DriveSmart - AI-Powered Training for Safer Roads

Description

This project aims to develop an intelligent driver training system that leverages AI and machine learning techniques to provide real-time assessments and feedback on driving performance. Students with experience in AI will have the opportunity to apply their skills to analyze driving simulator data, extract relevant features, and develop models that can assess driving behavior. By participating in this project, students can contribute to improving road safety and help shape the future of driver training.

Duration

Total project length: 350 hours

Task ideas

* Data collection and preprocessing: Design and implement a data collection framework that captures driving simulator data, including various driving scenarios and parameters such as speed, acceleration, and lane positioning. Preprocess the collected data to ensure its quality and usability for training models.
* Feature extraction and selection: Explore and apply various feature extraction techniques to extract relevant information from the collected driving data. Evaluate different feature selection methods to identify the most informative features that can be used to assess driving behavior accurately.
* Model development: Develop machine learning models that can assess driving performance based on the extracted features. Experiment with different algorithms such as decision trees, random forests, or deep learning models to find the most effective approach.
* Model training and evaluation: Train the developed models using the preprocessed data and fine-tune them to achieve optimal performance. Evaluate the trained models using appropriate metrics such as accuracy, precision, and recall assessing their effectiveness in assessing driving behavior.
* Real-time assessment and feedback: Integrate the trained models into a real-time driver training system that can provide instant feedback to drivers during their training sessions. Implement a user-friendly interface that displays driving performance metrics and suggests improvements based on the model’s predictions.
* Performance optimization: Optimize the models and the overall system to ensure efficient computation and minimal latency in providing real-time feedback. Explore techniques such as model compression, quantization, or parallelization to achieve faster inference times without compromising accuracy.
* Testing and validation: Conduct thorough testing and validation of the developed system using both simulated and real-world driving scenarios. Evaluate its performance in terms of accuracy, responsiveness, and user satisfaction. Fine-tune the system based on feedback and iterate on the design as necessary.

Expected results

* Efficient and personalized training optimized to address unique driver challenges

Requirements

Proficiency in programming languages such as Python, Java, or C++, knowledge of machine learning frameworks, solid understanding of statistical analysis, data visualization, and data preprocessing.

Project difficulty level

Intermediate to Hard