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Detecting Crime Scenes using ML

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Abstract – *The system that we have developed detects the crimes happening in real world. This system helps to avoid crimes and reduce them. Through face detection, object detection (gun, knife etc.), fire detection; the crimes can be detected. The deep learning paradigm has been recently applied for the first time to this task too, in the form of a 3D Convolutional Neural Network that processes the whole video sequence as input. So, basically the whole video will be an input to the system and the crimes will be detected and the alarm will be generated.*

Key Words: **crime detection, face detection, Convolutional neural network, machine learning, object detection**

1. INTRODUCTION

In recent years, the task of human action recognition from video has been tackled with computer vision and machine learning techniques, Experimental results have been obtained for recognition of actions such as walking, jogging, pointing or hand waving. Face detection and recognition from an image or a video is a popular topic in biometric research. Face recognition technology has widely attracted attention due to its enormous application value and market potential such as real time video surveillance system. It is widely acknowledged that the face recognition has played important role in surveillance system as it doesn't need object co-operation. Using real-time object detection to improve surveillance methods is a promising application of Convolution Neural Networks (CNNs). One particular application is a detection of hand-held weapons (such as pistols and rifles). Thus far previous work has mostly focused on weapon based detection within infrared data for concealed weapons. By contrast, we are particularly interested in the rapid detection ad identification of weapons from image and surveillance data. Also in this work we investigate the automatic detection of fire pixel regions in video imagery within real time bounds without reliance of temporal scene information.

Also, this type of systems must be very efficient because there is generally a large number of surveillance cameras which must be processed. Similarly, there is increasing demand for automated rating and tagging systems that can process large amounts of videos uploaded to websites. Since smart- phones are often used to record beatings, efficient mobile implementations are desired too.

1.1 MOTIVATION

The role of computers has been increased in all walks of life. In recent years police forces have been enhancing their traditional method of crime reporting with new technological advancements to increase their output by efficiently recording crimes to aid their investigation.

Human reasoning fails when presented with millions of records. Therefore, there is clearly a requirement for a tool kit to assist in analyzing the data which will make the best use of limited resources.

The aim of this study is to examine the current techniques used in crime prediction. Using real-time object detection to improve surveillance methods is a promising application of Convolutional Neural Networks.

- The objective of our project is to overcome limitations in human security.
- Normal and Abnormal Event classification in video sequence.
- Automation of these tasks in video surveillance.
- Once you recognize a violent situation, the assigned authority will be resolving the problems and take appropriate actions.

1.2 PROBLEM DEFINITION

Artificial Intelligence (AI) is proving its powers to prevent and detect everything gripping them from routine employee theft, frauds, insider trading and business risks. Many large corporations, business enterprises have been employing AI to detect and prevent money laundering and widespread frauds. Machine learning has been increasingly deployed by social media platforms to block illicit content such as child pornography and fake news. Businesses have been using AI for higher risk management and responsive fraud detection towards prevention and prediction of crimes.

The earlier monitoring systems used by the industries need manual interference and are often not cent percent accurate. For instance, banks have been using transaction monitoring systems for years which are based on predefined binary rules that had to be manually checked involving time and inaccuracy. On average, only 2 percent of the transactions flagged by the software indicated true crime or malicious intent through manual checking. On the contrary, the modern machine-learning solutions use predictive rules that point out anomalies in datasets. These advanced algorithms

successfully have decreased the number of false alerts by filtering out cases flagged incorrectly, while adding others missed using conventional rules.

2. LITERATURE SURVEY

In this section we have given the summary of the research papers.

2.1 A DEEP LEARNING APPROACH FOR FACE DETECTION USING YOLO

This paper gives the knowledge about deep learning which is nowadays considered as a new era of machine learning which trains the computers in finding the pattern from a huge amount of data. It mainly describes the learning at multiple levels of representation which helps to make sense on the data consisting of sound, text and images. Many organizations are using a type of deep learning known as a convolutional neural network to deal with the objects in a video sequence. Deep Convolution Neural Networks (CNNs) have proved to be impressive in terms of performance for detecting the objects, classification of images, etc. Object detection is defined as a combination of classification and localization. Face detection is one of the most challenging problems of pattern recognition. Various face related applications like face verification, facial recognition, clustering of face etc. are a part of face detection. Effective training needs to be carried out for detection and recognition. The accuracy in face detection using the traditional approach did not yield a good result. This paper focuses on improving the accuracy of detecting the face using the model of deep learning. YOLO (You only look once), a popular deep learning library is used to implement the proposed work as shown in Fig-1. This paper compares the accuracy of detecting the face in an efficient manner with respect to the traditional approach. The proposed model uses the convolutional neural network as an approach of deep learning for detecting faces from videos. [1]

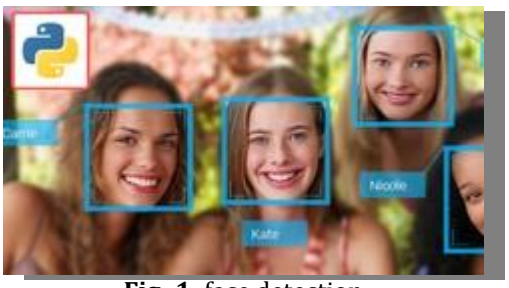

Fig -1: face detection

2.2 DEVELOPING A REAL-TIME GUN, KNIFE DETECTION CLASSIFIER ABSTRACT:

In this paper we learned Today, Closed Circuit Television (CCTV) is used as monitoring and surveillance tool for fighting crimes. The aim of CCTV is to reduce the crime and social offence by monitoring the scene under surveillance. Its use varies from user to user. For example, CCTV is being used in street surveillance for monitoring various activities like finding missing person, identifying anti-social behavior, drug misuse etc1. It is being also used for capturing evidence of crime and presenting evidences to courts for prosecution. A CCTV involves the use of an unmanned and remotely mounted camera and an operator. A CCTV camera captures the video and transmits it to the television screen of base station that is monitored by the operator to detect suspicious activity or to capture evidences, but the detection of suspicious activity is proportional to the operator attention on each video feed of screen. So, it is not possible for a CCTV operator to effectively monitor each activity of video feeds all the time with complete attention due to low operator to screen ratio, concurrent run of multiple video feeds at same screen2 and environmental condition of operational room. There is a possibility for them to miss the detection of some abnormal activity. According to Velastinetal.16, A CCTV operator suffers from video blindness after 20 to 40 minutes of active monitoring due to which he is not able to recognize objects in video feeds. According to a study published in Security Oz Magazine17 an operator will often miss up to 45 of screen activity after 12 minutes of continuous monitoring and this miss rate increase up to 95 after. 22 minutes. So, to make the CCTV monitoring and surveillance efficient, there is a need to automate the detection of suspicious activity in video material which in turn reduces the operator overload. The automated system will raise an alarm if any abnormal activity like gun or knife as shown in fig 2 & fig 3 , takes place under CCTV surveillance, due to which the operator will allocate his attention on video feed and will take appropriate action. [2]

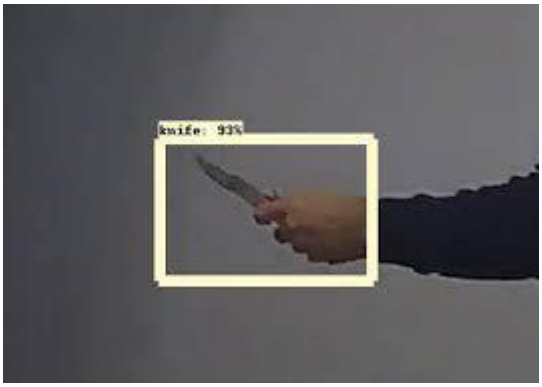

Fig -2: knife detection

Fig -3: gun detection

2.3 EXPERIMENTALLY DEFINED CONVOLUTIONAL NEURAL NETWORK ARCHITECTURE VARIANTS FOR NON-TEMPORAL REAL TIME FIRE-DETECTION.

In this paper we learned how to automatically detect the fire pixel regions in video (or still) imagery within real-time bounds without reliance on temporal scene information. As an extension to prior work in the field, they have considered the performance of experimentally defined, reduced complexity deep CNN architectures for this task. Unwanted fire causes many disasters. Thus, fire detection (as shown in fig- 4) has been an important phenomenon to save human life. Fires are one of the main causes of death amongst the world. In this paper we learned how the detection can be done by using computer vision and image processing techniques to detect fire flames based on studying the fire properties besides an alarm notification system. In this paper we learned how using CNN, fire detection is done. [3]

Fig -4: fire detection

2.4 CAPTURING THE RELATIVE DISTRIBUTION OF FEATURES FOR ACTION RECOGNITION

This paper presents an approach to the categorization of spatiotemporal activity in video, which is based solely on the relative distribution of feature points.

Human action recognition has gained significant attention in the field of computer vision. The ability to automatically recognize actions is important because of potential applications in video indexing and search, activity monitoring for surveillance, and assisted living purposes. [4]

3. METHODOLOGY

Our project consists of three modules namely face detection, fire detection and gun/knife detection. So this project is mainly used for detecting crimes. Firstly, Image Will be captured from webcam or any IP Cam. In database, certain images will be stored. The image captured by webcam will be matched with the image in database if match found, it will send screenshot along with the name of person that is stored in database. If the information of person is not stored in database, it will only send the screenshot of that image to the admin. Image processing mechanism is used for processing. It will also detect person in the video. It will divide video in number of images and will match with each different image. And lastly generate an alarm to the admin. The working is shown in fig- 5.

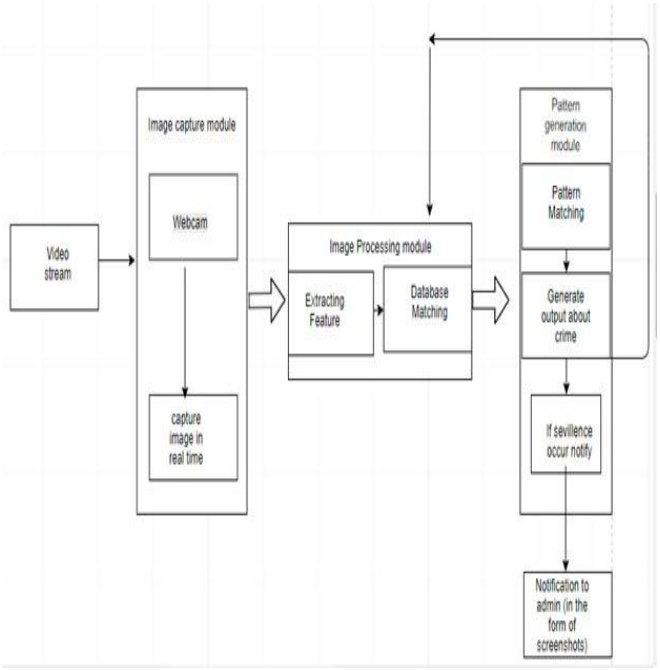

Fig -5: system architecture

4. CONCLUSION

This proposed, a technique for abnormal event detection based in a video surveillance system. The proposed method pretrains deep spatiotemporal networks over unrelated dataset and shows promising capability in abnormal event

detection of small sample problem. This project is focused on developing a surveillance system that detects face, object and fire and responds speedily by capturing an image and relaying it to an administrator device through the internet platform. It will be analyzed video input and apply different image processing techniques on it. After analysis of video stream it will use different Algorithm and techniques to detect any anomaly within surveillance system and notify to the admin through an alarm and the required actions will be taken by the authority.

5. REFERENCES

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