



# Real Time Object Detection And Tracking For Given Objects

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**Abstract**—In this project using python and OpenCV module we are detecting objects from videos webcam. This application consists a module such as 'Start Webcam Video Tracking'. Start Webcam Video Tracking: Using this module application connect itself with inbuilt system webcam and start video streaming, while streaming if application detect any object then it will surround that object with bounding boxes, while playing press 'q' to stop web cam streaming. To implement this project we are using object tracking algorithms from OpenCV python API.

**Keywords**—Convolutional Neural Networks, Object Detection and Tracking system, OpenCV.

## I. INTRODUCTION

Detecting an object when there is a lot of variation is extremely difficult. Background movement, partial and complete occlusions of complex-shaped objects, and varying degrees of illumination One of the most crucial applications for industries to ease the user, save time and achieve parallelism is object detection and localization in digital images. A more efficient and precise method of object detection is still needed in order to attain the desired result. The primary goal of computer vision research and study is to design a system that reduces human effort by showing the fundamental block diagram of detection and tracking by using a computer. Detection and tracking are implemented in a python environment using SSD and Mobile Nets-based techniques. Object detection is the process of identifying an object's specific area of interest in a certain type of image. Frame differencing, optical flow, and background subtraction are a few of the ways that can be used. With the use of a

camera, this is a way to track down and locate an object in motion. By extracting the properties of images and videos for security applications, detection and tracking methods are explained.

## II. LITERATURE SURVEY

In [1] Object Detection using OpenCV and Python, Ayushi Sharma, Jyotsna Pathak, Muskan Prakash, J N Singh, 2021. The paper has covered topics ranging from how artificial intelligence and machine learning algorithms help in object detection to how OpenCV is such a useful tool for beginners who wish to learn how real time object identification and tracking can be done. It also shows the flexibility of a tracking system to a moving camera, ideal for automotive safety applications. Image identification makes use of techniques like detection of an object, its recognition, and segmentation. The use of artificial intelligence and machine learning enhances the rate of processing the data and maintaining the standard of the outcome.

In [2] YOLO based Detection and Classification of Objects in videos, ArkaPrava Jana, Abhiraj Biswas, Mohana, 2018. YOLO(You Only Look Once) based detection and classification approach (YOLOv2) for improving the computation and processing speed and at the same time efficiently identify the objects in the video records. The classification algorithm creates a bounding box for every class of objects for which it is trained, and generates an annotation describing the particular class of object. The YOLO based detection and classification (YOLOv2) use of GPU (Graphics Processing Unit) to increase the computation speed and processes at 40 frames per second. In [3] Object Detection using OpenCV and Python, Ayushi Sharma; Jyotsna Pathak; Muskan Prakash; J N Singh, 2017. The project has covered topics ranging from how artificial intelligence and machine learning algorithms help in object detection to how OpenCV is such a useful tool for beginners who wish to learn how real time object identification and tracking can be done. It also shows the flexibility of a tracking system to a moving camera, ideal for automotive safety applications. Image identification makes use of techniques like detection of an object, its recognition, and segmentation. The use of artificial intelligence and machine learning enhances the rate of processing the data and

maintaining the standard of the outcome. Example, by using artificial intelligence, we can very easily complete difficult tasks.

### III. METHODOLOGY

**Existing System:** Many problems in computer vision were saturating on their accuracy before a decade. However, with the rise of deep learning techniques, the accuracy of these problems drastically improved. One of the major problem was that of image classification, which is defined as predicting the class of the image. A slightly complicated problem is that of image localization, where the image contains a single object and the system should predict the class of the location of the object in the image (a bounding box around the object). The more complicated problem (this project), of object detection involves both classification and localization. In this case, the input to the system will be a image, and the output will be a bounding box corresponding to all the objects in the image, along with the class of object in each box

**Proposed System:** We're detecting objects in movies and webcam images with Python and the OpenCV module in this project. "Start webcam video tracking" is the module included in this application. Allows the user to upload a video from his system and the application will begin to play that video; if the application detects any objects, those objects will be marked with bounding boxes. If the user wishes to stop tracking the video while it is playing, he or she can press the "q" key on their keyboard to do so. In order to use this module, the program must first connect to the built-in system webcam and begin streaming video; if the application detects an object during this process, the application Therefore the main objectives are:

- 1) To identify the targeted object in moving sequence.
- 2) To analyze YOLO based algorithm with GMM model to accuracy for feature extraction and classification.

will surround that object with bounding boxes. To stop the webcam streaming, simply hit 'q.'

Object tracking system aims to improve performance of object detection and tracking by contributing originally to two components:

- 1) Motion Segmentation.
- 2) Object Tracking.

**Kalman Filtering :** A very popular signal processing algorithm used to predict the location of a moving object based on prior motion information. One of the early applications of this algorithm was missile guidance! Also as mentioned here, "the on-board computer that guided the descent of the Apollo 11 lunar module to the moon had a Kalman filter".

**Meanshift and Camshift :** Single object trackers: In this class of trackers, the first frame is marked using a rectangle to indicate the location of the object we want to track. The object is then tracked in subsequent frames using the tracking algorithm. In most real life applications, these trackers are used in conjunction with an object detector. **Multiple object track finding algorithms:** In cases when we have a fast object detector, it makes sense to detect multiple objects in each frame and then run a track finding algorithm that identifies which rectangle in one frame corresponds to a rectangle in the next frame.

The aim of object detection is to detect all instances of objects from a known class, such as people, cars or faces in an image. Generally, only a small number of instances of the object are present in the image, but there is a very large number of possible locations and scales at which they can occur and that

need to somehow be explored. Each detection of the image is reported with some form of pose information. This is as simple as the location of the object, a location and scale, or get good the extent of the object defined in terms of a bounding box.

### IV. IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and its constraints on implementation, designing of methods to achieve changeover and evaluation of changeover method.

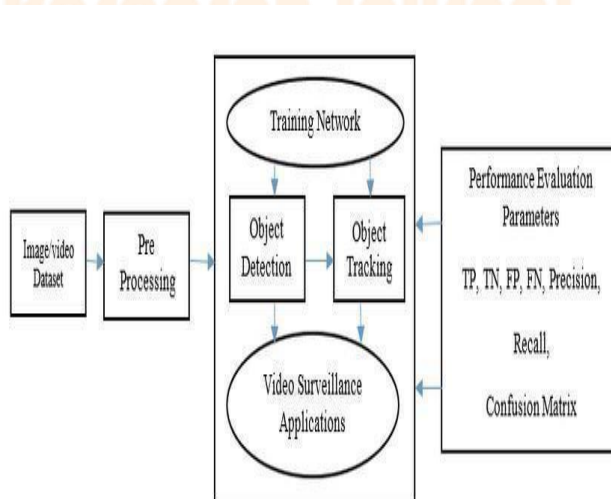
**Object Detection :**

Using this module application connect itself with inbuilt system webcam and start video streaming, while streaming if application detect any object then it will surround that object with bounding boxes, while playing press 'q' to stop webcam streaming. For object detection and tracking, you can use popular deep learning frameworks. Consider using pre-trained model SSD (Single Shot Multibox Detector) for object detection. For tracking, you might want to explore tracking algorithms like KLT (Kanade-Lucas-Tomasi) or use trackers integrated into deep learning frameworks. OpenCV, a computer vision library, provides various tools and algorithms for both detection and tracking. Combining a detection model with a tracking algorithm can enhance the robustness of your system.

**Software Requirements :**

Language: Python.

### V. ARCHITECTURE



OS: Windows 10 and above.

Hardware

Requirements :

Processor: Pentium IV or higher.

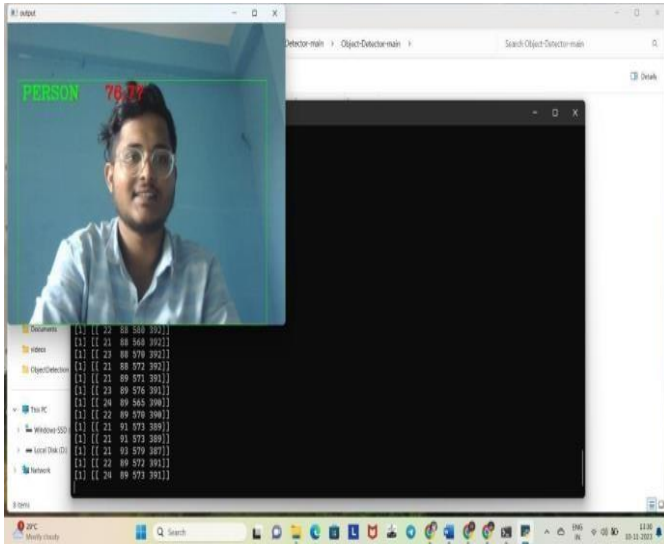
Ram:

256 MB.

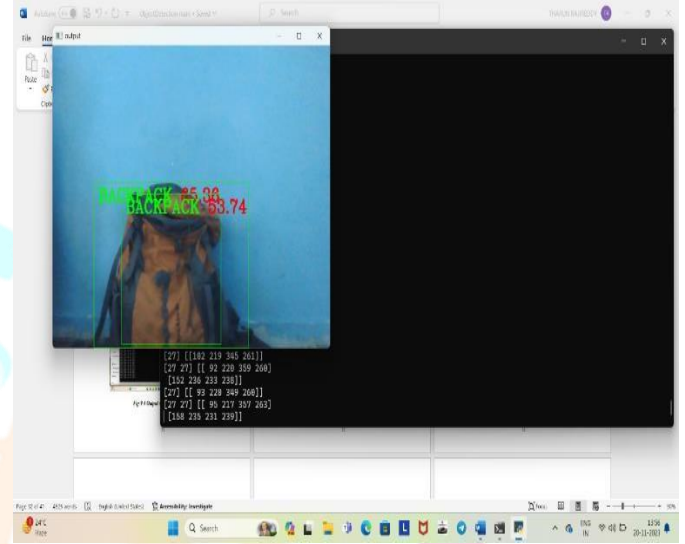
Space on Hard Disk: minimum 512M.

## VI. SYSTEM ANALYSIS

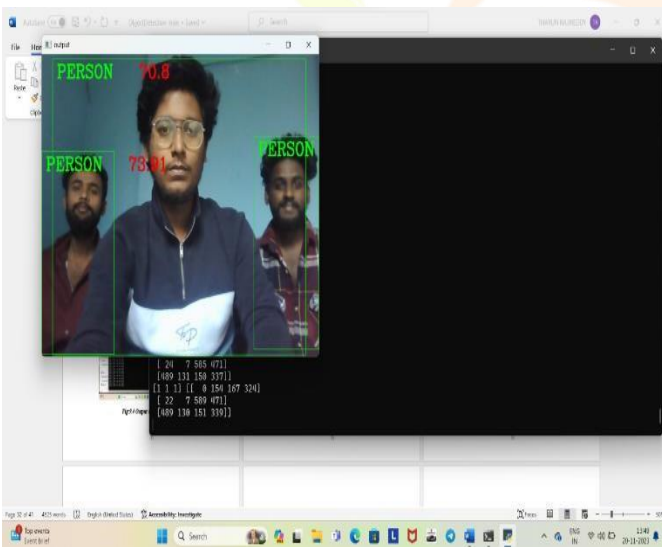
PERSON



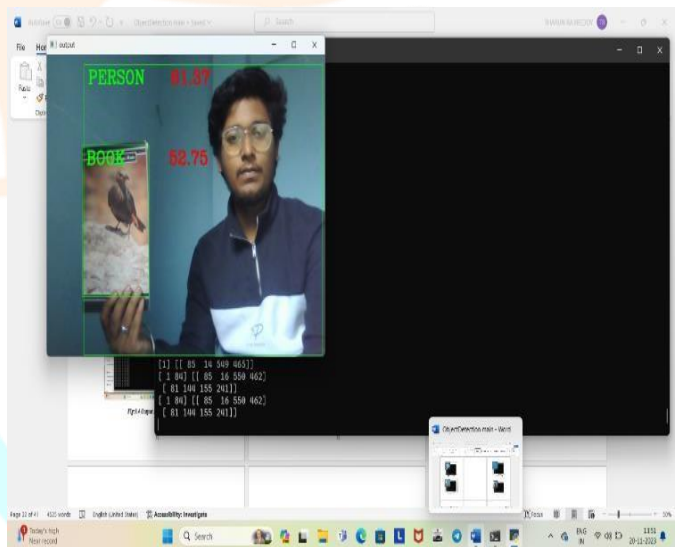
BACKPACK



MULTIPLE PERSONS



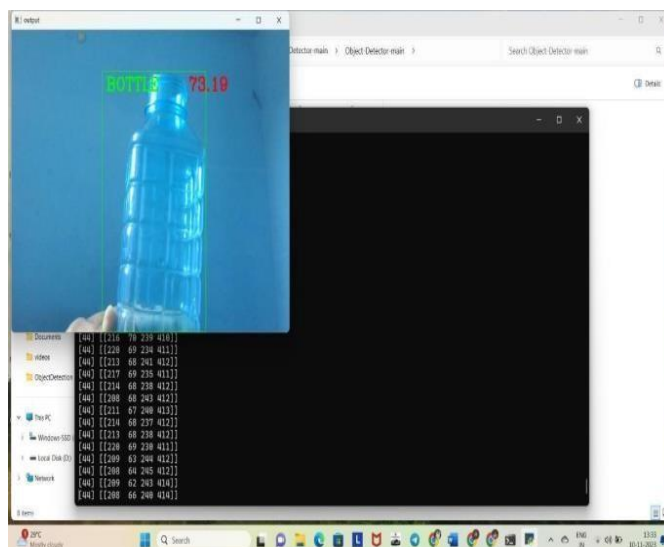
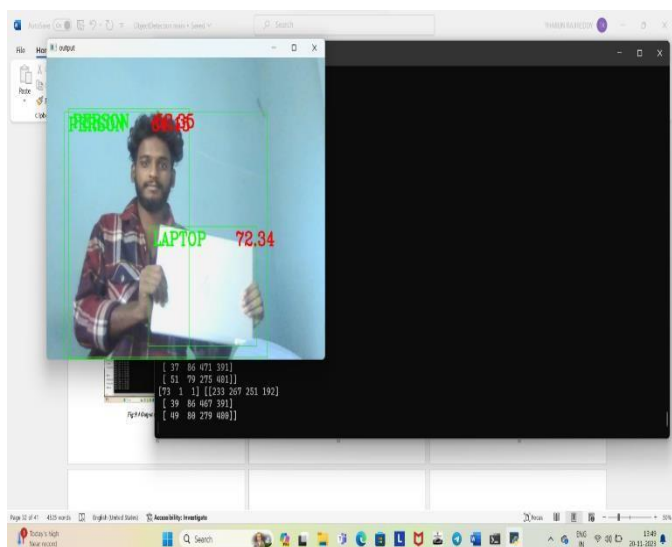
PERSON WITH BOOK



PERSON WITH LAPTOP

BOTTLE

Research Through Innovation



## VII. CONCLUSION

An accurate and efficient object detection system has been developed which achieves comparable metrics with the existing state-of-the-art system. This project uses recent techniques in the field of computer vision and deep learning. Although the visual tracking algorithm proposed here is robust in many of the conditions, it can be made more robust by eliminating some of the limitations as listed below: In the Single Visual tracking, the size of the template remains fixed for tracking. If the size of the object reduces with the time, the background becomes more dominant than the object being tracked. In this case the object may not be tracked. Fully occluded object cannot be tracked and considered as a new object in the next frame. To make the system fully automatic and also to overcome the above limitations, in future, multi-view tracking can be implemented using multiple cameras. Multi view tracking has the obvious advantage over single view tracking because of wide coverage range with different viewing angles for the objects to be tracked.

## VIII. REFERENCES

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