camera footage will be displayed along with other features. It takes real time video feed as input with the integrated OpenCV library in python.

### Django:

It is a popular web framework used in development of secure and maintainable websites and webapps. It is built in high-level Python language by many experienced developers. Django is open source and

free gaining a big community of active users with large documentation available.

#### **OpenCV:**

OpenCV is a cross-platform python library with the help of which real-time computer vision applications are developed. It mainly focuses on video capture and analysis including features image processing, face detection and object detection. But to achieve faster and accurate detection we have implemented YOLOv3 algorithm along with the OpenCV.

#### **YOLOv3 Algorithm:**

It is a real-time object detection algorithm generally known a “You Only Look Once”, Version 3 that detects specific objects in videos, live feeds, or images. Deep convolutional neural network features help YOLO to detect an object. All versions of YOLO were created by Joseph Redmon and Ali Farhadi. It is a Convolutional Neural Network (CNN) to perform real-time object detection. CNNs can process input images as structured arrays of data and identify patterns between them as they are classifier-based systems. YOLO is much faster than other networks and still maintains accuracy. The model to look at the whole image at once, so its predictions are well-informed by the global context in the image. It “score” regions based on the resemblance to predefined classes. High-scoring regions are considered to be as probable detections of whatever class they most closely identify with.

There are several ways in which YOLO can be used, and you can make use of sub processes to integrate it with Python scripts, but OpenCV has done a great job integrating it with their system. This is the way we have used in our project i.e., ‘dnn.net’ package by which we have implemented YOLOv3.

After the detection on theft in the surveillance area it will alert the user on the phone via text message and an email message with the help of API. We are using a SMS service provider named Fast2SMS.com.

#### **API:**

API (Application Programming Interface) is a set of operations that enable programs to interface with external software components, operating systems, or microservices. To put it another way, an API sends a user's response to a system and then receives the system's response. The "JSON" programming language is used to carry out this communication. We are using API to in cooperate Fast2SMS.com service in this project for alert messages.

#### **Fast2SMS.com:**

Fast2SMS is a company which provides bulk messaging services. Fast2SMS system delivers millions of SMS at a time. The system has multiple SMS routes in which they distribute SMS load so that delivery will be quick. Besides providing such quality and professional service, Fast2SMS is also the cheapest SMS provider in Indian SMS industry. And that is why we have chosen them for our project.

### **III. RESULTS & DISCUSSION**

With the help of above-mentioned components and features the designed system will be able to detect theft in the live video footage which in terms will be like CCTV management software with the detection feature making it smart than the available software.

As it will detect the theft in the footage and alert the user with the text message and email message but it will also save the footage only whenever the theft or the intruder is in the footage which will be useful for memory optimization and be able to stored large amount of footage and avoid wasting memory on the unnecessary video footage which cannot be useful in anyway. So, it can be used for training of the model to increase the efficiency and accuracy of the model to improve the performance of the project. As it does not need sensors or any other expensive components making it very cost efficient and easy to use and maintain. This system can be used in banks, residential areas, commercial areas and any region

where the surveillance is needed. Also, further advancements and expansion in features will this system applicable in many different areas. With the of large data collected over the use the system and algorithm can be more precise and faster and can also be included with the features like ROI (Region of Interest) and behavioural analysis etc., and the system is implemented in the form of webapp as it could be deployed on cloud can run virtually and with the help of Ip cameras it can be accessed directly on mobile devices without actually having a computer. In future can also be implemented in Children Day-care centres for children's safety without human being present there physically.

#### IV. CONCLUSION

Except from traditional CCTV camera software this system will make the cameras not only just record and store video but will inform the owner in case of any intervention which will help to make more secure and faster action taking against the theft which will make improved, efficient and more reliable solution for surveillance activities.

#### V. REFERENCES

- [1]. H. Jain, A. Vikram, Mohana, A. Kashyap and A. Jain, "Weapon Detection using Artificial Intelligence and Deep Learning for Security Applications," 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), 2020, pp. 193-198,
- [2]. H. Gong, H. Li, K. Xu and Y. Zhang, "Object Detection Based on Improved YOLOv3-tiny," 2019 Chinese Automation Congress (CAC), 2019, pp. 3240-3245, doi:10.1109/CAC48633.2019.8996750.
- [3]. E. Alajrami, H. Tabash, Y. Singer and M. -. E. Astal, "On using AI-Based Human Identification in Improving Surveillance System Efficiency," 2019 International Conference on Promising Electronic Technologies (ICPET), 2019, pp. 91-95, Doi: 10.1109/ICPET.2019.00024.
- [4]. <https://pjreddie.com/darknet/yolo>
- [5]. <https://www.fast2sms.com>