3rd National Conference on Green Technology and Science for Sustainable Development
© 2020 IJSRST | Volume 5 | Issue 6 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
International Journal of Scientific Research in Science and Technology

Object Detection And Recognition Using Tensorflow

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ABSTRACT

Creating the accurate machine learning models capable of localizing and identifying multiple objects in a single image remain a core challenge in computer vision. The TensorFlow Object Detection API is open source framework built on top of TensorFlow that makes it is easy to construct, train and deploy object detection models. Efficient and accurate objects detection has been an important topic in the advancement in computer vision systems with the advent of deep learning techniques, the accuracy for object detection has increased drastically, the paper aims to incorporate state of the-art technique for object detection with the goal of achieving high accuracy with a real-time performance. major challenge in many of the object detection systems is the dependence on other computer vision techniques for helping the deep learning-based approaches, which leads to slow and non-optimal performance in this paper we use completely deep learning-based approach to solve the problem of object detection in an end-to-end fashion. The network is train on the most challenging publicly available dataset (PASCAL VOC), on which the object detection challenge is conducted annually. The resulting system is fast and accurate, thus adding those applications which require object detection.

The aim of this study is to explore the modern open source-based solutions for object detection in sports: in this case for detecting football players. The model is tested as a dataset consisting of images extract from video footage of two football Matches Following hypotheses were examine:

1) Pre trained model will not work on data without fine tuning.
2) Fine tuned model will work reasonably well on given data.
3) Fine tuned model will have problem with occlusion and player pictures against the rear wall.
4) Using more variable training data will improve the results on new images.

Keywords : Machine learning, Object detection, TensorFlowObject Detection API SSD model.

I. INTRODUCTION

This For a few decades computer scientists and engineers have attached cameras and simplistic image interpretation methods to a computer (robot) in order to impart vision to the machine. A lot of interest has been shows towards object recognition, objectdetection, object categorization etc. Simply speaking object recognition deals with training the computer to identity a particular object from various perspectives in various lighting conditions and with various backgrounds object detection deals with identifying the presence of various individual objects in an image: and object categorization deals with recognizing objects belonging to various categories For example, an object is a coffee machine (object recognition) it may be trained to detect a coffee machine in the kitchen(object detection) and it may be trained to identify cups of various types and forms into a common category called cups. Despite the simplistic definition mention above, lines separating the three skills above are very blur and the problem often intermingle in term of the challenge as well as solution approach Further, it is evident that for practical purpose, a good combination of all the three skills is essential. The goal of object detection is to detects all instances of objects from known class, such as people,cars or faces in an image Typically only a small number of instances or the object are present in the image, but there is a very large number of possible location and scale at which they can occur and that need to somehow be explore.

I. **What is object detection?**

Object detection involves detecting instances of objects from a particular class an image. Given an image or a video stream. an object detection model can identity which of a known set of objects might be present and provide information about their Positions within the image. An object detection model is trained to detect the presence location of multiple classes of objects For example, a model might be trained with images that contain various pieces of fruit, along with a label that specifies the class of fruit they represent (an apple, a banana, or a strawberry), and data specifying where each object appears in the image.

II. PROBLEM STATEMENT

Many problems in computer visions were saturating on their accuracy before a decades. However, with the rise of deep learning technique, accuracy of these problems improveddrastically. One of the major problem was that of images classification, which is defined as predicting the class of the images. slightly complicated problem is that of images localization, where the image contain a single object and the system should predict the class of the location of the objects in the image(a bounding box around the object). The more complicated problem , 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, with the class of object in each box.

III. SYSTEM DESIGN

RELATED WORK

There has been a lot of work in the object detection using traditional computer vision technique(sliding windows, deformable part models) However, they lack the accuracy or deep learning-based techniques. Among the deep learning-based techniques two broad class of methods are prevalent two stage detection (RCNN (1) Fast RCNN (2). Faster RCNN (3)) and unified detection (Yolo(4). SSD (5). The major concept involved in these techniques have been explain

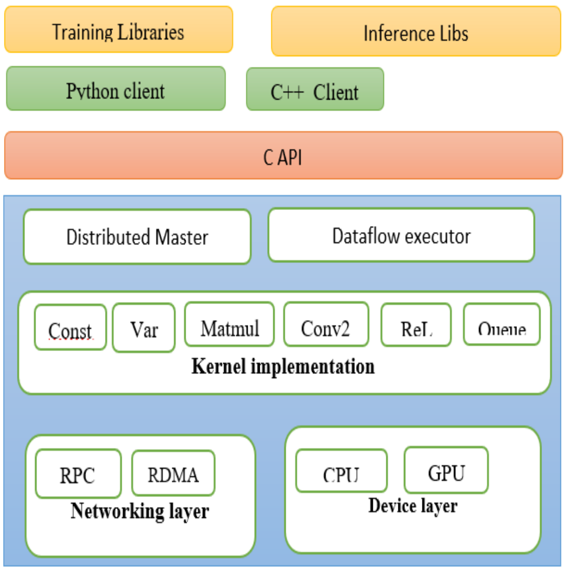

Fig1. General Architecture of TENSORFLOW

I. WORKING OF TENSORFLOW API:

The TensorFlow runtime is a cross-platform library Fig1 illustrates its general architecture, AC API separates user level code in different languages from the core runtime.

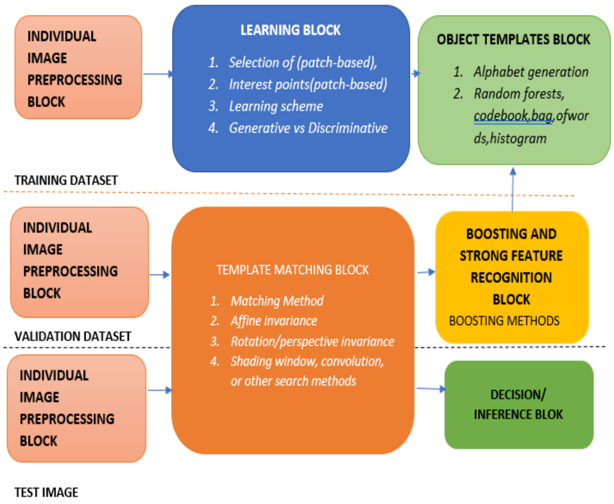

Fig 2. Basic block diagram of a typical object detection / recognition system

WORKING OF OBJECT DETECTION USING TENSORFLOW:

1)STEP 1: Importing Required Packages

importnumpy as np import os

importsix.moves.urllib as urllib import sys import tarfil import tensorflow as tf

importzipfile

fromthe distutils.version import StrictVersion from collections import defaultdict from theio

importStringIO from matplotlib import pyplot as plt

from PIL import Image

sys path append (".") from object_detection.untils.import ops as utils_ops

ifStrictVersion(tf__version_) <StrictVersion('1.12.0'): raise Import error (Please upgrade your TensorFlow installation to v1.12.*.')

2)STEP 2: Seting Up the Env

%matplotlib inline

3)STEP 3: Object detection imports

Here are the imports from the object detection module. fromutils import

Label_map_util from utils import visualization_utils as visutil

IV. APPLICATIONS

1. Video Surveillance

Surveillance is the monitoring of behavior activities,or the changing information for the purpose of influencing managing directing protecting people, This can include observation from a distance by means of electronic equipment (like closed circuit television cameras (CCTV)) or interception of electronically transmitted information (like internet traffic or phone calls). It can also include simple no or relatively low technology method such as human intelligence agent and postal interception.

2. Pedestrian detection

It is an essential and significant task in any intelligent video surveillance system is provide fundamental information for semantic understanding of the video footages.'Fleuret et al' suggested a method for integrating multiple calibrated cameras for detecting multiple pedestrians. In this approach. The ground place is partitioned into uniform, non-overlapping grid cells typically with the size of 25 by 25(cm). The detector produce a Probability Occupancy Map(POM), it provide an estimation of the probability of each grid cell to be occupied by a person.

3. Anomaly detection

In data mining, anomaly detection (also outlier detection) is the identification of rare items, events or observations which is suspicions by differing significantly from the majority of the data. Typically. the anomalous item will translates to some kind ofproblem such as bank fraud, a structural defect medical problems or errors in a next Anomalies are also referred to as outliers, novelties, noise, deviations and exceptions

Three broad categories of the anomaly detection technique exists

1. Unsupervised anomaly detection
2. Supervised anomaly detection
3. Semi-supervised anomaly detection

4. Self-Driving cars

A self-driving car, also known as a robot car, autonomous car or driverless car, is a vehicle that is capable of sensing its environment and moving with little orno human input. Autonomous cars combine a variety of sensors to perceives their surrounding.

5. Face detection

It is a computer technology being used in a variety of application that identifies human faces in digital images. Face detection also refer to psychological process by which human locates and attend to faces in a visual scene. Face detection can be regarded a specific case of object-class detection. It is analogous to image detection in which Image of a person is matched bit by bit Image matches with the image stores in database. Any facial feature changes in the database will invalidate the matching process Face detection is used in biometrics, open as a part of (or together with) a facial recognition system. It is also use in video surveillance, human computer interfacesand images database management.

V. FUTURE SCOPE

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 site 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 track.
- Fully occluded object cannot be track and consider as a new objectin the next frame.
- Foreground object extraction depends on the binary segmentation which is carried out by applying threshold techniques So blob extraction and tracking depends on the threshold value.
- Splitting and merging cannot be handled very well in all conditions using the single camera due to the loss of information of a 3D object projection in 3D images,
- For Night time visual tracking, night vision mode should be available as inbuilt feature in the CCTV camera.

To make the system fully automatic and also to overcome the above limitation.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 with different viewing angles for the objects to be tracked.

VI. CONCLUSION

An accurate and efficient object detection system has been develope which achieve comparable metrics with the existing state of the art system. This paper uses therecent technique in the field of computer vision and deep learning. Custom dataset was created using labeling and the evaluation was consistent. This can be use in realtime applications which require object detection for preprocessing in their pipeline. An important scope would be to train the system on a video sequence for usage in tracking application. Addition of a temporally consistent network would enable us smooth detection and more optimal than per frame detection.

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