Object Detection App Using Machine Learning

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ABSTRACT - Human activities can be monitored in public places such as buses, railways, roads, banks, etc., to obviate malefaction through visual surveillance. Public spaces are perpetually being monitored and perspicaciously monitored by video, detected and alerted. In places where there is a peril of being glommed or shot, such as airports, train stations, and malls, our app can be utilized in surveillance. This application aims to detect objects with maximum precision. The application is built to recognise or detect some household objects like chair, table, bed, refrigerator, laptops etc and some on alfresco objects like cars, motorbikes, potted plants, people etc. The application will utilize a mobile phone camera to scan the circumventing in authentic time and take the frames from the perpetual video.

Keywords - Object, surveillance, mobile device, detection, image processing.

I.   INTRODUCTION

Detecting object is an opencv technique in which a software predicated system is utilized to detect or locate any item / object from the provided data source (video, image). In object detection it identifies the class of an object detected, which makes it more informative and alluring outputs can be visually perceived as equivalent. For detection of the particular object a square shape rectangle can be drawn around the object with the class name exhibiting on the top right corner of the frame. The boundary box's precision depends on the algorithm used while training the system. Sometimes it draws multiple boxes to find precision to detect an object.

Human activities can be monitored in public places such as buses, railways, roads, banks, etc., to obviate malefaction through visual surveillance. Public spaces are perpetually being monitored and astutely monitored by video, detected and alerted. In places where there is a jeopardy of being purloined or shot, such as airports, train stations, and malls, our app can be utilized in surveillance.So by utilizing tensorFlow and Java ,we are developing an application that can detect objects in genuine time by utilizing mobile cameras.

II.   LITERATURE SURVEY

Ajeet Ram Pathaka et al.,[1] (2018), deep learning aims to copy the way the human brain analyses the data and make accurate predictions based on data provided. This paper throws light on wide applications of deep learning including computer vision to visualize and recognize the data provided in terms of images or patterns. Thus, deep learning paves way for computer vision.

Dr. Ganesh Khekare et al.,[2] (2019) this is an android based system which provides object detection for visually challenged users by identifying the objects around. It uses RGB color cameras and machine learning. This system builds

a detection system based on the SSD network and object classification based on MobileNets network.

Phalguni kadam et al.,[3] (2020), nowadays, video surveillance is utilized virtually everywhere for security. The traditional method of monitoring cameras requires constant human intervention. Utilizing deep Learning and Image Processing, the proposed work aims to eliminate time and effort wasted on monitoring video surveillance cameras. Soothsaying human demeanor is virtually infeasible. Deep Learning is utilized to detect suspicious and non-suspicious activity and to admonish the utilizer if any suspicious activity is detected. The proposed system strives for the detection of genuine-world suspicious activities such as burglaries, assaults, etc. in surveillance video.

Ajeet Ram Pathak et al.,[4] (2018), the ubiquitous and wide applications like scene understanding, video surveillance, robotics, and self-driving systems triggered vast research in the domain of computer vision in the most recent decade. Being the core of all these applications, visual recognition systems which encompass image classification, localization and detection have achieved great research momentum. Due to significant development in neural networks, especially deep learning, these visual recognition systems have attained remarkable performance. Object detection is one of these domains witnessing great success in computer vision. This paper demystifies the role of deep learning techniques based on convolutional neural networks for object detection. Deep learning frameworks and services available for object detection are also enunciated. Deep learning techniques for state-of-the-art object detection systems are assessed in this paper.

Sumitra A. Jakhete et al.,[5] (2019), vision is one of the most consequential senses that avail people interact with the genuine world. There are approximately 200 million blind people all over the world, and being visually impaired obstructs an abundance of day-to-day activities. Thus it is very obligatory for blind people to understand their circumventions, and to know what objects they interact with. This project proposes an android application to avail blind people visually perceive through handheld contrivances like a mobile phone. It integrates sundry techniques to build an opulent android application that will not only agnize objects around visually impaired people in authentic-time but will also give an audio output to avail them as expeditiously as possible. SSD

(Single Shot Detector) Algorithm is utilized for object apperception as well as detection. Additionally, this algorithm gives approximately precise results for authentic-time object detection and is proven to be more expeditious than other relative algorithms. The application further uses android TensorFlow APIs and android TextToSpeech API to give audio output.

This is an android-predicated system for visually challenged people. This system avails visually impaired people to identify circumventing things like a chair, table, phone, etc. utilized in their quotidian life. This system aims to obtain the image information of the circumventing environment through an RGB color camera and utilizes the deep learning method to identify the type and location of the object in front of the blind person, which allows the blind person to shop in the supermarket. This system is a buildup of an Android - TensorFlow interface to deploy an object relegation network on the Android phone. A voice promulgation function is integrated to the android terminal to feedback the perceived object to the blind person in authentic-time. This system has proven to be more efficient for visually challenged people

Priyal Jawale et al.,[6] (2020), in recent years, deep learning has been utilized in image relegation, object tracking, action apperception, and scene labeling. Traditionally, Image Processing techniques were habituated to solve any Computer Vision quandaries that occurred in an artificial perspicacity system. However, in genuine-time identification, image processing cannot be utilized. This is where Deep Learning concepts are applied. We built a simple ConvolutionalNeuralNetwork for object detection.The model is trained and multiple test cases are implemented in the TensorFlow environment so as to obtain precise results.

Diya Baldota et al.,[7] (2021), the world of innovation has prospered at an expeditious rate over the last decade with the ascension of more au fait and more current developments. With the employment of these more current advances, our lives need to be swifter. The expeditious advance of information and arranged innovation have advanced from the internet and mechanization frameworks that were initially utilized for regulatory workplaces and mechanical and commercial applications to the apparatus of these advances all over in life. The Cyber World has become progressively well kenned. Each family

has arranged a scope. Individuals commenced to seek a more auxiliary and superior living environment and commenced to ruminate the applying of portable contrivances, apps, and multifarious systems in natural checking, machine automation, perspicacious home, etc.

White paper et al., [8] (2018), this case study evaluates the competency of the TensorFlow* Object Detection API to solve an authentic-time quandary such as traffic light detection. The experiment utilizes the Microsoft Mundane Objects in Context (COCO) pre-trained model called Single Shot Multibox Detector MobileNet from the TensorFlow Zoo for transfer learning. Intel processor-predicated machines were utilized for the study. At the cessation of this experiment, we obtained a precise model that was able to identify the traffic signals at more than 90 percent precision

III. METHODOLOGY

In this android based realtime object detection app, one can easily detect objects at any place like bus stands, railway station, cinema halls, hospitals, parks, etc. This app uses tensorflow lite to display the bounding box around the detected object and show its class.

An object observation model is trained to detect the presence and placement of multiple categories of objects. As an example, a model could be trained with pictures that contain sundry items of fruit, alongside a label that designates the category of fruit they represent (e.g. an apple, a banana, or a strawberry), and information designating wherever every object seems within the image.

When a picture is later provided to the model, it'll output a listing of the objects it detects, the placement of a bounding box that contains every object, and a score that betokens the arrogance that detection was real. Below is the flowchart given for a detailed view.
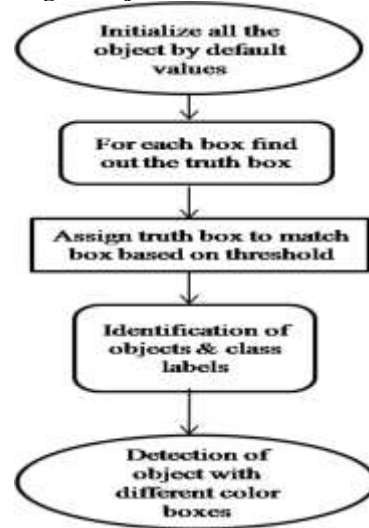

Fig. 1 Object Detection Process

Fig. 2 System Flowchart

This flowchart shows the steps of object detection,

- Firstly the image placed in front of the camera is captured and sent to the internal processing module for that will perform all the operation like background abstraction through feature extraction method, then segmentation of the image is performed, after that initializing of the object can be done on the substructure of its class present in the dataset utilized.

- Now after classifying the class of the input image the result is sent to the truth check module where the accuracy is measured on the basis of truth and false box theory made with coco dataset.

- Using the threshold value of the truth boxes the result is now compared with other similar truth boxes to find the accuracy of the class.

- After the comparison method the final result is shown with different objects detected in different color frames according to its class.

We have made use of tensorflow lite to train our model using COCO dataset to get more accuracy to our project. Tensorflow is an open source library specially designed to train modules on the basis of dataset provided. And the COCO dataset has a large amount of data for segmentation, object detection and labeling.

This project is made portable with the help of android technology as we are all dependent on

mobile phones today and also in future. The object detection process will be fun as we can carry it anytime anywhere and hence if any secret operation is going on no one can even imagine the detection process and it is very low cost which makes it reliable.
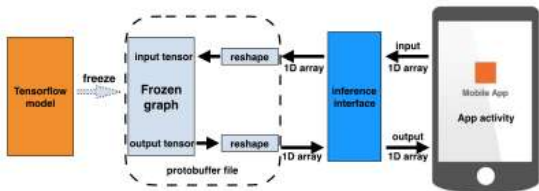

Fig. 2 Interfacing tensorflow with android app

IV. RESULT AND DISCUSSION

Fig. 3 Detection of book

Fig. 4 Bottle Detected

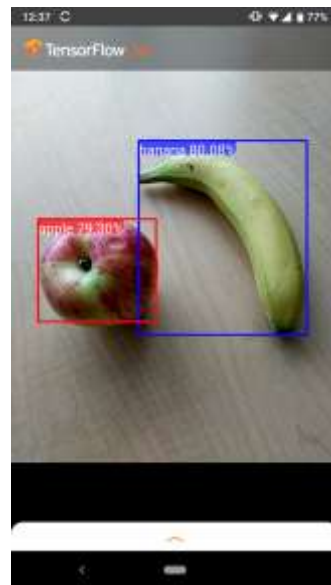**Fig. 5 Keyboard Detected**

Fig. 6 Fruit Detected

Fig. 7 Tie Detected

Fig. 8 Cup Detected

V. CONCLUSION

Almost all our daily work is done by mobile phones like making calls, sending sms, paying bills, shopping then why not surveillance can be done using the same. Keeping this in mind the object detection app is proposed where any object can be detected in a very simple way as it can be installed in any mobile phone and can be used as a secret object detection operation part. Tensorflow lite is helping in model training as well as making the detection possible with the help of opencv image processing method. COCO dataset is proving accuracy with the available data and labels of different classes. This android based application can be used by anyone and many features like voice command counting of the object can be done to update the system.

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