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Object Detection using Python

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Abstract — **Considering how closely object detection relates to video analysis and visual comprehension, it has received a lot of study interest lately. standard object detection the foundation of techniques is handcrafted details and shallow trainable architectures. By creating, they easily experience performance stagnation. Intricates ensembles that blend numerous lower-grade image characteristics with effective and noteworthy context from scene analysis and Object detection classifiers. Because deep learning is developing so quickly, more strong technologies that can learn high-level, semantic new features are added to solve the issues already present. In conventional buildings. These models exhibit various behavior network design, training methods, and optimization perform, etc.**

This paper is exploration of object detection frameworks based on deep learning . We have mentioned the history of deep learning and its tools i.e the Convolutional Neural Network aka CNN before our review . Again there is a concentration on object detection architectures that are generic with some changes to enhance its detection performance. There's also a brief overview salient item detection, face detection, etc. so as to get an idea of every possible characteristics as each detection exhibit different characteristics. Also have mentioned some scientific experimental studies to contrast different approaches so as to have insightful results. In order to improvise on future work in object identification and neural network based learning systems, many promising directions and tasks have been provided .

Keywords — Convolutional Neural Network, visual comprehension, etc.

I. INTRODUCTION

One should not only emphasize on categorizing various objects but as well attempt to precisely approximate the conceptions and positions of things present in each matrix of pixels in order to develop a thorough comprehension of images. The term "object detection" [1][S1] refers to this task, which typically consists of several smaller functions like "facial recognition" [2][S2], "Wayfarer identification" [3][S2," and "cadaver detection" [4][S3]. Object detection is a fundamental computer vision problem that is related to many applications, such as image categorization [5], [6], human behavior evaluation [7][S4], face detection [8][S5], and automatic driving assistant [9], [10]. It can provide valuable and insightful information for the definitive apprehension of images and videos. Additionally, as these domains advance, neural network algorithms will be developed, with the help of neural networks and similar techniques.

However, a Methodology/Experimental object localization task makes it challenging to completely complete object detection due to the wide range of angles, postures, occlusions and lighting conditions. In recent years, this field has drawn a lot of interest [15]. Identifying the location of items in a picture (object localization) and the category to which each object belongs is the definition of the object detection problem (object classification). Therefore, the three stages of the pipeline for classical object detection models are informative region selection, feature extraction, and classification.

II. LITERATURE REVIEW

Some of the research paper were reviewed deeply to make any possible betterment in our project. Those papers and their summarized points are as below:

1. Machine Learning for Object Labelling-
   Used two approaches to train the model i.e. first by feeding maximum images of each class and second by minimum but self-sufficient or higher entropy images of each class.
   Advantages:
   The second approach has reduced the time consumption in training the model .
   Disadvantages:
   Higher entropy images' use doesn't guarantee more precision.

2. Deep Learning based Intelligent Incremental Object detection and classification System-
   Proposed a new model in which v4 network is employed to extract the image features and SVM (support vector machine) are used to classify objects respectively to compare the effectiveness of our method.

Advantages:

Proposed a new alternative for SVM algorithm which becomes more and more efficient with more and more learning.

Disadvantages:

The SVM model has high accuracy than the accuracy of this model.

3. Indoor Localization System for Assistance of Visually Impaired People based on Image Processing:

Used RGB color space to allocate detectable objects to help blind users know about obstacles by speech conversation.

Advantages:

Proposed a model which is feasible alternative of MATLAB model which can't be afforded by all.

Disadvantages:

Since it uses RGB color space , it limits the multi-user facility .

4. Using Tensorflow's Object detection API for Guidepost Detection and Recogniton with new benchmark dataset-

We took help of TensorFlow's Object Detection API which is open library which is built by google that facilitates the creation, training and deployment of object detection models.

Advantages:

With the help of COCO dataset, results of the number of one-to-one overlapping traffic signs were actually better than the pre-trained model.

Disadvantages:

Some of the traffic signs were not detected due to small size and thus some of them were missing from the dataset.

5. Object Detection and Count of Objects in Image using Tensor Flow Object Detection API-

Designed a model by using Faster R-CNN that considers detection of threatening objects in an image using Object Detection API .

Advantages:

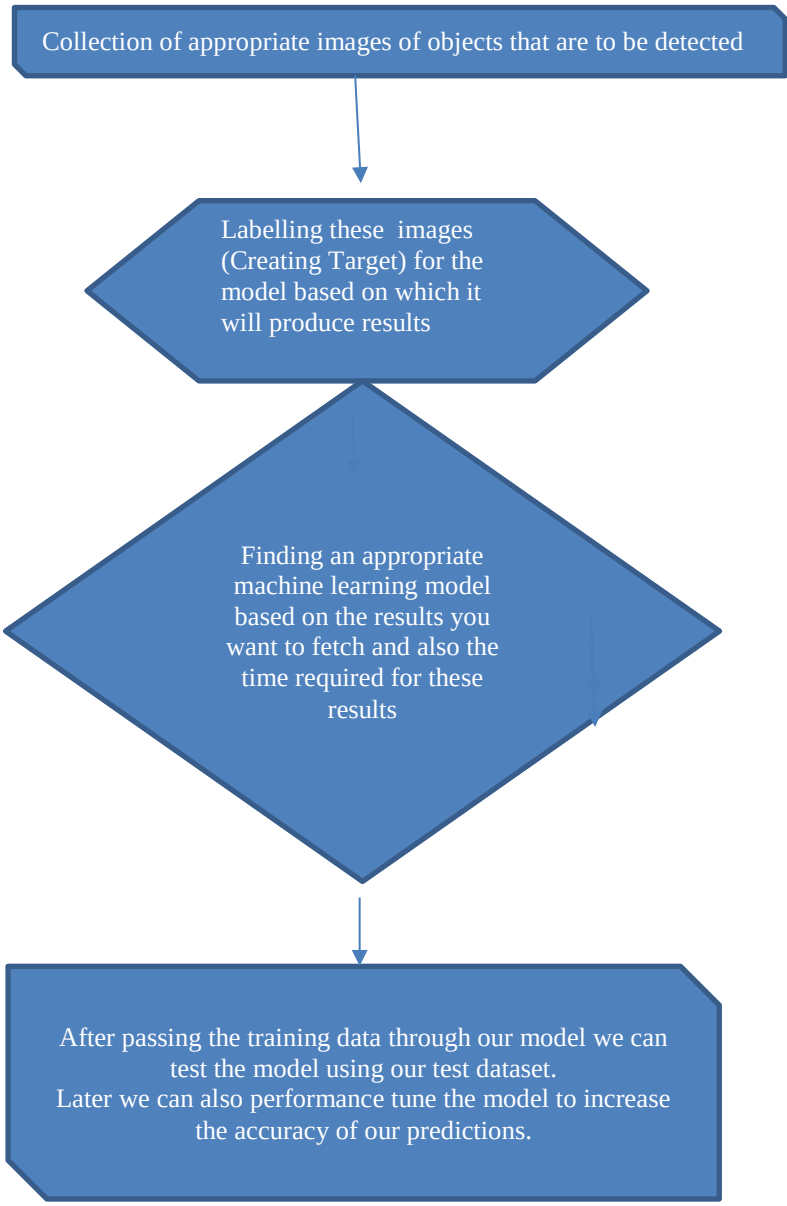
The detection and counting of objects were very accurate and faster .

Disadvantages:

Large number of objects can't be accurately counted and detected at the same time.

III. METHODOLOGY

- Collecting the images of the object that is to be detected(About 100-300) and segregate the images on the basis of testing data and training data.
- Labelling the images(We have used LabellImg for this purpose)After the labeling process we will get .xml files along with the image files after that we converted the .xml files to .csv files.
- Then we generated another record file which will help TensorFlow interpret the images and generate a model.
- Next we use a particular object detector software which will go through the images and the labels.
- After that we get our model ready to test on a number of testing images that we already collected.

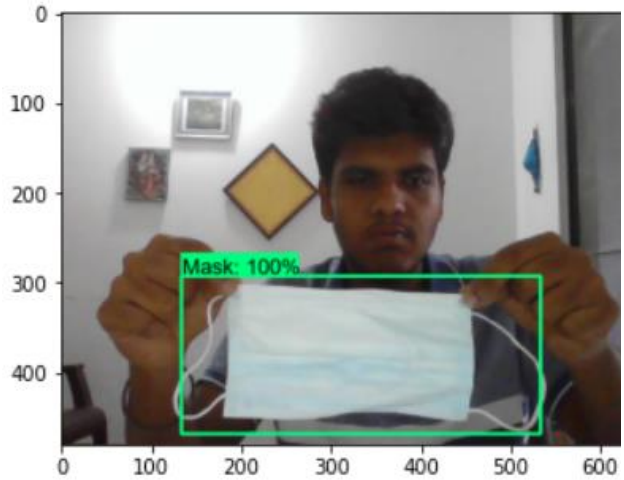


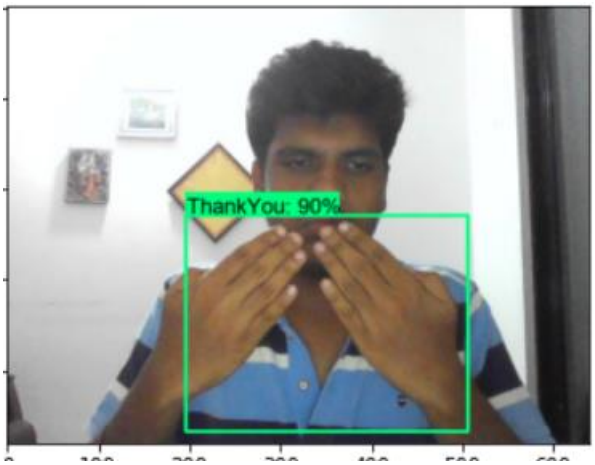
IV. RESULTS AND CONCLUSIONS

We have successfully trained the model and it is now detecting the objects .

Object Detection is one of the foremost fundamental application of deep learning and computer vision till now.

A lot of enhancement and progression within the strategies of object detection was seen. Object detection is not limited to pictures as it can be successfully performed on recordings and real time footage with great accuracy. we can anticipate a lot more successful algorithms and libraries for object detection in future





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