

# DEEP LEARNING BASED MISSING OBJECT DETECTION AND PERSON IDENTIFICATION AND APPLICATION FOR SMART CCTV

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## ABSTRACT

*Security and protection are the most crucial concerns in today's quickly developing world. Deep Learning methods and computer vision assist in resolving both problems. One of the computer vision subtasks that allows us to recognise things is object detection. Videos are a source that is taken into account for detection, and image processing technology helps to increase the effectiveness of state-of-the-art techniques. With all of these technologies, CCTV is recognised as a key element. Using a deep convolutional neural network, we accept CCTV data in real time in this article. The main objective is to make content the centre of things. Using the YOLO technique, we were able to detect the missing item with an improvement of 10% sparsity over the current state-of-the-art algorithm in the context of surveillance systems, where object detection is a crucial step. It can be utilised to take immediate additional action.*

## KEYWORDS

*Deep Learning, Object Detection, Computer vision*

## 1. INTRODUCTION

The method of object detection involves comprehending the entire image, concentrating on proper categorization while focusing on the item in the image. This process is a subtask of computer vision, which also covers face detection and skeleton identification by Zhao, Zheng, Xu, and Wu (2019), Felzenszwalb, Girshick, Mcallester, and Ramanan (2010), Sung and Poggio (1998), Dollár, Wojek, Schiele, and Perona (2011) and Sampat and Bovik (2003). The development of computational models that offer the most fundamental data required by computer vision applications is the aim of object detection. An industrial revolution changes the face of the computer vision task where identification, surveillance, medical, robotics, self-driving cars can be part of it. In recent era advancement in deep learning accelerated the object detection task. A specific form of machine learning called "deep learning" (DL) uses neural networks to learn in phases. It can therefore mimic human thought. Video analytics is closely related with the deep learning which provides application in different fields. Traditional Object detection is complex in complexity and low level features are also leads to saturation to increased complexities (Zhao et al., 2019).

Image classification and detection are the steps for the detection of object for surveillance. Primary task for both the operation to receive the relevant features. Deep Learning is the better solution for it. It learns from previous stages and extracts new features. Deep Network may conventional neural network or Multilayer Perceptron networks which consist of activation functions and various hidden layers. Image is extracted from the video with fixed size as neural network required for model (Sung and Poggio, 1998). If fully integrated networks are necessary. However, size reduction results in information loss inside the image, reducing accuracy, precision, and sparsity as well as applicability for surveillance system (Zhao et al., 2019). Viola-Jones Detector (Viola and Jones, 2001) and HOG Detector (Dalal and Triggs, 2005) are two examples of conventional object detection algorithms. One-stage and two-stage algorithms based on deep learning are the two main categories. The two-stage algorithms RCNN and SPPNet (Girshick, Donahue, Darrell, and Malik, 2013), (Liu, Anguelov, Erhan, Szegedy, Reed, Fu, and Berg, 2016), Fast RCNN and Faster RCNN (He, Zhang, Ren, and Sun, 2014), Mask R-CNN, Pyramid Networks/FPN (Girshick, 2015), and G-RCNN (Ren, He, Girshick, and Sun, 2015) propose object region utilising deep feature before classification. Without the region suggestion, one-stage algorithms like YOLO (Redmon, Divvala, Girshick, and Farhadi, 2016), SSD (Liu et al., 2016), RetinaNet (Girshick, 2015), YOLOv3, YOLOv4, etc. anticipate bounding boxes over the pictures.

In this paper we created application using CCTV will be helpful to understand whether any object is stolen from the area (room, cabin, etc.) and recognition of the person, thus helping to form the better security infrastructure. This system can be used at official workspaces where there is a crucial need for more secure surveillance than earlier. Analyses frames and find stolen objects by using structural similarities. A deep learning-based object recognition system coupled with YOLO for remote surveillance that can accurately and quickly identify the target inside video frames has been suggested. proposed system has the ability to send data to a localised remote server after automatically detecting a person or item. To detect and transmit the information, a thin coating of YOLO was utilised. We applied filters to the data to keep it clean.

## 2. LITERATURE REVIEW

Viola and Jones (2001) proposed a machine Learning based object detection which is popularly known as Viola-Jones Detector where they calculate new feature, learn by using AdaBoost and able to classify more complex features. Dalal and Triggs (2005) proposed HOG (Histograms of Oriented Gradient) object detection algorithm which uses dense overlapping grid gives which provides better results for person identification, reducing false positive rates with respect to Haar wavelet based detector. Forsyth (2014) Extended the above work and proposed the DPM model for object Detection. They

modify the SVM algorithm of data mining for the purpose object detection. It uses divide and conquire technology with the root filter and various part filters which make it Multi instance Learning algorithm. All above traditional methods have far surpassed many algorithm in term of accuracy.

Girshick et al. (2013) proposed RCNN object detection algorithm with mean average precision. As local Search combine with CNN it said to be RCNN. They Combine the CV and Deep Learning for better results as comparre to traditional Methods. He et al. (2014) proposed SPPNet model for object detection. It Detect the object by variriyng the image size. For that they changes the image size as most of object detection algorithms are used the standard size of 255\*255. Girshick (2015) proposed Fast RCNN detector, advanced verison of R-CNN and SPPNet. They suggested Dense boxex and and Parse preposal to acceleate process as it is costly process.

Ren et al. (2015) proposed Faster RCNN detector and target is too reduce the time of RCNN. Which is mostly presented as RPN as it uses more deep learning network. Redmon et al. (2016) proposed Feature Selection framewok inside convonet popularly know as FPN (Feature Pyramid Network) which is based on Faster RCNN with framework. They suggest multi scale problems with deep learning. Redmon et al. (2016) proposed most popolar and widely used algorithm you only looks one (YOLO) one stage detector using deep learning. Instead of consideration of whole image, it convert image in to region and simultaniously predict the bounding boxes and probability of each region. Also they train the loss function which helps model to detect the images. Further they improved to YOLOv3, YOLOv4.

### 3. METHODOLOGY

By observing the various literature, we apply the CNN with two layer architecture and different activation function and Filter. Identified Process is as follows.

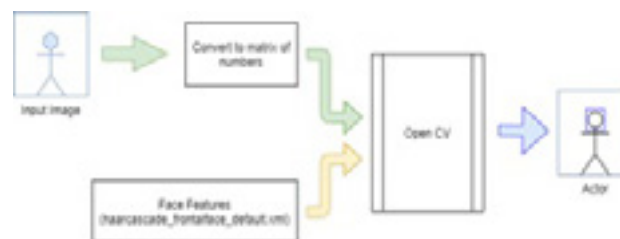


Fig 1: Feature Selection.



Fig 2: Flow of Process.

In this process we used real time data capture from CCTV and camera. The images which received which are filter using LBPS parameters. This helps process simpler. Then 2 layer deep neural network with Relu activation functions.

## 4. RESULTS

Step1: Collection of images: We accept the images from CCTV camera and then we create the slices as shown in bellow figure. Which store in specific folder with less size.

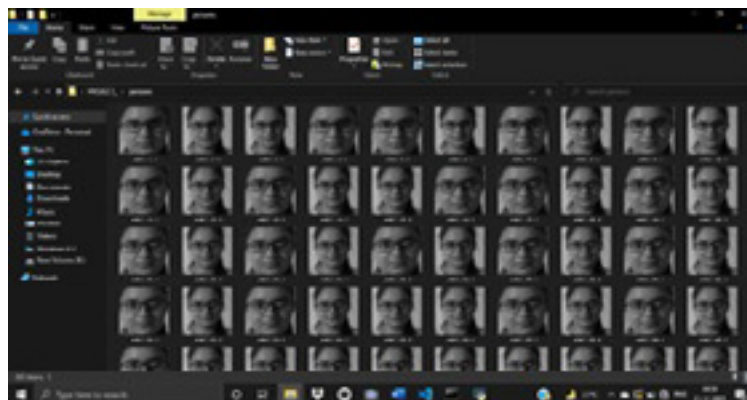


Fig 3: Extraction of images of one frame.

Step2: Extraction of features using specific one layer deep neural Network. The Features are selected as core point of the real time flowing image.

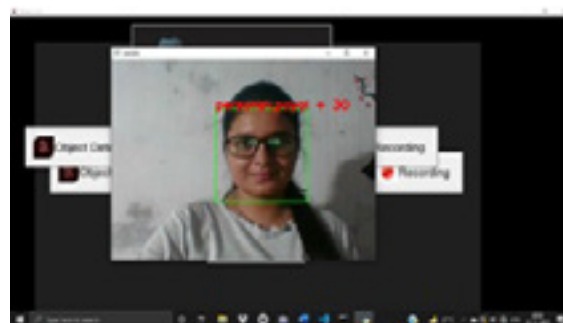


Fig 4: Feature Selection

Step3: identification of images using second deep layer where we can identified the images. Following figure demonstrate the detection of images.

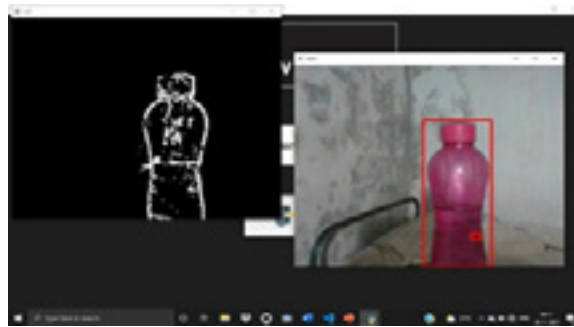


Fig 5: Detection of images.

## 5. DISCUSSION

The System Developed is shown below:



Fig 6: System GUI.

It is application which having Portable CCTV with some in-built night vision capability. In That by using CNN we adding deep learning if having high power device. It consist of feature such as Deadly weapon detection, Accident detection, Fire Detection, much more.. Working of standalone device. As shown in following figure

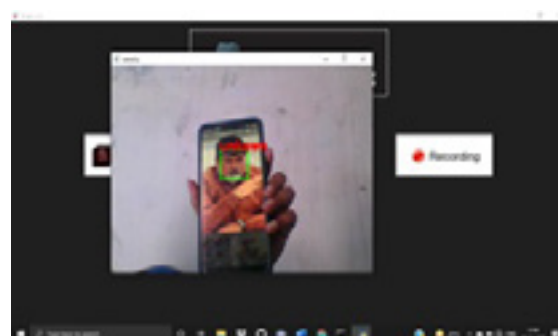


Fig 7: Object Detection.

## 6. CONCLUSION AND FUTURE SCOPE

In this paper we used two layer deep networks for the object Detection. Using architecture we are able to chive accuracy up to 90%. CNN level are provided the features which helps to make the fast detection of object. In This study it is observed that reduction of image sizes helps to train the networks more faster and deep network can also provide the essentials features. As we implement this

study for security purposed we able to detect object and provide suitable alarm messages.as a Future scope we can used high end camera and test the accuracy and speed.

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