

AI/ML

A3 - INTEGRATED SURVEILLANCE, TRAFFIC MANAGEMENT & PREDICTION SYSTEM: CAMERA-BASED DETECTION, TRACKING, AND VIOLATION RECOGNITION

PS Description:

Develop an advanced surveillance and traffic management system capable of detecting, tracking, and recognizing various violations on roadways. The system should utilize surveillance cameras for real-time detection and tracking of moving vehicles, enabling automatic number plate recognition (ANPR) for identification purposes. Additionally, the system should have the capability to monitor and enforce traffic regulations by identifying and reporting violations such as speeding, illegal parking, and lane violations. It should provide real-time alerts and data on detected violations, including vehicle speed and license plate information, while ensuring accuracy and efficiency in the detection process.



Ideaology

1. REAL-TIME SURVEILLANCE

Utilize surveillance cameras placed strategically along the paths of JKLU roadways to capture live footage of moving vehicles.

2. OBJECT DETECTION

Implement object detection modules such as YOLO and OpenCV to identify and track moving vehicles in the captured footage and violation of traffic rules such as over-speeding, tripling, having security measures, lane violations, etc.

3. MODEL TRAINING

Train various machine learning models (e.g., Random Forest, KNN, Logistic Regression) and deep learning models (e.g., MLP, LSTM, CNN, GRU) using the collected data to improve accuracy in violation recognition.

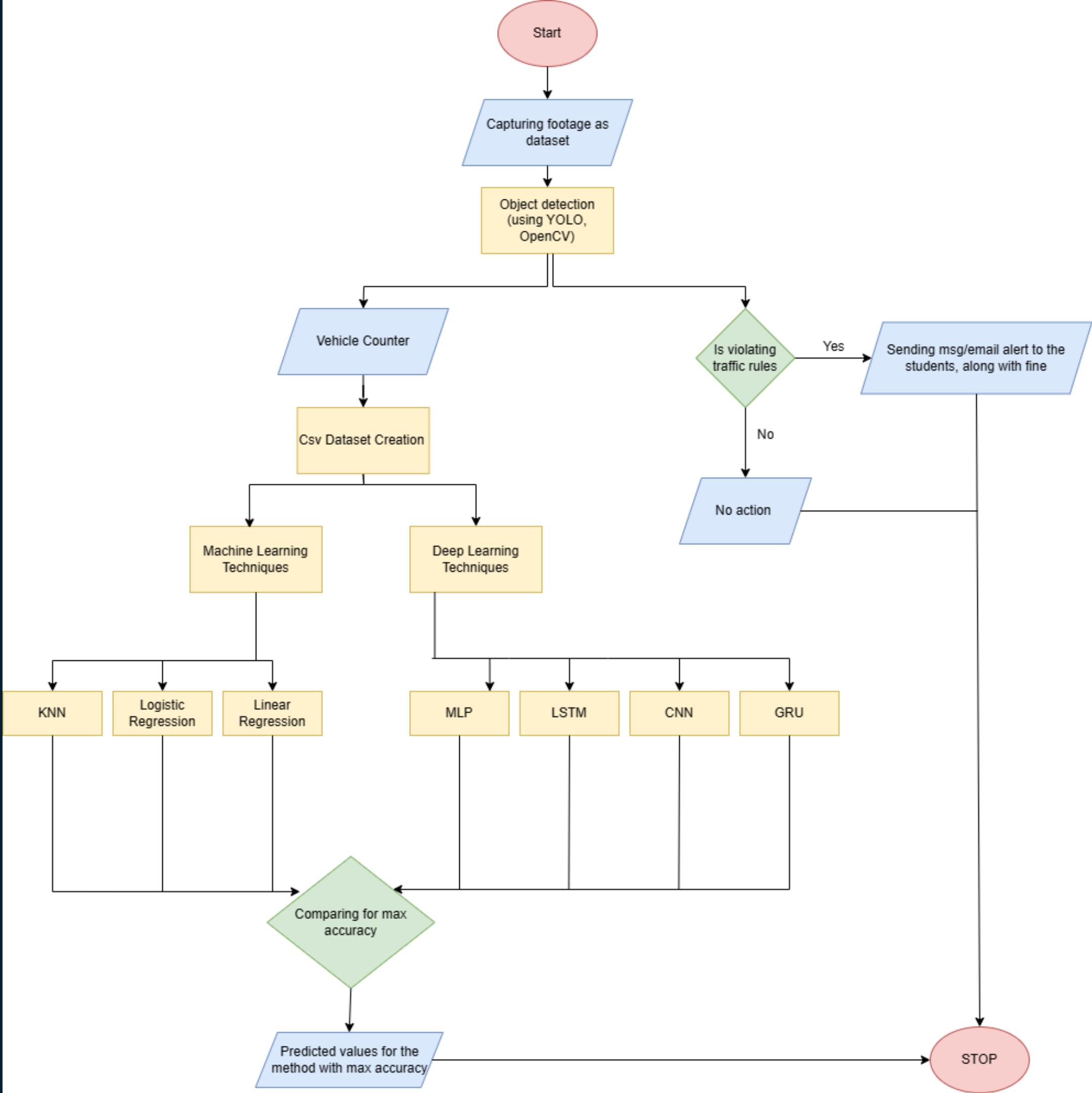
4. ALERTING MECHANISM

Implement a mechanism to send real-time alerts and notifications to relevant authorities or stakeholders whenever a violation (like traveling without helmets, tripling, wrong lane movement, red light skips, overspeeding etc.) is detected.

5. ROUTE OPTIMISATION & PREFERENCE SYSTEM

For multiple routes, between two points the application will use the previous data to predict the traffic on a particular route, optimising and predicting the best route.

FLOWCHART



Use Cases

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1. Traffic violation Tracking and Reporting
2. Real-Time Traffic Rule Violation Alerts

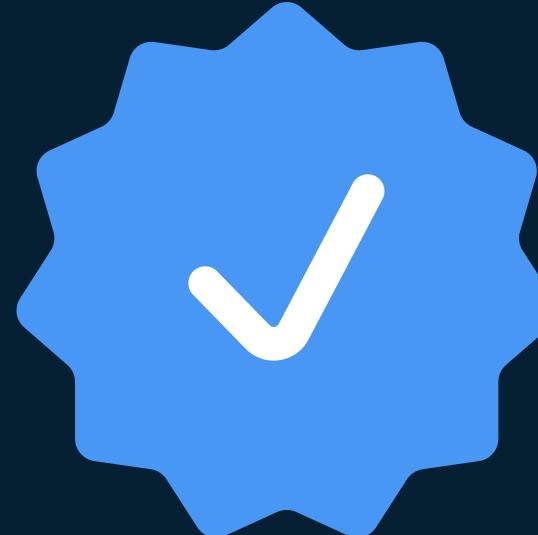
Overall:

1. Traffic Rate Monitoring
2. Traffic Prediction for Route Optimization
3. Monitoring and Reporting Violations



Showstoppers

1. **Additional Route Preference System:** This system optimises the route to be taken according to the time and day details of travel.



Limitations

1. Lack of physical devices to act upon a rule violation or accidental situations.
2. **Accuracy and False Positives:** Despite advancements in computer vision technology, there's still a possibility of false positives, where innocent drivers can be wrongly flagged for violations.



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