



DHAKA TRAFFIC DETECTION

COURSE CODE: CSE499

COURSE TITLE: CAPSTONE PROJECT

NAME OF OUR GROUP MEMBERS

- 1. Fabliha Bushra
ID: 163014029
- 2. Mohammad Navid Nayyem
ID: 172014003
- 3. KH. Nafiu Nur Rashid
ID: 172014026

OUTLINES

- Introduction
- Aim and Objective
- Understanding Dhaka Traffic
- Classes of Vehicle
- Dataset Statistics
- Some Output Pictures After Model Train
- Image Annotation using labelling tool
- Context Level Data-Flow Diagram
- Methodology
- Final Outcome
- Gantt Chart

INTRODUCTION

- Dhaka is the most densely populated city in the world.
- Automated vehicles detection.
- Helpful for maintaining a better parking management system.
- Machine learning methods.
- Set of vehicle images.
- Detect different types of vehicles from the images.
- Training our model by using YOLOv5 in Kaggle Notebook.

AIM AND OBJECTIVE

- Vehicle Images Annotation.
- Create dataset using annotated image with xml file.
- Train a model using dataset.
- Create an Application Programming Interface (API).
- Develop a fully functioning Android app to detect the vehicle classes perfectly from video or images.
- Easy to use.
- The wastage of time will reduce as the traffic jam will be controlled.
- Provide good service to the users.
- Reduce the difficulty to manage traffic.
- Beneficial for better parking management system.

UNDERSTANDING DHAKA TRAFFIC

- Dhaka's traffic is traffic in extremis.
- 70,000 rickshaws, 118254 private cars and 5407 buses were licensed in 2020.
- Only 7.5% of Dhaka is made up of roads.
- Average speed of vehicles are 6.4kmph
- Small amount of traffic light system to control traffic.



CLASSES OF VEHICLE

- Total Classes: 21



DATASET STATISTICS

- Datasets preprocessing in Roboflow.ai
- Total Images: 4000
- Resolution Used: 512 x 512 px
- Total Classes: 21
- Total Bounding Box: 7664
- Class Imbalanced Observed

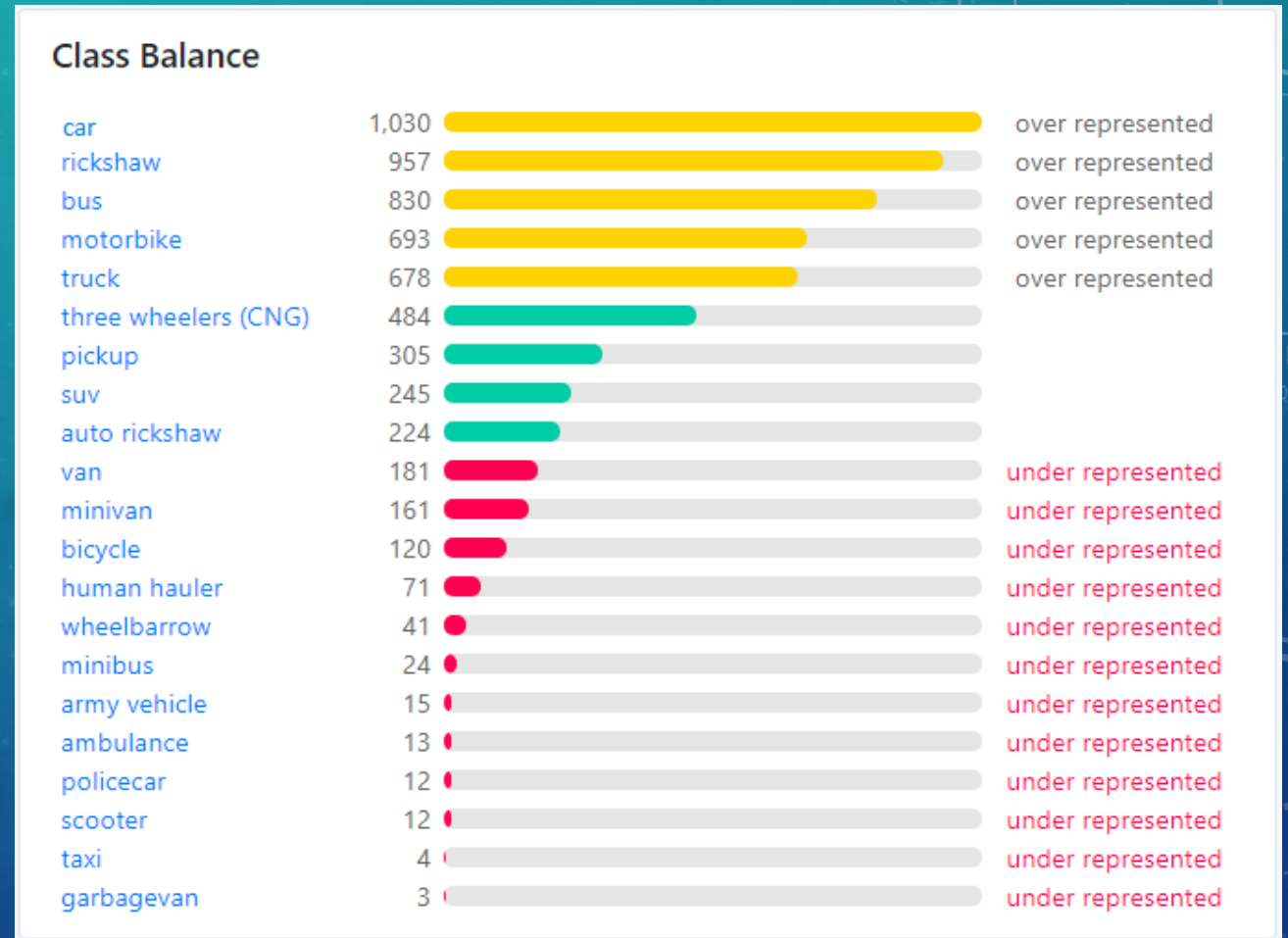


Figure: Sample statistics of 1000 images

SOME OUTPUT PICTURES AFTER MODEL TRAIN

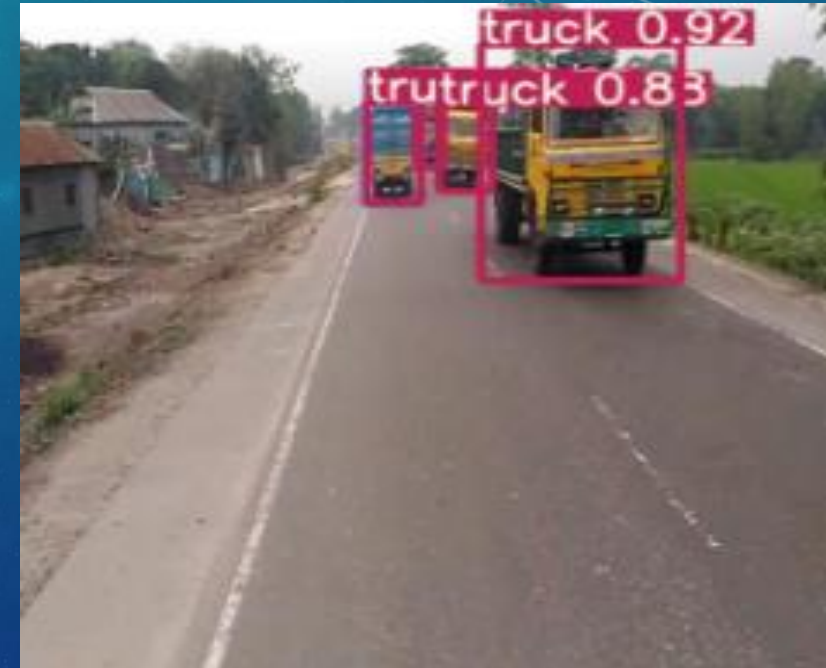
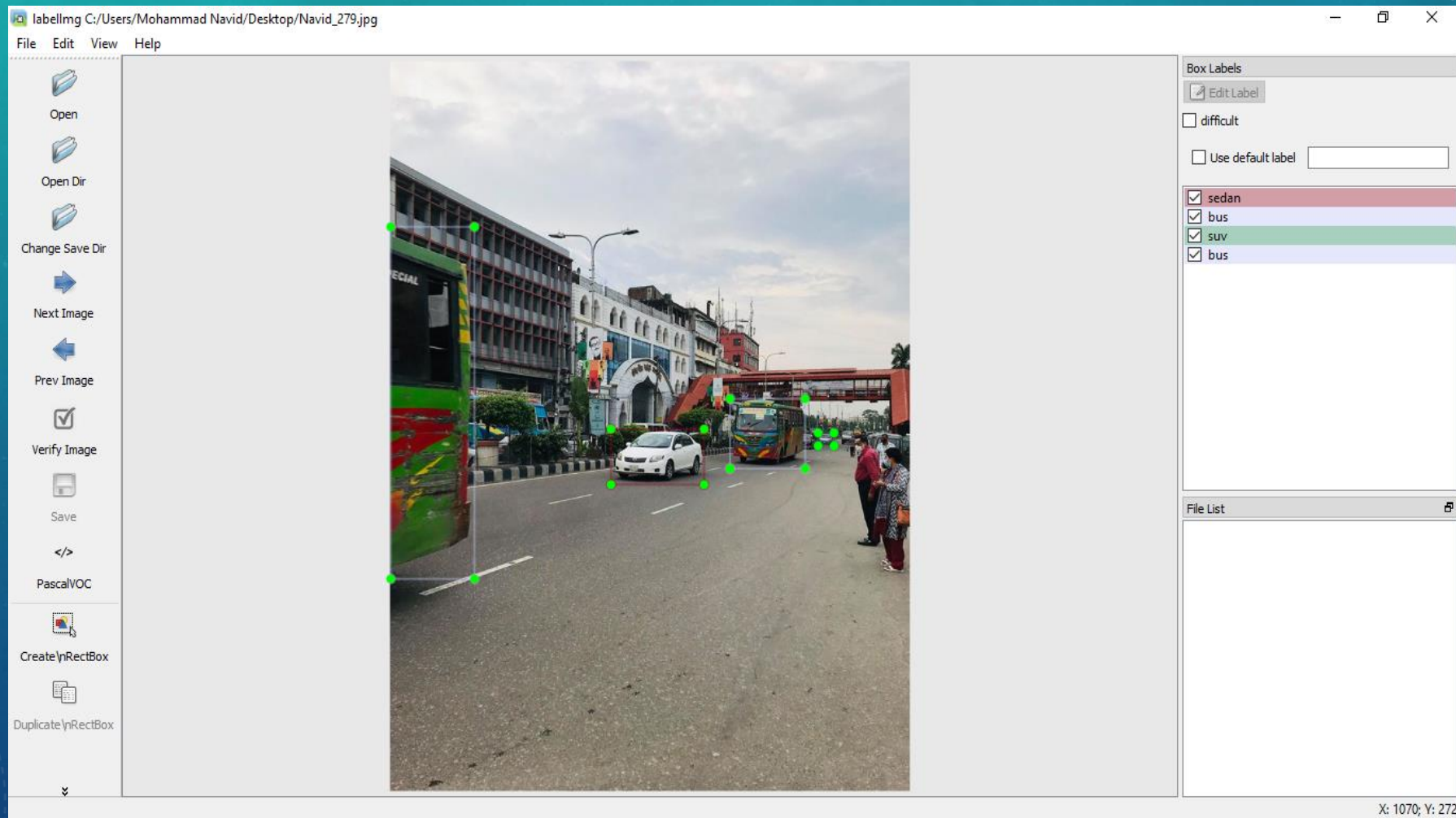
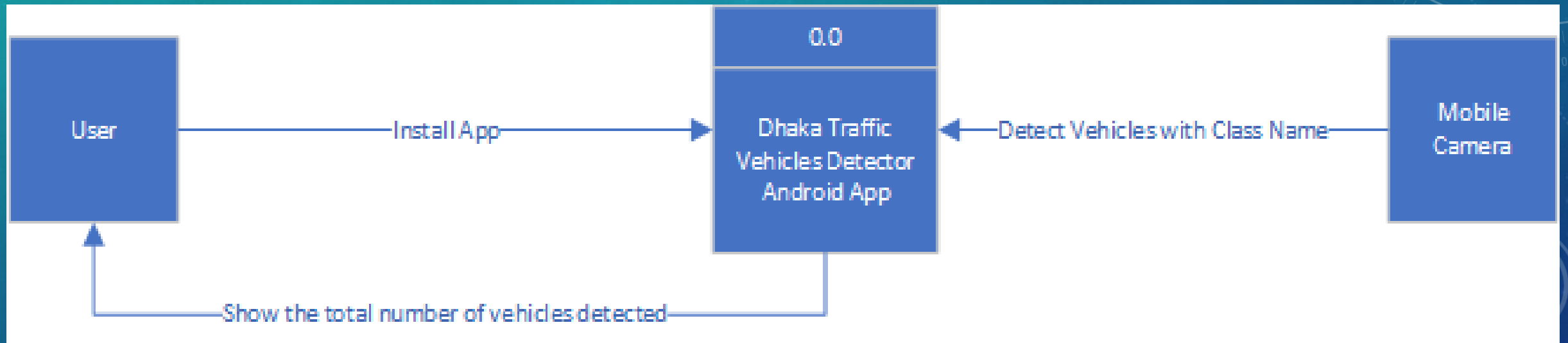


IMAGE ANNOTATION USING LABELIMG TOOL

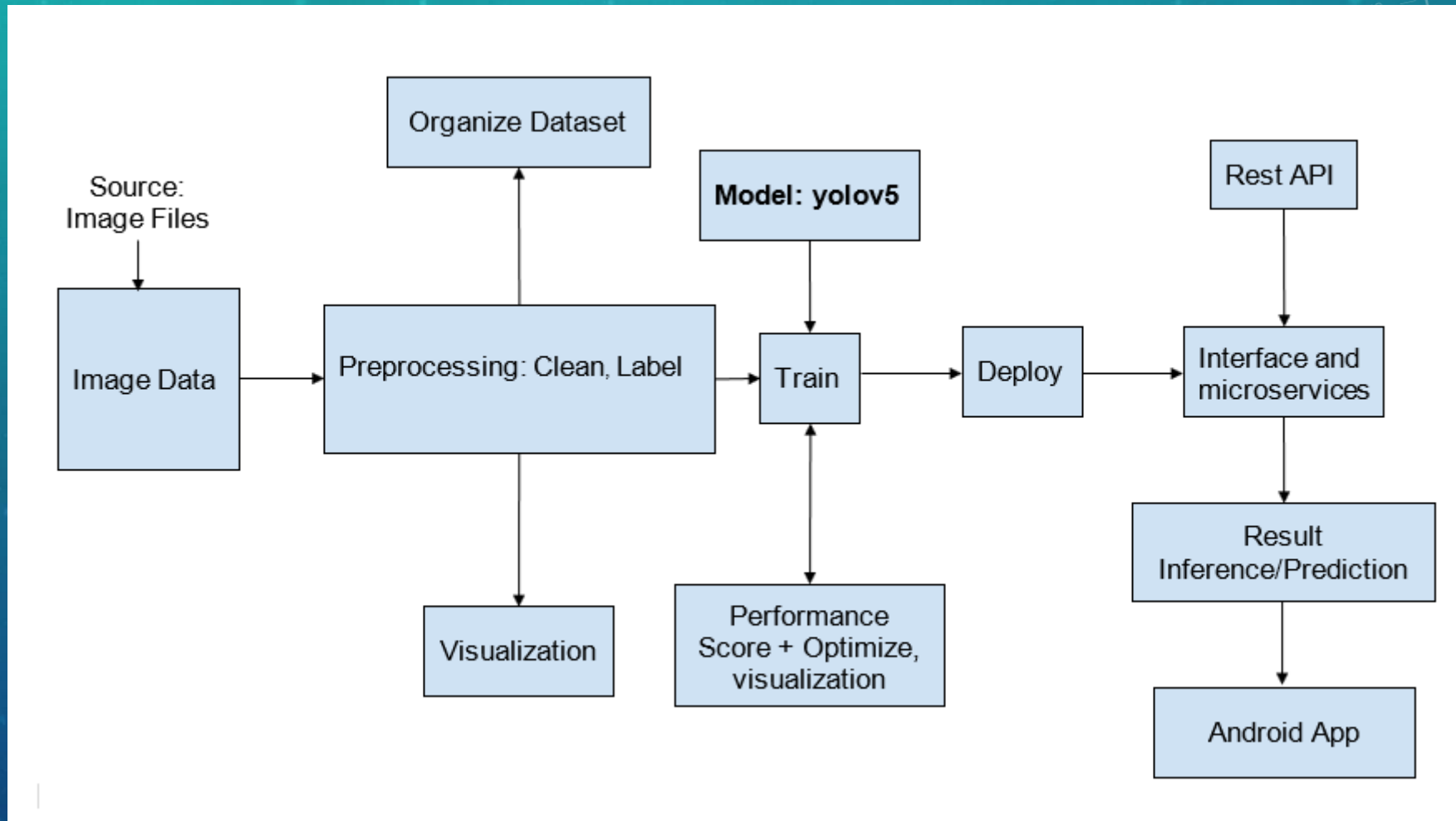


CONTEXT LEVEL DATA-FLOW DIAGRAM



METHODOLOGY

Machine Learning Pipeline



METHODOLOGY(CONT.)

Architecture of YOLOv5

- **Model backbone**
 - Extract important features from the given input image.
- **Model Neck**
 - Generates features pyramids that helps to identify the same object with different sizes and scales.
- **Model Head**
 - Applies anchor boxes on features and generates final output vectors with class probabilities, objectness scores and bounding boxes.

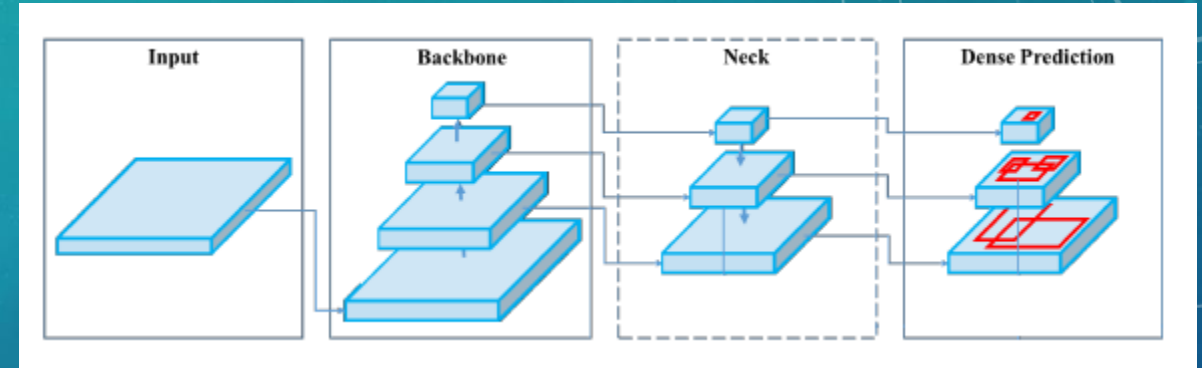


Figure: Object Detection Process

Other Aspects of YOLOv5

Augmentation Used: Mosaic

Bounding Box Anchor: Learned from dataset automatically with K-means and genetic learning algorithm

Reference: Bochkovskiy, A., Wang, C.Y. and Liao, H.Y.M., 2020. YOLOv4: Optimal speed and accuracy of object detection. arXiv preprint arXiv:2004.10934.

FINAL OUTCOME

- An Android-Based Application which will detect different categories of vehicles and count the number of vehicles.
- Beneficial for maintaining the traffic jam of Bangladesh.
- Graph can be generated.
- Measure the percentages of specific vehicles travelled through any route.
- There will be less need of traffic police.

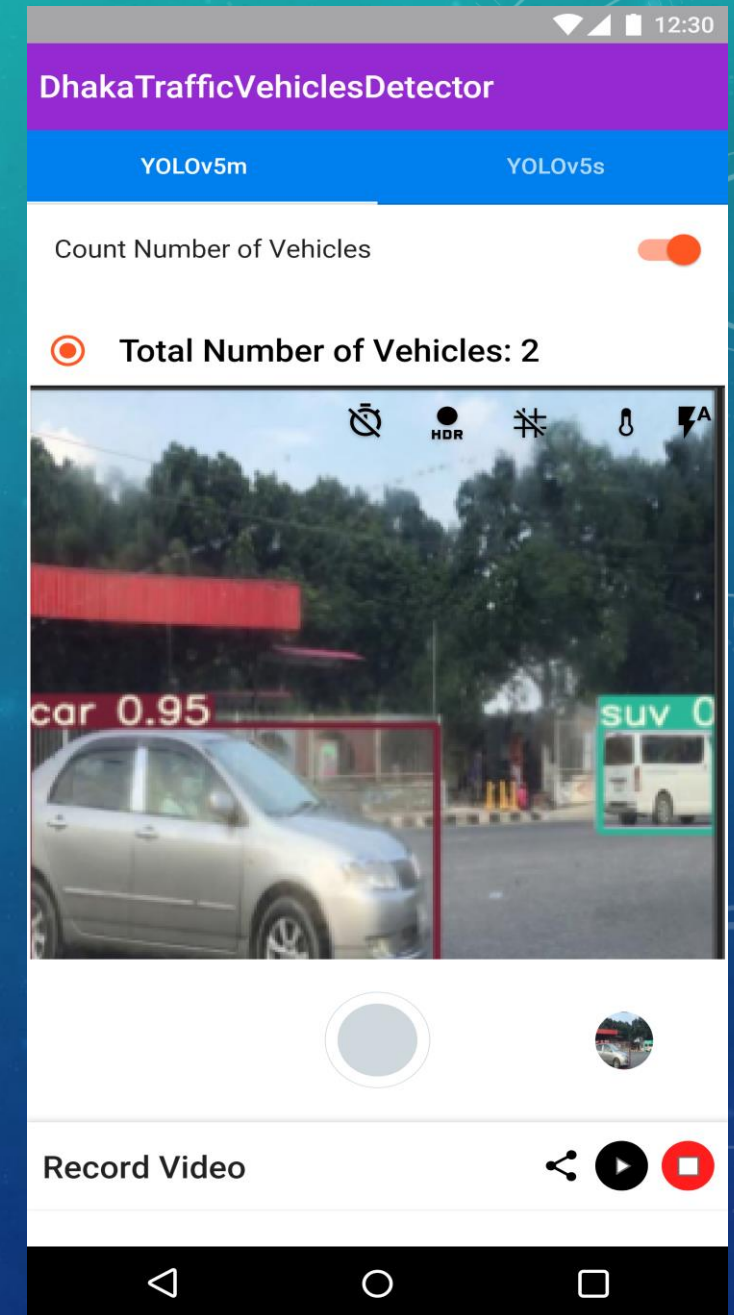
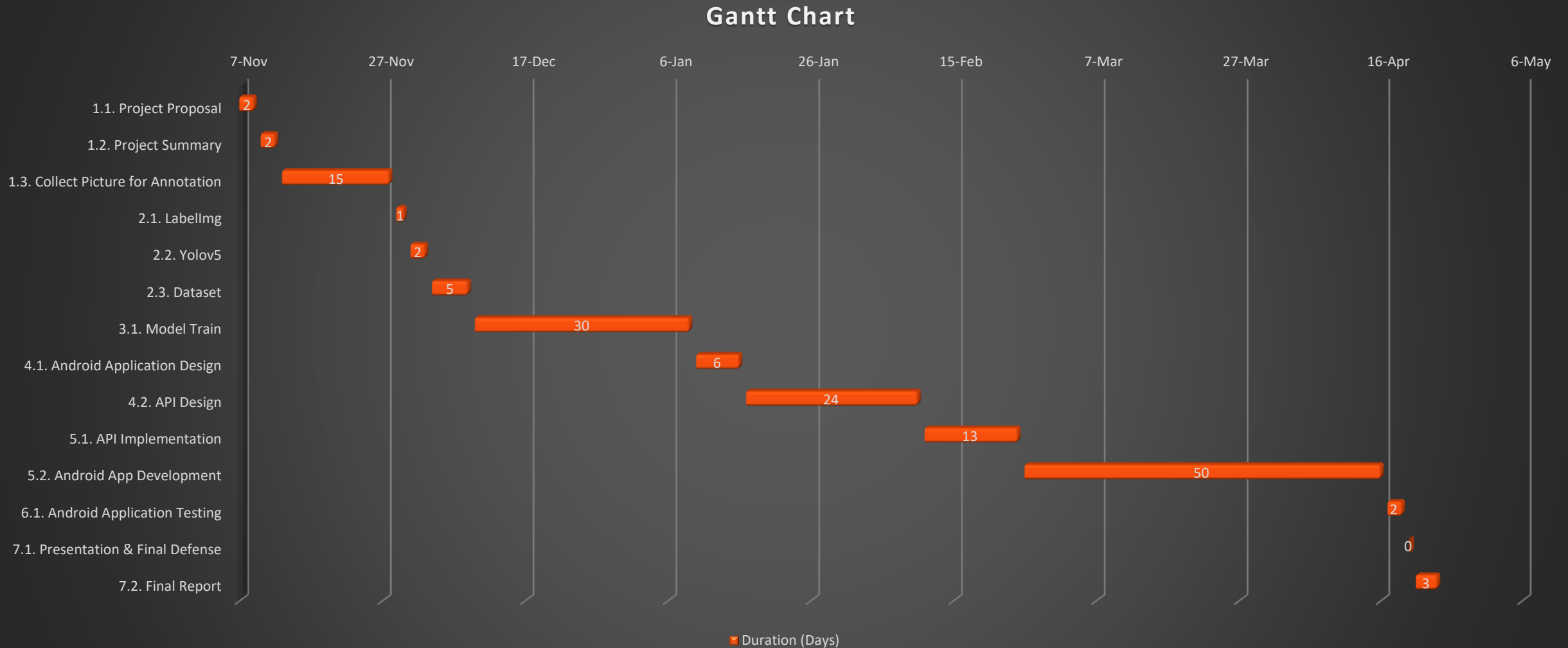


Figure: Prototype of our Android App

GANTT CHART





THANKS FOR WATCHING