

# Sobriety Test

COMPSCI 328 : Group 13

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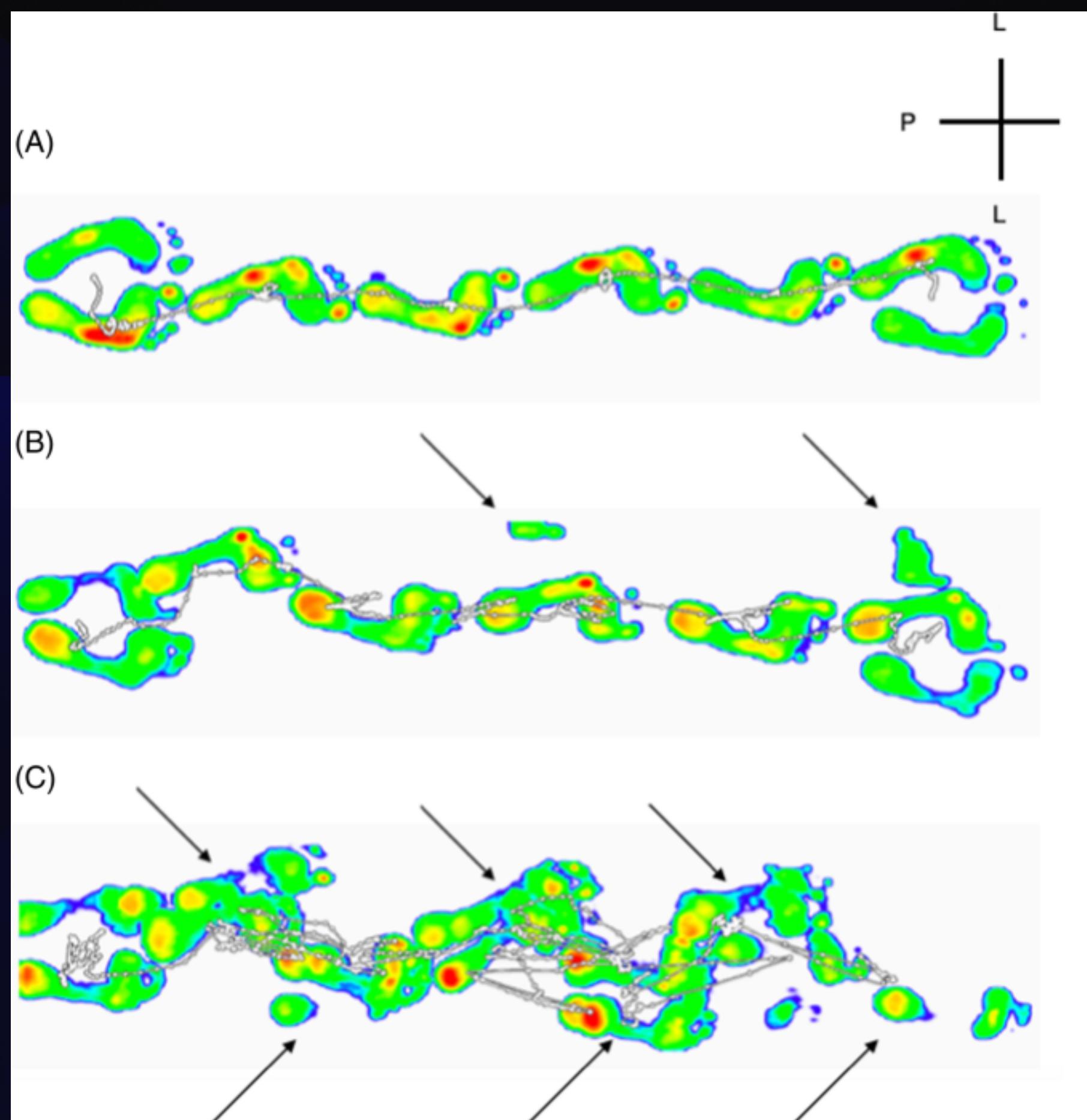
# Project Description

- Over the recent years there have been an increased amount of cases for Driving Under Influence.
- Our project aims to detect three levels of sobriety in a person using the heel-to-toe walking test, also known as the **Tandem Gait**, and using the phone's accelerometer and gyroscope, classify the person's walk into one of the three categories: **Sober, Tipsy or Drunk**

# Thought process

- Using the phone's accelerometer, we can detect the person's velocity of steps during the gait and show the magnitude of each step which might differ if the person is inebriated.
- Using the phone's gyroscope, we can measure the person orientation while performing the test, as the person would be swaying more when they are intoxicated.

# Step simulation of Sober (A), Tipsy (B) and Drunk (C)



# Data Collection

- Using online videos of tandem gait walks as reference (eg. [Youtube Link](#)), we simulated three different types of walks for the classes we chose.
- Using the Sensor Logger App, we simulated the Tandem Gait test around a 100 times with our motion varying between someone doing it while sober, while tipsy and while drunk. All the data has been stored on GitHub

# Data Processing

- All files were stored in a CSV format with respective labels for efficient processing.
- With the help from previous assignments and using the given functions, we reoriented the data using list comprehension with respect to the timestamps.

```
1 ext_sober_gyro = '/data-sober/gyro/'
2 for filename in os.listdir(f'{data_dir}{ext_sober_gyro}'):
3     csv_files.append(f'{ext_sober_gyro}{filename}')
4     activity_list.append('sober')
5
6 ext_topsy_gyro = '/data-topsy/gyro/'
7 for filename in os.listdir(f'{data_dir}{ext_topsy_gyro}'):
8     csv_files.append(f'{ext_topsy_gyro}{filename}')
9     activity_list.append('tipsy')
10
11 ext_drunk_gyro = '/data-drunk/gyro/'
12 for filename in os.listdir(f'{data_dir}{ext_drunk_gyro}'):
13     csv_files.append(f'{ext_drunk_gyro}{filename}')
14     activity_list.append('drunk')
```

Appending data to Processor functions

# Data Testing and Models

- The simulated dataset was put under a K-Fold validation classifier, to be more precise, 10 folds. We expect three separate classes as an outcome:  
**Sober, Tipsy and Drunk**
- For varied results we used two separate classification methods, a three-way classification and two-way classification.

# Data Testing and Models

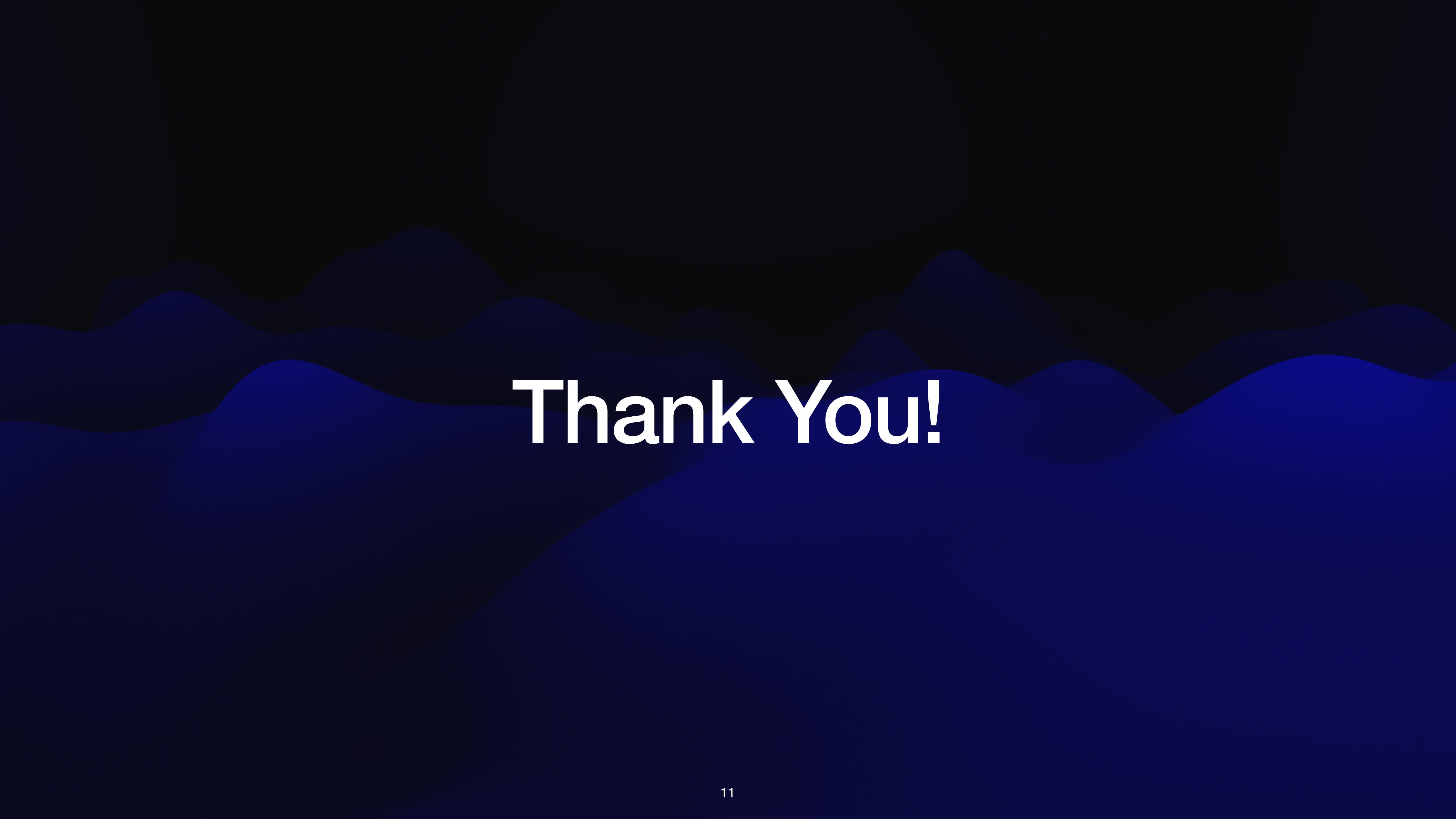
- Readings for the three-way classification:
  - 1. Average Accuracy: 0.5517102676463158**
  - 2. Average Precision: 0.5579847610553056**
  - 3. Average Recall: 0.5623704727930093**

# Data Testing and Models

- Readings for the two-way classification:
  - 1. Average Accuracy: 0.7293450335981192**
  - 2. Average Precision: 0.7330530078098423**
  - 3. Average Recall: 0.7290691267490377**

# Lessons Learnt from this project

- Importance of actual data collection vs simulated data collection
- Importance of processing data and training models efficiently
- Use of mobile sensor data in people's safety
- During research on the topic, the unfortunate increase in number of drunk driving cases.



# Thank You!