

Identification of Different Objects in Videos Using Yolo Detector

G.Divya¹, SP. Chokkalingam²

¹Research Scholar, ²Professor, Department of Computer Science and Engineering,
Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai
¹mailtodivya16@gmail.com, ²cho_mas@yahoo.com,

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Abstract

Surveillance camera is widely used in cities to provide safety of the public, Crime investigation, etc. It is highly impractical to monitor entire video to detect particular incident which increases time and manpower. Objects like human, vehicles, animals are detected automatically in streaming video using Convolutional Neural Network. Convolutional Neural Network is deep learning based technique Deep learning technique is highly recognized in numerous applications in a higher and crucial level is due to its accuracy. This techniques efficiency in electronics helps reaching user expectations. As a result of applying CNN approach it reduces time in search of specific event and gives high accuracy of detection. In this work, comparative study of various detection frameworks like YOLO, SSD, and RNN of tensor flow API. YOLO detector gives accuracy of 85% and reduces time.

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1. Introduction

Video analytics plays tremendous growth in the field of artificial intelligence. In modern cities, CCTV (Closed Circuit Television Camera) is deployed in the public environments such as Railway stations, Airlines, Shopping Malls, Military sectors to protect the safety of people. Surveillance Camera is widely used in detection of crime for investigation case like chain snatching, Murders, Robbery etc. Analyzing the online surveillance video in terms of face recognition of human, detecting abnormal events and behavior is emerging research topic. It is tedious process to find abnormal behavior or event on thousands of cameras were used for monitoring in various fields such as Hospital, schools, Ministries, Public transport etc. It produces an enormous quantity of knowledge on every day. Researchers are urged to develop intelligent systems to expeditiously extract information from large volume of recorded data.

This paper focuses on identifying the abnormal human behavior activities in motion video using Convolutional Neural Networks. Detection of abnormal behavior can prevent crimes like robbery, murder chain snatching etc. It can save time to search the relevant key frames from the video for investigation of crime cases. Convolutional Neural Network outperforms with image analysis than traditional machine learning algorithm

related to time and cost effective. Figure 1 shows CNN consists of multi-layered primarily based neural network wherever there's vast variety of connections between neurons [1].

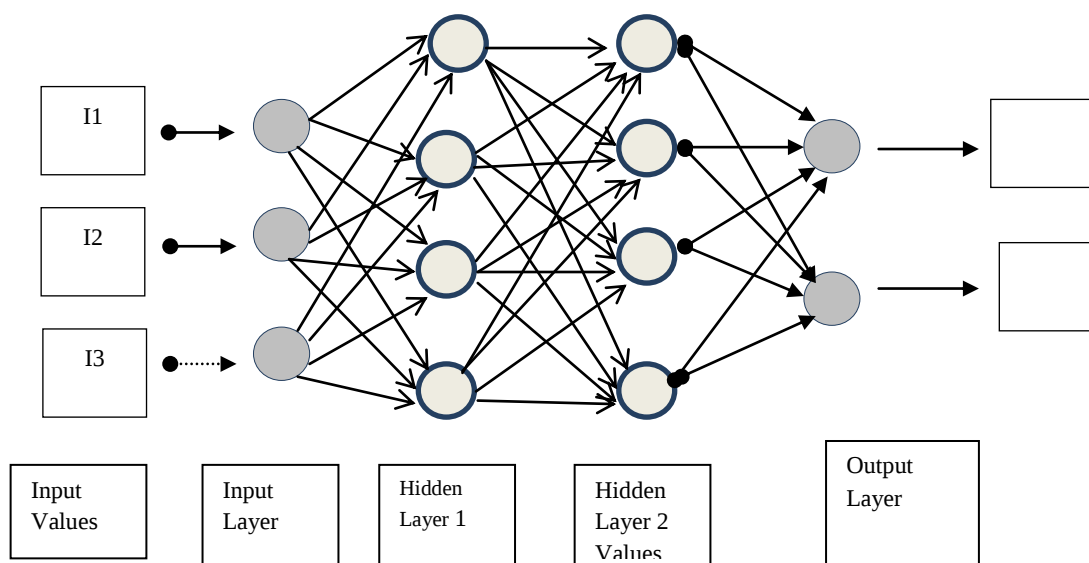


Figure 1: Convolutional Neural Network Architecture

CNN is a self-learning model where the network is trained using a huge volume of image dataset and their weights. The network identifies the input during the testing phase and gives respective classified output.

This model helps to introduce intelligent system to detect abnormal behavior between close interactions with people from multiple images using classifier.

2. Related Works

Previous studies on video intelligent system on face detection using skin color ratio and local binary pattern proposed by Pengfei et al. He has applied multi-frame detection algorithm on 138 video samples collected from indoor or outdoor surveillances cameras used to validate concealed face in sequence of frames take from the video. Liang Tain et al constructed block level background modeling for efficient video encoding in smart cities apart from this he focused on storage using SRDO approach. With rapid development of surveillance data, Traditional approaches declines the performance compared to big data analytics, Tirthraj et al analyze the data and organized the data in the form of clusters. Artificial neural network used to predict the crime patterns on that clusters.

Detection of abnormal behavior in surveillance using control charts. Stefan Hommes tested with online stream video to detect abnormal behavior and statically control to identify action pattern. OpenCV (Open Computer Vision) is package in python to trace the object using Haar-like features. PETS-2009 data sets were tested on that algorithms yields 80% Of precision. XiminCai et al examined abnormal behavior of person using examination surveillance system with a farnes back algorithm and compare the performance with various algorithm as shown in the given table.

Table 1: Performance of Different Methods

methods Accuracy	82%
Motion blob[4]	86%
Template matching[5]	84%
Skin+SVM[7]	84%
Using CNN	89.8% 86.5% 83.2%

Some of the research projects used thermal cameras for surveillance monitoring. Author in [13] explained that the sensitivity and resolution of the videos are low than the other videos. Author also stated that, thermal videos are noisy and the video quality is low. Author in [14] stated that feature extraction is a process to extract motion as well as spatial information from the video frames. Author in [15] presented that, the low level and high-level features are highly integrated together for abnormal activities inference. It helps the programmer to identify the abnormal activities speedily and for any complex behaviors in the video.

3. Object Detection

In this paper, Tensor flow object detection API was tested for detecting persons in chain snatching video. YOLO method is used to classify the different types of object in streaming video. Figure 2 shows network to detect objects using tensor flow. YOLO method give high accuracy rate to detect even smaller object in the video compared to SSD method. Tensor Flow object detection open source framework to train and deploy the new model with existing model.

With the wired or wireless CCTV cameras in the application. If it is wired connection then the video file automatically stored in the PC, else the video is

transmitted to the corresponding PC with the help of an intermediate device like router. Some of the assumptions are made in this paper, where it helps to understand the entire process very clearly.

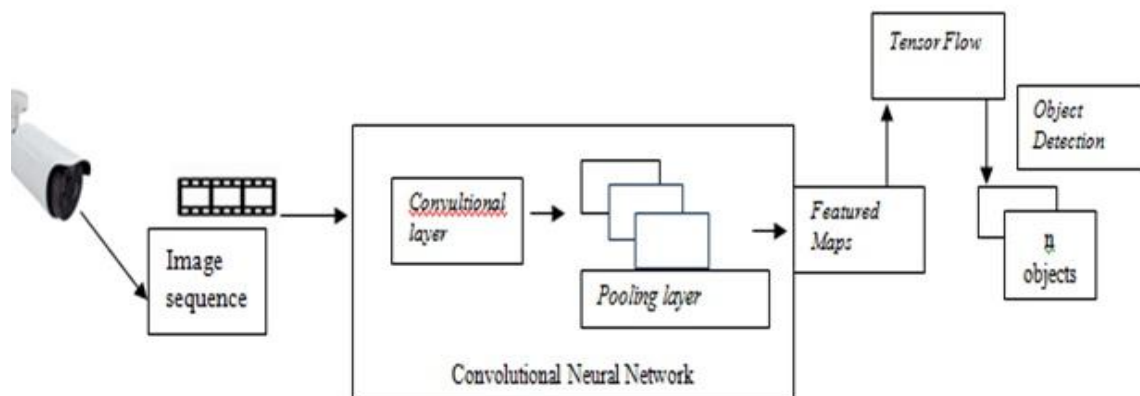


Figure 2: A System Block Diagram to detect object detection using YOLO Model

4. Results and Discussion

Snatch 1.0: Dataset Description. The video in this data set are low resolution in surveillance setups. Detecting events of interest such as tracing the person is challenging task because camera is very far, when the event is occurred. Chain snatching is the incident occurs very frequently, we obtained 35 chain snatch incident occurs from archived video footage of six month from different places in the

city of Hyderabad, India. 37485 regular interactions occurs in the overall duration of video, only 4-5 seconds where theft occurs, so surveillance footage was divided in to 10 – seconds clips which resulted overall of 816 clips. The below figure sequence of clips shows that detection of abnormal activity using tensor flow object detection API.



Figure A-Person 1 is walking

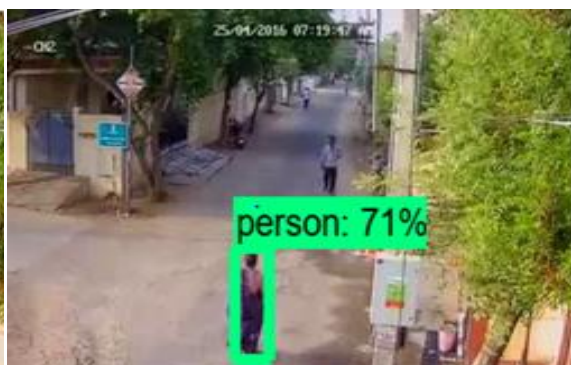


Figure B-Person 1 and Person 2 are colliding



Figure C-Person 2 is running



Figure D-High Accuracy of Detection



Figure-E Prediction of Abnormal activity

Figure 3 shows that comparison of various frameworks related to speed and accuracy of the detection in streaming video. YOLO network outperform than SSD and RNN model.

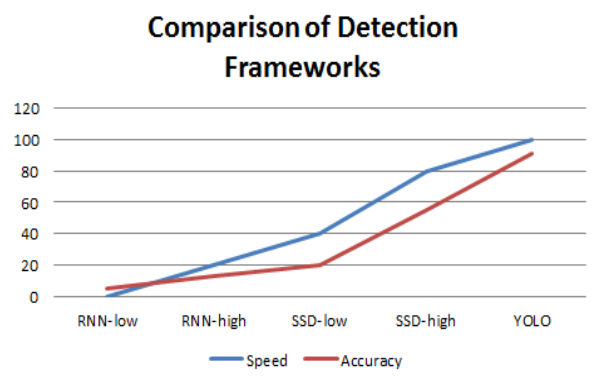


Figure 3: Comparisons of Frameworks

5. Conclusion

In this study, a tensor flow object detection method is used to detect object like human, car, etc. This can be applied to smart video surveillance System. The main feature of this study involves assuming that human behavior is composed of a sequence of static postures, and their temporal relationship contributes to the recognition of human behavior. To improve the efficiency of pattern recognition, a deep learning model is applied to detect real time objects. YOLO network out performs well compared to other networks. It detects and discriminates human subjects in a video.

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