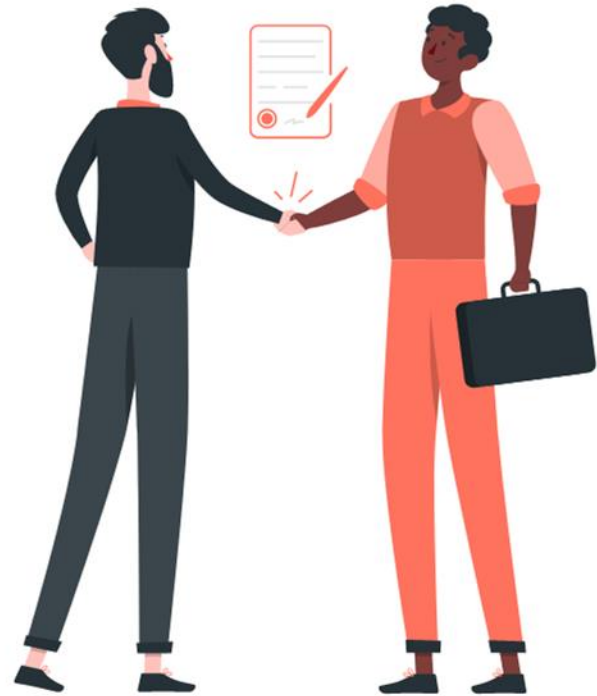


# FINAL PROJECT PROPOSAL

By Kosta Ljubisavljevic (233101)  
Madalina Carcea (221989)  
Zsombor Szöcs (234240)



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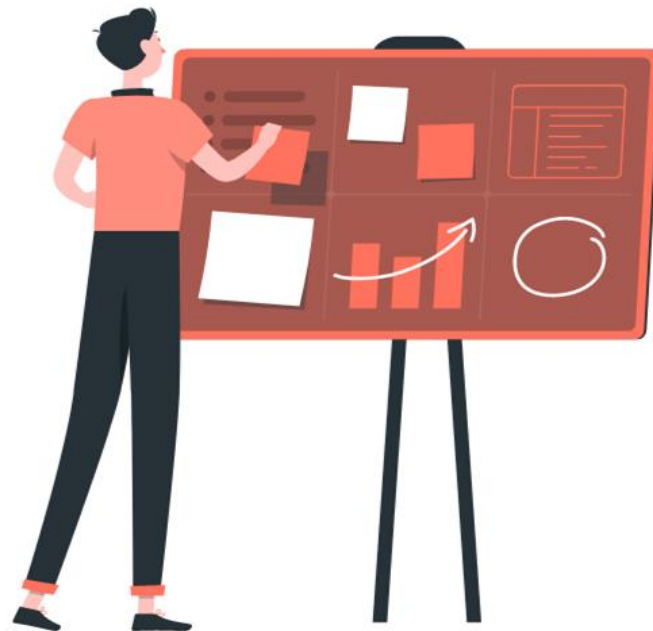


# 01

## About the Project

# About the Project

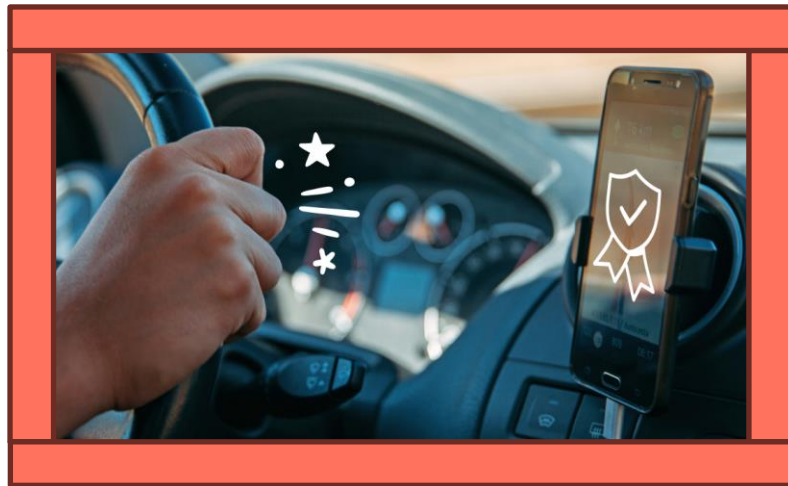
Our project purpose is to help predict and categorize the incidents and their severity, that takes place when driver approaches a different street. We are going to be able to give insightful feedback regarding which category (harsh cornering, accelerating, speed and harsh braking) is present and their severity.



# About the Project

Why is this good?

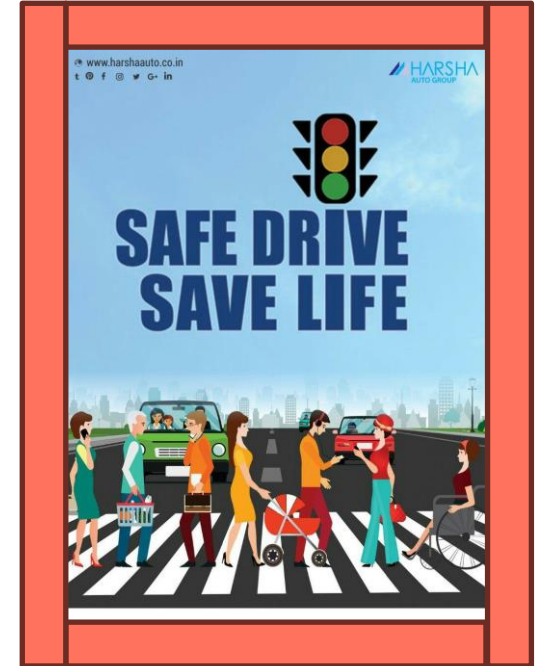
This way we are warning the driver beforehand on what to watch out for. We are also going to be using the weather and factors regarding the road in Breda which are going to serve as outside factors to further improve the analysis we are giving. Therefore, improving safe driving in Breda.



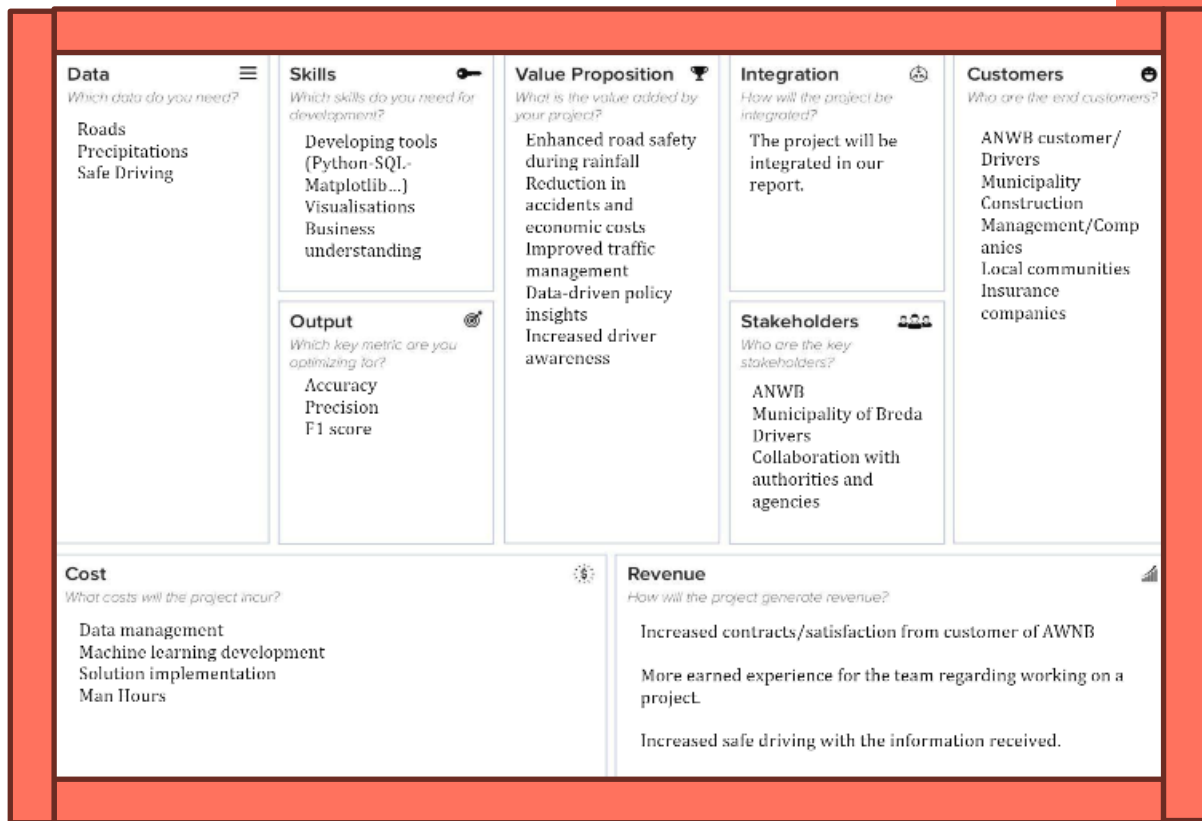
# About the Project

Our project utilizes machine learning to predict and categorize driving incidents (harsh cornering, accelerating, speeding, harsh braking) and assess their severity as drivers navigate different streets in Breda. By integrating weather and road condition data we can improve our analysis regarding the data which we will show in the dashboard.

Therefore, these insights enhance driver awareness and safety. This initiative aims to proactively mitigate risks, improve road safety, and foster responsible driving behaviors in the city of Breda.



# AI Canvas





# 02

## Project stages



# PROJECT STAGES

## Madalina

Task EDA Breda\_Road table  
Jun 5

JOIN the necessary tables : Safe driving , precipitations and Accidents  
Jun 5

Ethics Individual assignment  
Jun 11

ML - XGBoost

ML - Random Forest

Deep Learning task

Balancing the underfitting classes in the 'Category' column from our joined table

Streamlit dashboard

## Kosta

Task EDA Safe Driving table  
Jun 5

Doing the perfect criteria for ILO 5  
Jun 11

Ethics Individual assignment  
Jun 11

Fixing the Trello Board and Adding Extra categories

Error analysis  
Jun 11

Unit testing

Making the Presentation

## Zsombor

Task EDA Precipitation table  
Jun 5

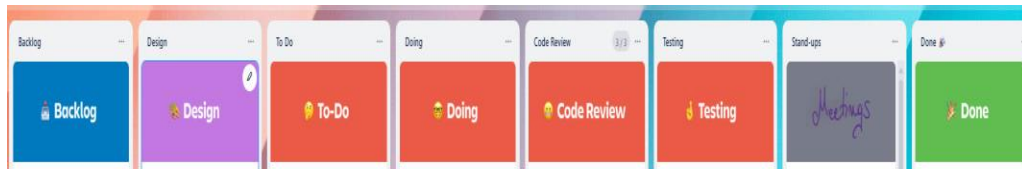
Ethics Individual assignment  
Jun 11

Fixing the Trello Board and Adding Extra categories

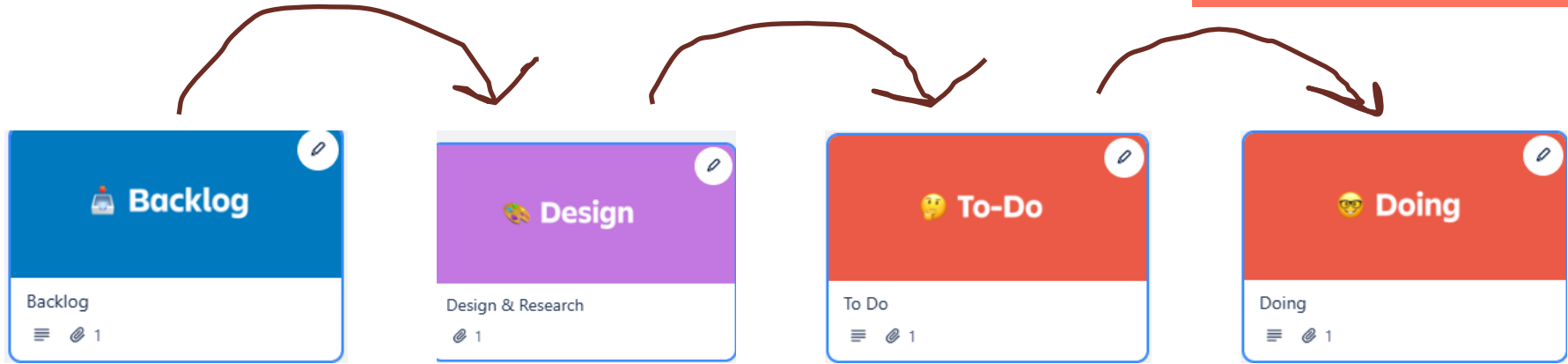
Ethics - Task 3.4 - Legal assessment (Group Task 1)  
Jun 12

Test Coverage  
Jun 20

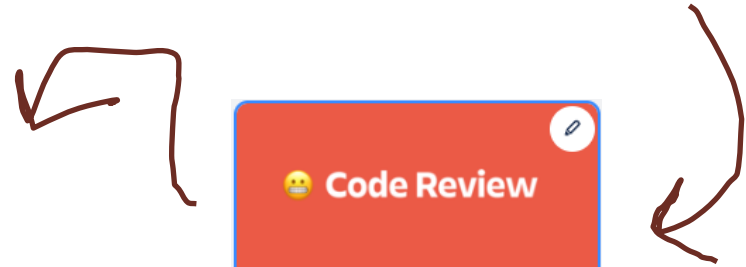
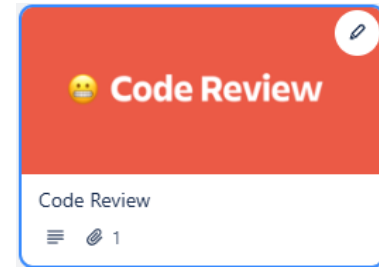
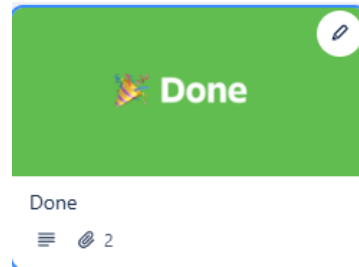
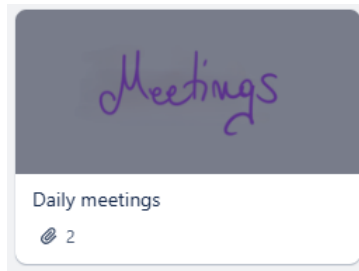
Each section of Trello



# PROJECT STAGES



Separate Card Holder



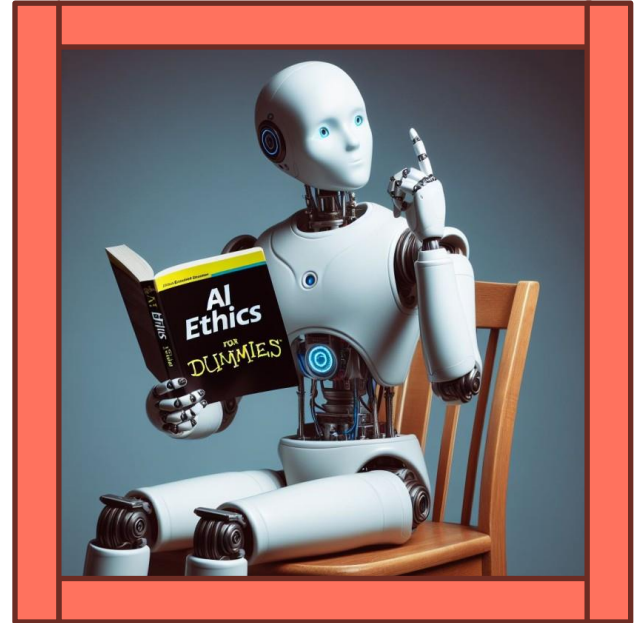


# 03

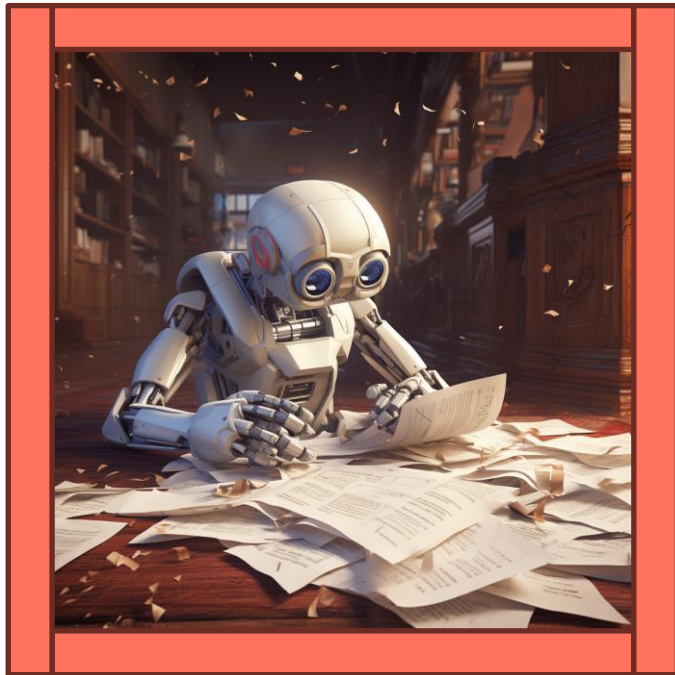
## Legal & Ethical considerations

## Legal Obligations for AI System Development

1. We adhere to the EU AI Act for safe and responsible AI development.
2. Our AI system targets high-risk applications to improve road safety.
3. Compliance with ethical standards is our priority.



# EU AI Act Requirements



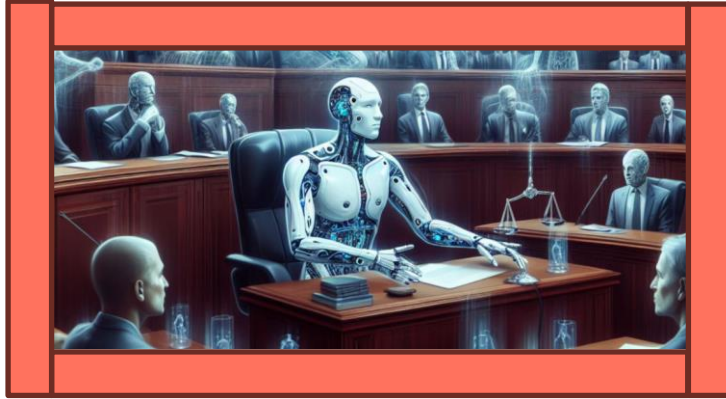
1. Avoid manipulative, exploitative, or discriminatory AI practices (Article 5).
2. Implement quality management systems and maintain records (Chapter III).
3. Develop privacy-preserving methods to protect user data (Article 27).

# High-Risk AI System Compliance

1. Ensure accuracy, transparency, and fairness in AI operations.
2. Use anonymized and diverse driving data for unbiased decision-making.
3. Strict security measures to protect data and user rights.



# Legal and Ethical Considerations



1. Continuous monitoring and corrective actions to mitigate risks (Articles 17-21).
2. User complaint-handling procedures for accountability (Article 85).
3. No use of real-time biometric identification systems (Article 5).



# 04

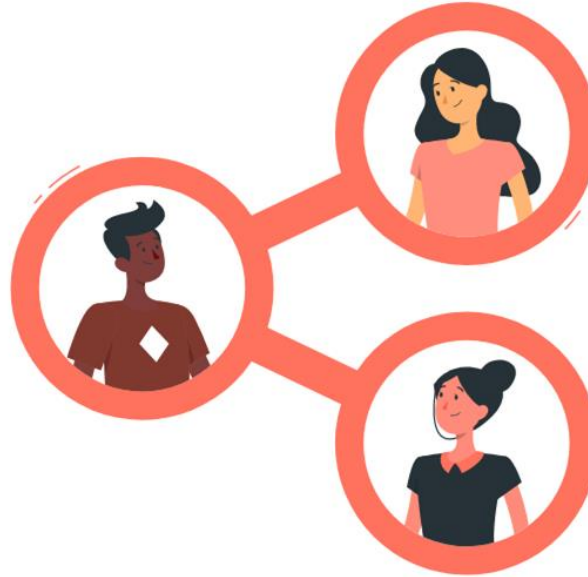
## ML iterations



# OUR TEAM

## Best iteration

How your final implementation helps in addressing the business problem?



## EDA

Explain the EDA process

## Iteration 1

What was your initial algorithm to address your idea and accuracy?

Safe Driving



Precipitation



Accidents



EDA

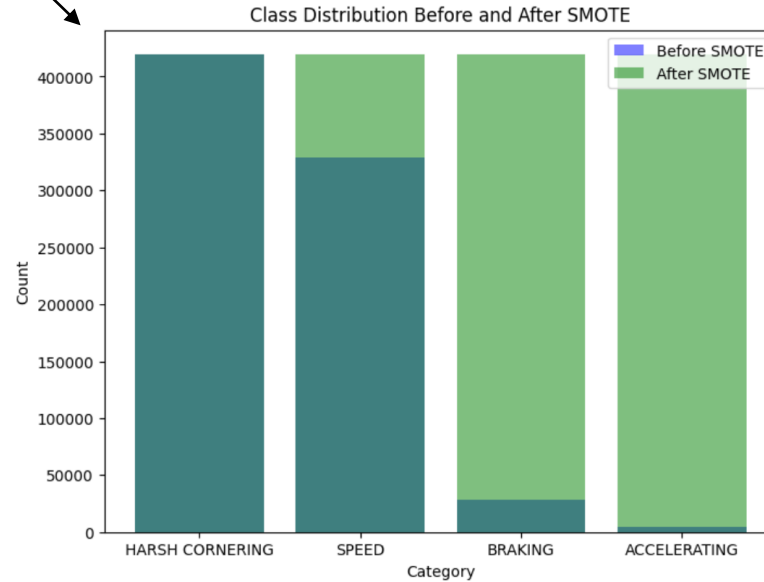
Road



# ML&Deep Learning

Random Forest

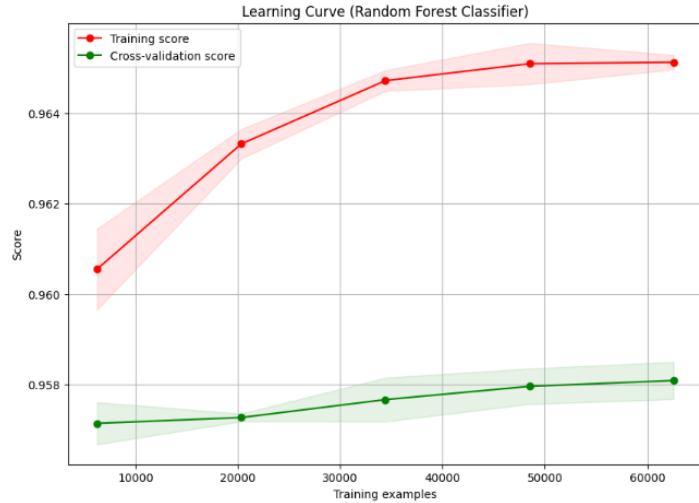
XGBoost Classifier



SMOTE technique used for class balancing for the Machine Learning methods

# ML&Deep Learning

## Random Forest



Accuracy: 95.76%

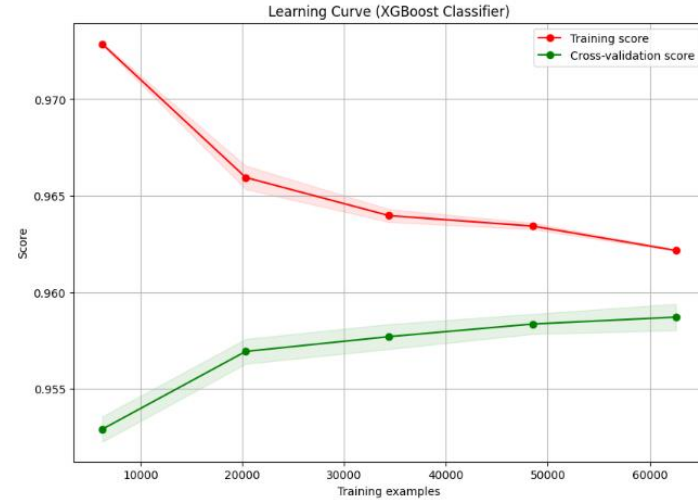
Confusion Matrix:

```
[[ 0 21 153 0]
 [ 0 145 1088 0]
 [ 1 159 17842 0]
 [ 0 0 0 14107]]
```

Classification Report:

	precision	recall	f1-score	support
ACCELERATING	0.00	0.00	0.00	174
BRAKING	0.45	0.12	0.19	1233
HARSH CORNERING	0.93	0.99	0.96	18002
SPEED	1.00	1.00	1.00	14107
accuracy			0.96	33516
macro avg	0.60	0.53	0.54	33516
weighted avg	0.94	0.96	0.94	33516

## XGBoost Classifier



Accuracy: 87.38%

Confusion Matrix:

```
[[ 31 120 23 0]
 [ 139 893 200 1]
 [ 572 3173 14257 0]
 [ 0 1 0 14106]]
```

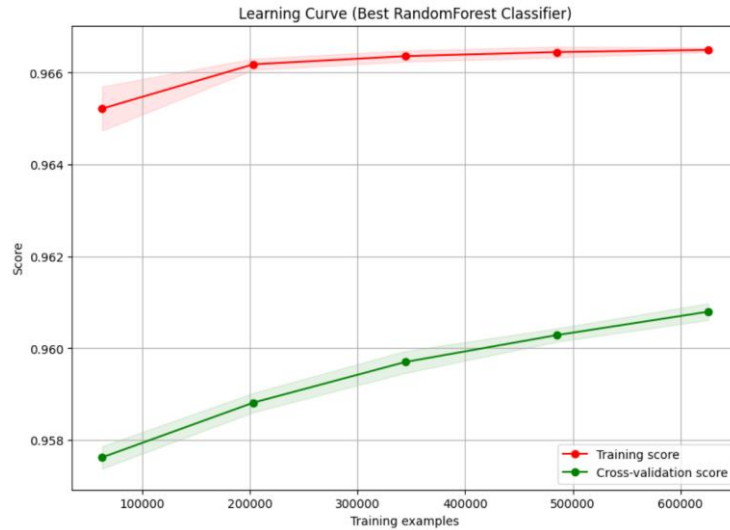
Classification Report:

	precision	recall	f1-score	support
0	0.04	0.18	0.07	174
1	0.21	0.72	0.33	1233
2	0.98	0.79	0.88	18002
3	1.00	1.00	1.00	14107
accuracy			0.87	33516
macro avg	0.56	0.67	0.57	33516
weighted avg	0.96	0.87	0.90	33516

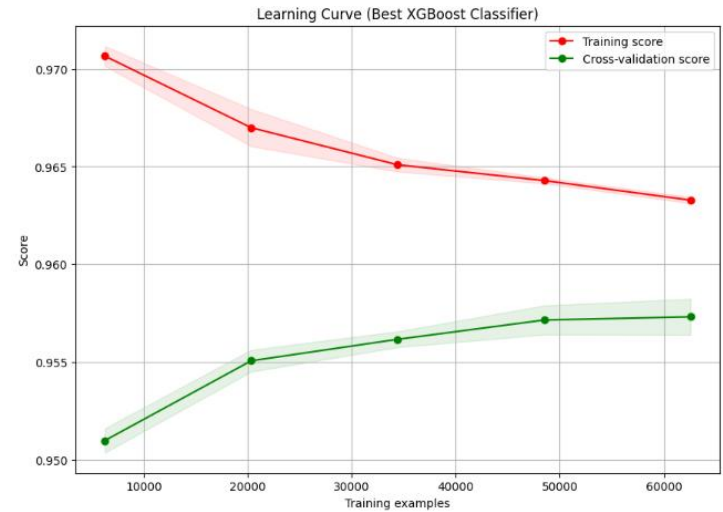
# ML&Deep Learning

After hyperparameter tuning:

## Random Forest



## XGBoost Classifier



# ML&Deep Learning

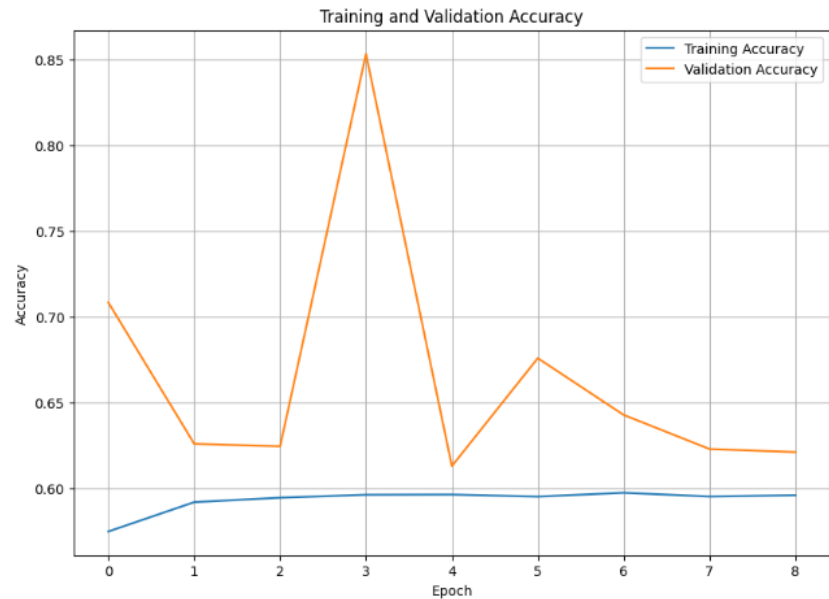
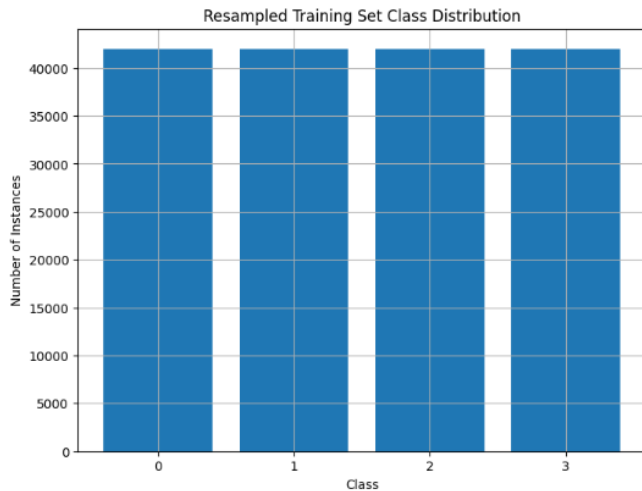
Resampled training data

```
# Apply RandomOverSampler to the training data
ros = RandomOverSampler(random_state=42)
X_train_resampled, y_train_resampled = ros.fit_resample(X_train_processed, y_train_encoded)

# Check new class distribution
train_class_counts_resampled = Counter(y_train_resampled)
print("Resampled training set class counts:")
print(train_class_counts_resampled)

# Visualize the resampled class distribution
plot_class_distribution(y_train_resampled, title='Resampled Training Set Class Distribution')
```

Resampled training set class counts:  
Counter({2: 42005, 3: 42005, 1: 42005, 0: 42005})





# 05

## Demo

Demo of the dashboard

X

Pave your way

Project

About us

Deep Learning

Map

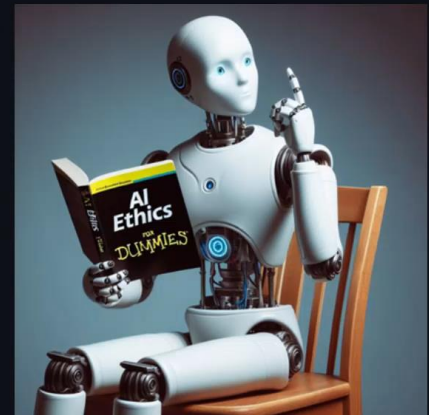
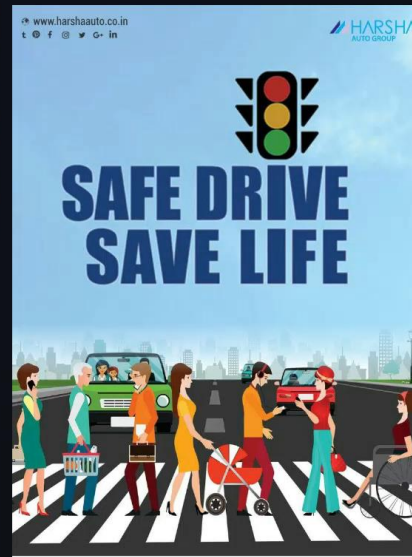
# Business Idea Page

## Welcome to the Traffic Incident Dashboard!

Navigating traffic can be a challenge, but with our innovative Traffic Incident Dashboard, we bring you a solution that turns data into actionable information. Designed specifically for drivers in Breda, Netherlands, our dashboard provides a comprehensive, user-friendly interface to keep you informed about traffic incidents. To improve your safe driving experience!

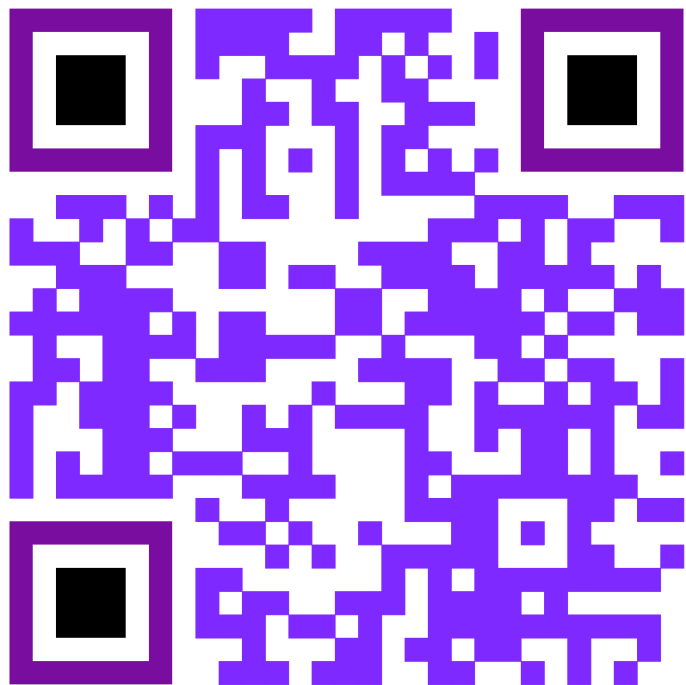


Safe driving



AI Ethics for Dummies





# Thank you for your attention!

Please make sure to try our  
interactive dashboard!