Task: "Safe Taxi: Monitoring Anomalous Driver Condition"

Problem Description

Passenger and driver safety is a key priority in the taxi industry. Anomalous driver behavior—such as sudden braking, rapid acceleration, speeding, or deviating from the planned route—may indicate reckless driving, fatigue, or even a potentially dangerous situation. Developing a monitoring system will help enhance transport safety, improve service quality, and reduce the risk of accidents.

Project Goal

Develop an intelligent system that analyzes taxi drivers' driving behavior in real-time and detects anomalies.

Technical Requirements

Input Data (synthetic or real open-source data can be used):

- GPS data (coordinates, speed, route).
- Acceleration sensor data (for detecting sudden braking, acceleration, and sharp turns).
- Historical data on traffic violations and accidents.
- Traffic and road condition data.
- Route deviation information.

Output Data:

- Detection of unsafe driving behavior (sudden acceleration, braking, speeding).
- Identification of unusual activity (route deviations, unexpected stops).
- Calculation of a "safety rating" for each driver.
- Real or simulated alerts for drivers and dispatchers.

Expected System Features:

- ☑ Real-time analysis of GPS and acceleration sensor data.
- ☑ Driver risk level assessment (e.g., on a scale from 1 to 10).
- ☑ Alert system (notifications for the driver, passenger, and dispatcher).
- ☑ Visualization of routes and anomalies on a map.
- ☑ API or web interface for dispatchers.

Evaluation Criteria (100 points)

1. Functionality (30 points)

- How accurately does the system detect anomalies?
- Are all key features implemented?
- Is there an alert system?

2. Technical Implementation (20 points)

- Quality of the code and analysis algorithms.
- Use of modern technologies (machine learning, GPS and sensor data processing).

3. Innovation (20 points)

- Does the system account for complex scenarios (e.g., emergency braking before a pedestrian)?
- Does it use ML techniques to predict unsafe behavior?

4. Visualization and Usability (10 points)

- Is the system interface user-friendly?
- How well are routes and anomalies displayed?

5. Relevance and Practical Application (10 points)

- Can the system be implemented in a real taxi service?
- Does it improve trip safety?

6. Presentation (10 points)

- Clarity in explaining and demonstrating the system.
- Use of realistic test scenarios.

Additional Recommendations

- Machine learning (ML) can be used to analyze driving behavior (e.g., clustering to detect anomalous driving patterns).
- Data visualization on an interactive map will improve usability.
- Open data on road accidents and weather conditions can be used to enhance the model.
- Anomaly detection algorithms (Isolation Forest, Autoencoder, DBSCAN) can help identify unusual behavior.