**Project Requirement and Specification**

on

**OBJECT DETECTION AND RECOGNITION**

(CSE 5th Semester Mini project )

2021-2022



University Roll no.: Submitted by:

2014407 JITENDRA SINGH

Section:

G

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

# GRAPHIC ERA UNIVERSITY, DEHRADUN

**---------------------------CONTENTS-----------------------**

**1.1ABOUT PROJECT--------------------------------------**

**1.2 MOTIVATION-----------------------------------------------------------**

**1.3 APPLICATION-------------------------------------**

**1.4 SYSTEM REQUIREMENT--------------------------**

# 1.5 Steps for Tensorflow-object-detection-api- configuration------------------------------------------------

## 1.6 SSD Model Working-------------------------------

## 1.7 REFERENCE----------------------------------------------

----------------------------------------------------------------------

### 1.1About Project

Object Detection is the process of finding and recognizing real-world object instances such as car, bike, TV, flowers, and humans out of an images or videos. An object detection technique lets you understand the details of an image or a video as it allows for the recognition, localization, and detection of multiple objects within an image.

Humans can easily detect and identify objects present in an image. The human visual system is fast and accurate and can perform complex tasks like identifying multiple objects with little conscious thought. With the availability of large amounts of data, faster GPUs, and better algorithms, we can now easily train computers to detect and classify multiple objects within an image with high accuracy.

### 1.2 MOTIVATION

Blind people do lead a normal life with their own style of doing things. But, they definitely face troubles due to inaccessible infrastructure and social challenges. The biggest challenge for a blind person, especially the one with the complete loss of vision, is to navigate around places. Obviously, blind people roam easily around their house without any help because they know the position of everything in the house. Blind people have a tough time finding objects around them. . So we decided to make a REAL TIME OBJECT DETECTION System. We are interested in this project after we went through few papers in this area. As a result we are highly motivated to develop a system that recognizes objects in the real time environment.

### 1.3 ****Application:****

1.OPTICAL CHARACTER RECOGNITION

2. TRACKING OBJECTS

3. SELF DRIVING CARS

4. FACE DETECTION AND FACE RECOGNITION

5. OBJECT EXTRACTION FROM AN IMAGE OR VIDEO

### 1.4Requirement of Project

**1.4.1Hardware Requirement:**

* **PROCESSOR: INTEL® PENTIUM® CPU @ 2.0 GHZ**
* **RAM: 2 GB(MINIMUM)**
* **STORAGE: 50MB(MAXIMUM)**
* **OS: WINDOWS 10,8,7**
* **GPU CUDUART64, CUDNN64 etc.**

**1.4.2Software Requirement:**

* **PYCHARM**
* **PYTHON**
* **Tensorflow**
* **Jupyter Notebook**
* **Download the Object Detection model file(SSD\_mobilenet)**

# 1.5 Steps for Tensorflow-object-detection-api-configuration

This tutorial discusses how to configure the Tensorflow Object Detection API in windows and how implement custom object detection.

## Credits & Links

1. [Download Tensorflow Object Detection API](https://github.com/tensorflow/models)
2. [How to install Tensorflow Object Detection](https://github.com/tensorflow/models/blob/master/research/object_detection/g3doc/installation.md)

## Installing the Tensorflow Object Detection API

1. Download the tensorflow object detection api from [Github](https://github.com/tensorflow/models)
2. Open the Anaconda Prompt and install the dependencies for windows,

pip install tensorflow==2.4.1

pip install Cython

pip install contextlib2

pip install pillow

pip install lxml

pip install jupyter

pip install matplotlib

pip install tf\_slim

pip install opencv-python

1. Download the files from this repository
2. Copy and paste protoc.exe file in the path models-master\research
3. Open the Commmand Prompt in models-master\research and copy and run the command included in protoc command.txt
4. Copy the files object\_detection\_tutorial.ipynb, 1.0 Customized Object Detection.ipynb & 1.1 Customized Object Detection-Video.ipynb into models-master\research
5. Run above codes and check

## Models used in Tensorflow Object Detection API

Graphical user interface, application, table

Description automatically generated

### Explanation through image:

### Diagram Description automatically generated

Diagram

Description automatically generated

**Graphical user interface

Description automatically generated**

**1.6 SSD model working :**

The SSD object detection composes of 2 parts:

1. Extract feature maps, and

2. Apply convolution filters to detect objects.

**Diagram

Description automatically generated**

SSD uses VGG16 to extract feature maps. Then it detects objects using the Conv4\_3 layer. For illustration, we draw the Conv4\_3 to be 8 × 8 spatially (it should be 38 × 38). For each cell in the image(also called location), it makes 4 object predictions.

**A picture containing text, outdoor

Description automatically generated**

Each prediction composes of a boundary box and 21 scores for each class (one extra class for no object), and we pick the highest score as the class for the bounded object. Conv4\_3 makes total of 38 × 38 × 4 predictions: four predictions per cell regardless of the depth of featuremaps. A expected, many predictions contain no object. SSD reserves a class “0” to indicate.

**Diagram

Description automatically generated**

SSD does not use the delegated region proposal network. Instead, it resolves to a very simple method. It computes both the location and class scores using small convolution filters. After extraction the feature maps, SSD applies 3 × 3 convolution filters for each cell to make predictions. (These filters compute the results just like the regular CNN filters.) Each filter gives outputs as 25 channels: 21 scores for each class plus one boundary box.

A picture containing diagram

Description automatically generated

Beginning, we describe the SSD detects objects from a single layer. Actually, it uses multiple layers (multi-scale feature maps) for the detecting objects independently. As CNN reduces the spatial dimension gradually, the resolution of the feature maps also decrease. SSD uses lower resolution layers for the detect larger-scale objects. For example, the 4× 4 feature maps are used for the larger-scale object.

A picture containing text, shoji, crossword puzzle

Description automatically generated

SSD adds 6 more auxiliary convolution layers to image after VGG16. Five of these layers will be added for object detection. In which three of those layers, we make 6 predictions instead of 4. In total, SSD makes 8732 predictions using 6 convolution layers.

Diagram

Description automatically generated

# 1.7 REFERENCE

1. GEEKS FOR GEEKS.
2. W3 SCHOOL.
3. STACK OVERFLOW.

4. <https://www.researchgate.net/publication/337464355_OBJECT_DETECTION_AND_IDENTIFICATION_A_Project_Report>

5. <https://github.com/aieml/tensorflow-object-detection-api-configuration/blob/master/1.2%20Customized%20Object%20Detection%20-%20Video.ipynb>

6. <https://github.com/aieml/tensorflow-object-detection-api-configuration>

**Source code is available at my Github Account:**

[**https://github.com/Jitendra-singh-123/All-projects/tree/main/object\_detection\_and\_recognition**](https://github.com/Jitendra-singh-123/All-projects/tree/main/object_detection_and_recognition)

