Object Detection And Classification API

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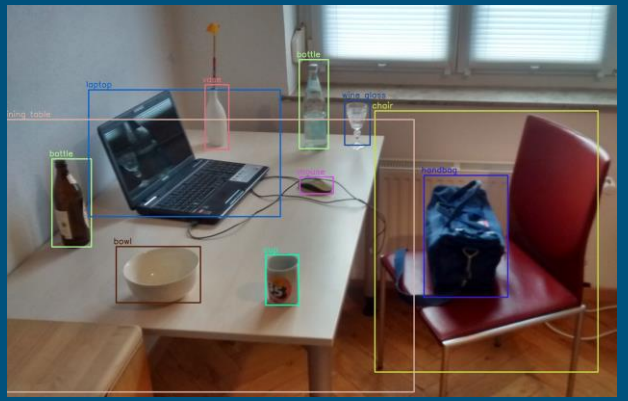
Introduction

- This project introduces an Application Programming Interface(API) for object detection. The server will do all the heavy work for the client even if client has low-end system.
- This API can be used by anyone for the object detection task freely.
- An image clicked/selected by the client will be sent to the API endpoint in specific format and then API would do the object detection task and send back the object detected image.
- The received image will be obtained by the client with different objects classified within that image.
- YOLO v3.0 algorithm is used in the backend that would perform the object detection task.



Highlights...

IMAGE

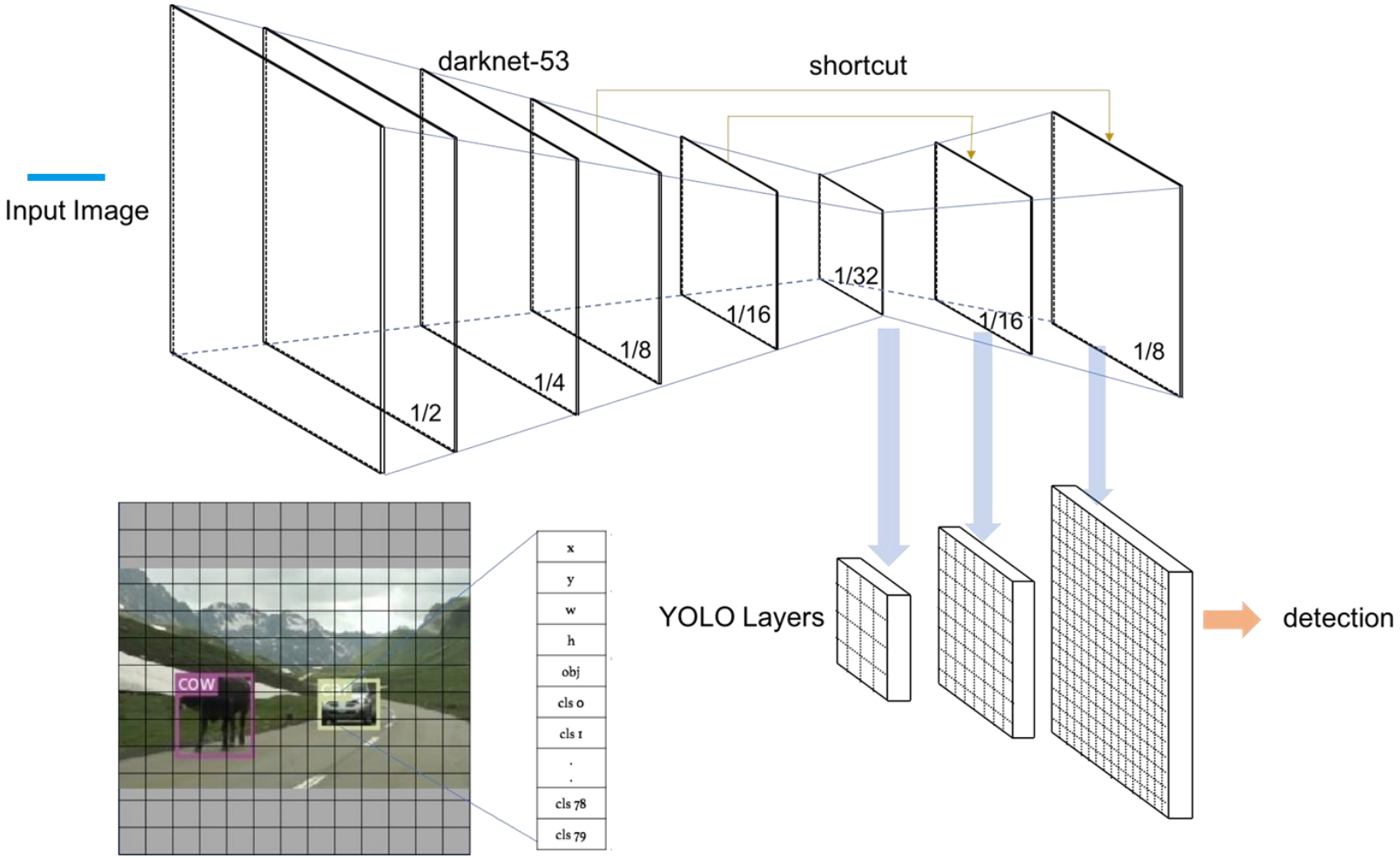
YOLO ALGORITHM

APPLICATION PROGRAMMING INTERFACE

CLIENT

YOLO v3.0 (You Only Look Once)

- The algorithm applies a neural network to an entire image. The network divides the image into an SxS grid on which image classification and localization is applied, YOLO then comes up with bounding boxes, and predicted class probabilities for each of these regions.
- The method used to come up with these probabilities is logistic regression. The bounding boxes are weighted by the associated probabilities. For class prediction independent classifiers are used.
- The biggest advantage of YOLO is it’s incredibly fast speed.


Input Image
darknet-53
shortcut
1/2
1/4
1/8
1/16
1/32
1/16
1/8
COW
x
y
w
h
obj
cls 0
cls 1
.
.
cls 78
cls 79
YOLO Layers
detection

The ObjectDetectorAPI( )

- This API is built using Django Framework
- It accepts a Multipart POST Requests of the form:

POST /detect HTTP/1.1

Host: 172.16.14.14/

Content-Type: multipart/form-data;

image=[bytearray of image]

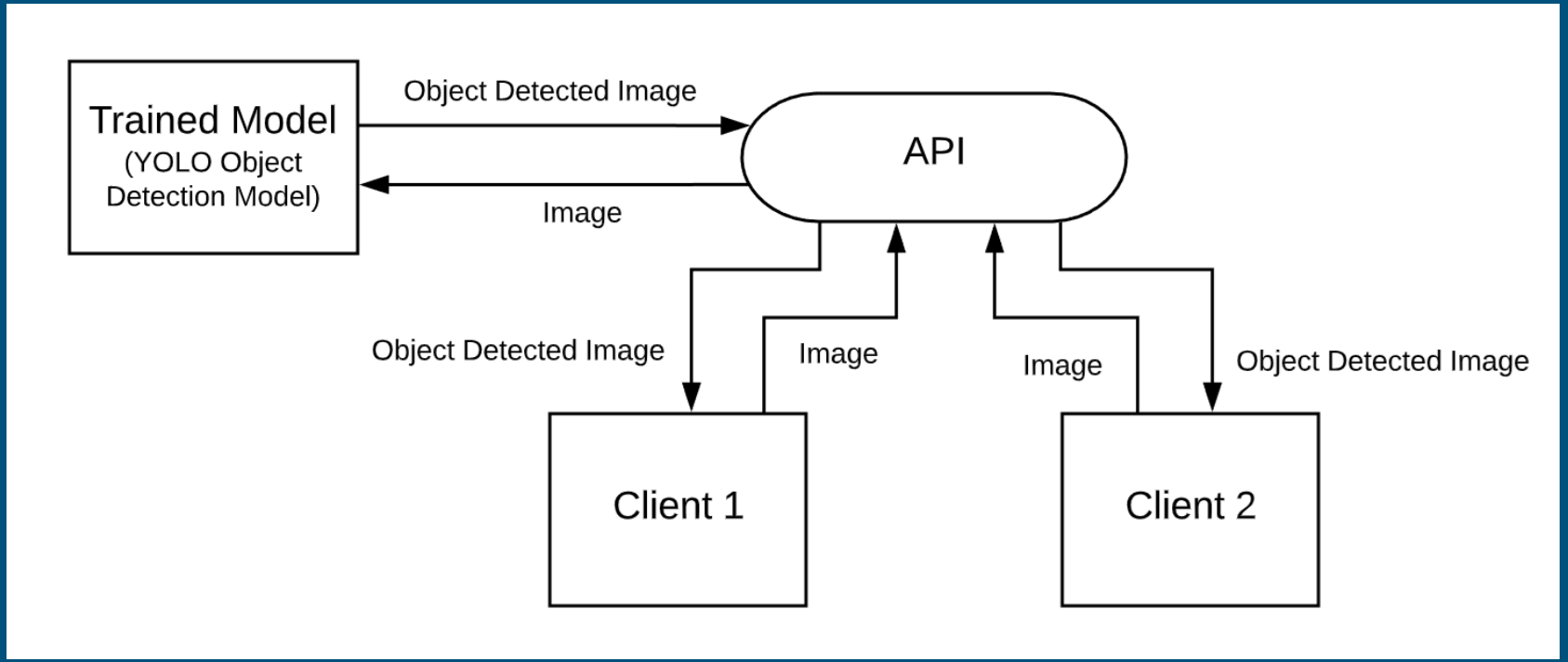
contd...

- After reading the image from the request, the API pass it to YOLO v3.0 Trained Model.
- PyTorch v1.11.0 has been used for building and production of the model.
- Trained Model returns an image with boundary boxes plotted around the detected objects.
- API sets the MIME Type to ‘image/png’ and send back the obtained image to client.
- The client now has an image with all the objects detected without having the heavy load on its own system.

contd...

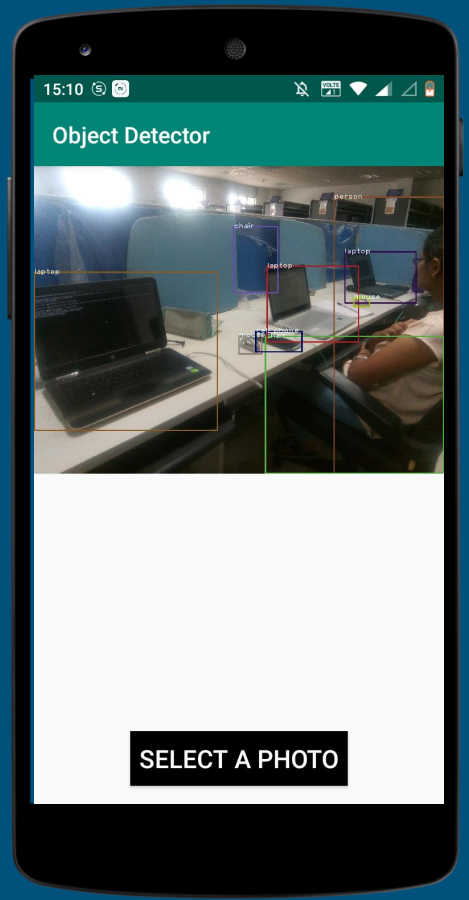
- The Object Detector classifies the objects into one of the 80 classes.
- It was trained on 500 instances of each class.
- Object Detection part involves a functions. So, many parallel function calls can be made.
- This enables API to handle multiple requests.
- The only limit is GPU quality and Memory.
- The API is tested on NVidia 940MX.

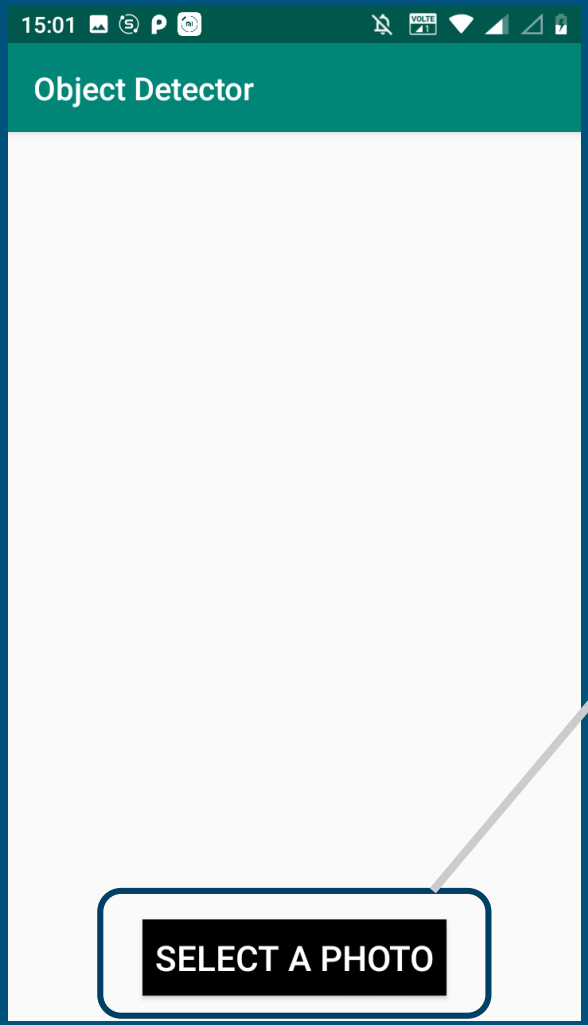
Flow Chart

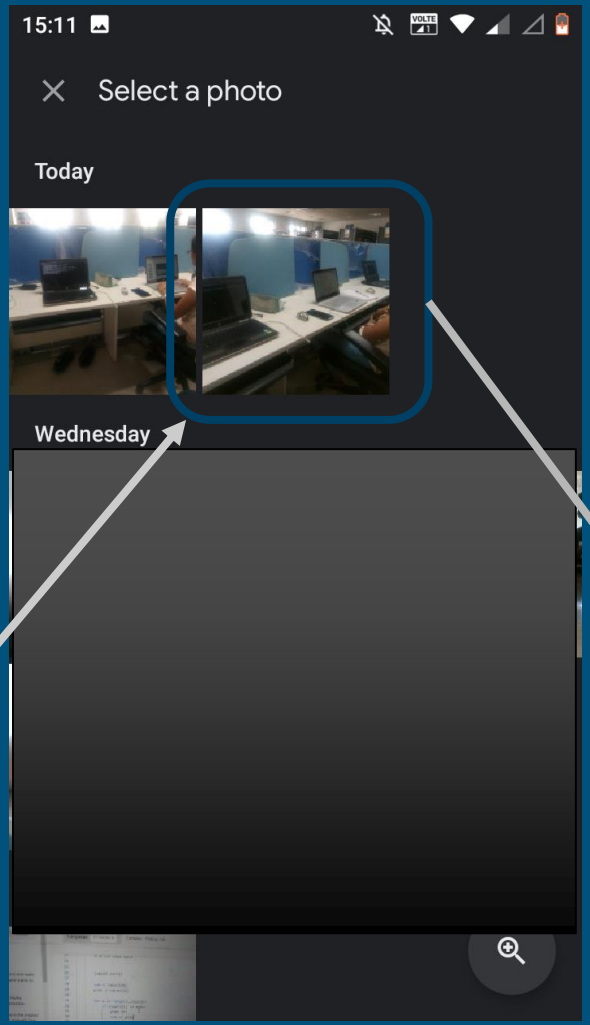

Trained Model
(YOLO Object Detection Model)
Object Detected Image
Image
API
Object Detected Image
Image
Image
Object Detected Image
Client 1
Client 2

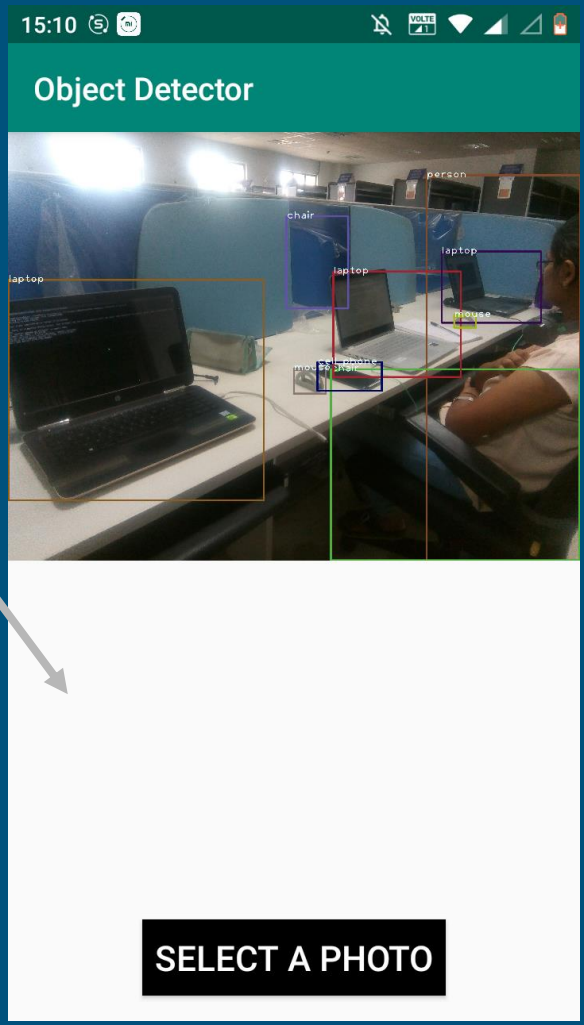
An APP-lication of API

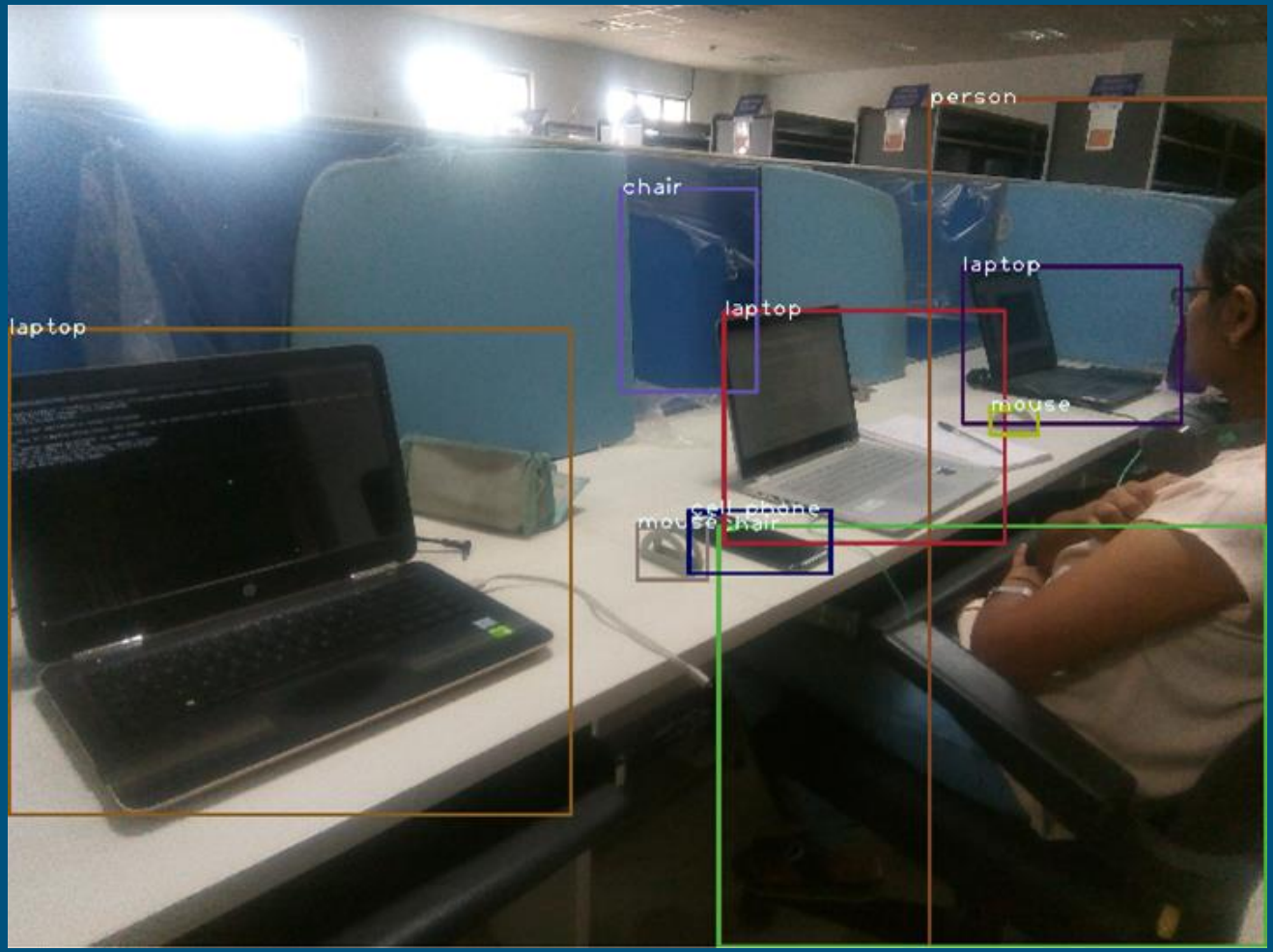
- One of the applications of this API would be to send image from a smartphone and receive the object detected image.
- An Android App is built using Android Studio 3.2.
- The app would select an image from the gallery and send it to the server using API.
- API would return back the image.
- App would now show user the received image.




15:01
Object Detector
SELECT A PHOTO


15:11
Select a photo
Today
Wednesday


15:10
Object Detector
person
chair
laptop
laptop
laptop
mouse
SELECT A PHOTO


person
chair
laptop
laptop
laptop
mouse

Demonstration

Thank You!!!