Breda University
OF APPLIED SCIENCES

PROJECT PROPOSAL

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Year 1 - Block D

Team 18

Introduction

1. **Overview of Project's Purpose and Objectives:**
   - Project purpose: improve road safety in Breda through innovative solutions and data-driven approaches.
   - Objectives: identifying key risk factors, developing predictive models, and implementing effective interventions to reduce traffic accidents.
2. **Relevance and Interest of the Topic:**
   - Road safety is a universal concern that impacts public health, urban mobility, and economic efficiency.
   - By addressing this issue, we can leverage cutting-edge technology to create safer, smarter cities.
3. **Significance of Applying Machine Learning:**
   - Machine learning provides powerful tools for analyzing vast amounts of data, uncovering patterns, and making accurate predictions.
   - Efficiency and scalability: These techniques offer scalable solutions that can adapt and improve over time, making them ideal for ongoing road safety initiatives.

Problem Statement

- **Identification and prediction of danger zones for traffic incidents in Breda.**
- Context and Background:
  - Breda, like many cities, faces significant challenges with road safety. Traffic accidents result in personal injury and disruptions to the urban transport system.
  - Current methods for identifying danger zones rely on historical data and manual analysis, which can be time-consuming and less effective.
- Importance and Benefits:
  - reduce traffic accidents, enhance public safety, and improve traffic management.
  - It provides city planners with data-driven insights to design safer infrastructure and implement targeted safety measures.

AI Canvas

AI Project Canvas

Title: Danger zones prediction

Data
Which data do you need?

Incident Data from ANWB:

Unique incident identifiers
Timestamps
Location data (latitude, longitude)
Speed data
Incident type and severity
Road segment information

Weather Data from KNMI:

Precipitation data (duration, intensity)
Temperature data (air temperature, dew point, humidity)
Wind data (speed, direction)

Skills
Which skills do you need for development?

Data Analysis and Preprocessing
Machine Learning and AI Development
Geospatial Analysis
Weather Data Analysis
Software Development and Integration
Project Management
Communication and Reporting

Output
Which key metric are you optimizing for?

Enhancing road safety in Breda by predicting Danger zones.

Value Proposition
What is the value added by your project?

Notifying drivers in real-time when they are approaching or passing through a danger zone serves as a proactive safety measure, ensuring their awareness of heightened risks and enabling them to adjust their driving behavior accordingly.

Integration
How will the project be integrated?

- Data Understanding and Preprocessing
- Model Development
- System Integration
- User Interface
- Testing and Validation
- Deployment and Maintenance

Stakeholders
Who are the key stakeholders?

ANWB and Municipality of Breda

Customers
Who are the end customers?

Road users
Navigation app providers

Cost
What costs will the project incur?

- Costs associated with real-world testing and validation of the system.
- Ongoing maintenance of the system post-deployment.
- Data storage solutions and any required software licenses.

Revenue
How will the project generate revenue?

- Reducing Insurance Costs.
- Reducing Road Construction Costs.

Data Description

- Category and severity, location and weather

- Attributes

- Pre-processing

Data cleaning

Data transformation

Filtering

Joining and merging

Date functions

Methodology

Machine Learning process:

- **data collection: datasets provided by ANWB, KNMI, BRON**
- **data preparation: data cleaning and transfortmation**
- **model architecture and training: MLP using train, test, split.**
- **evaluation: classic evaluation metrics**
- **deployment and feedback**

Methodology

Possible model architecture:

```
# Create a sequential model
model = Sequential()

# Add 3 dense layers of 128, 64 and 32 neurons each
model.add(Dense(128, input_shape=(12288,), activation='relu'))
model.add(Dense(64, activation='relu'))
model.add(Dense(32, activation='relu'))

# Add a dense layer
model.add(Dense(3, activation='softmax'))

# Compile your model
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

# Train your model
history_no_earlystopping = model.fit(X_train, y_train, epochs=20, validation_data=(X_val, y_val))
```

Methodology

Risk Assessment:

- **High Risk**
- **What are the risks?**

Legal Obligations and Approach to Addressing Them:

GDPR Compliance:

- **How does the model comply with the regulations?**

Transparency and Explainability:

- **How can we ensure a transparent model archetype?**

Methodology

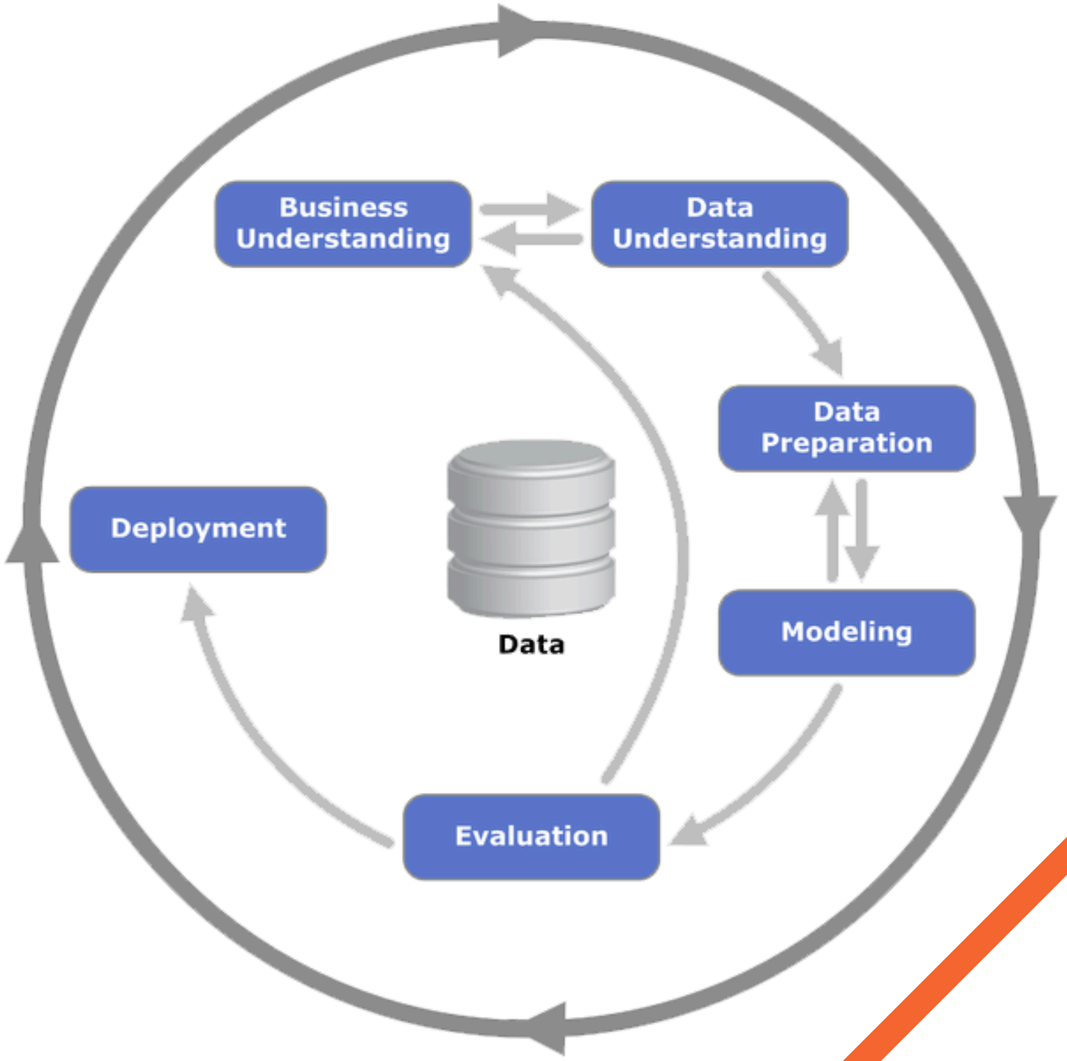
Bias and Fairness:

- **Bias Detection: Regularly check for bias in model predictions against protected attributes (e.g., age, gender).**
- **Fairness: Implement fairness constraints to ensure the model does not disproportionately affect any specific group.**

High-Risk AI Regulations (EU AI Act):

- **Risk Assessment: Conduct a thorough risk assessment to identify and mitigate potential risks.**
- **Conformity Assessment: Ensure the AI system undergoes a conformity assessment before deployment.**

Project Timeline



Week 4: Data Understanding, Preparation, Preprocessing, SQL Querying and Data Framing

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Week 5: Develop Machine Learning model that aligns with the Business idea

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Week 5: Develop Machine Learning model that aligns with the Business idea

Week 6: Evaluation, Iteration, Fine Tuning, and Interface Design

Week 7: Deployment of the model in the application

Project Timeline

Individual contributions of each team member will be documented in several ways

References

- European Parliament. (2021). Proposal for a Regulation laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206

- European Union. (2016). General Data Protection Regulation (GDPR). https://eur-lex.europa.eu/eli/reg/2016/679/oj

Thank you for your attention!