

Driver Drowsiness Detection from Video Surveillance Using Transfer Learning

Aishwarya Gopan

UG Student, Department of CSE-BDA, SRM Institute of Science and Technology Ramapuram, Chennai, India

Debopriya Chatterjee

UG Student, Department of CSE-BDA, SRM Institute of Science and Technology Ramapuram, Chennai, India

Chitirala Priyanka

UG Student, Department of CSE-BDA, SRM Institute of Science and Technology Ramapuram, Chennai, India

Dr. Adlene Ebenezer P

Assistant professor, Department of CSE, SRM Institute of Science and Technology Ramapuram, Chennai, India

Abstract:

While working on this project, we realized how often driver fatigue is overlooked as a risk factor on the road. To help reduce such dangers, we built a system that can spot drowsiness in real-time. It uses Python, TensorFlow, and OpenCV—tools that worked well together for what we needed. We trained a lightweight model, MobileNet, to recognize whether a person's eyes are open or closed. To do this efficiently, we used Haar cascade classifiers to locate the face and eyes in each video frame. The system runs on live video, making it easy to connect with existing driver-assistance technologies in vehicles. By utilizing a pre-trained model, the system reduces the need for extensive training data while maintaining high accuracy. The real-time processing capability ensures seamless driver monitoring, offering a practical solution for accident prevention. Beyond road safety, its applications extend to security, healthcare, and human-computer interaction. Future improvements include enhancing robustness to lighting conditions, exploring more advanced face and eye detection algorithms, and incorporating physiological signals such as heart rate variability for a more comprehensive assessment of drowsiness.

Keywords:

Drowsiness Detection, Real-time Monitoring, Python, Image Preprocessing, TensorFlow, OpenCV, Computer Vision, Deep Learning, Transfer Learning, Face and Eye Detection, MobileNet, Convolutional Neural Network (CNN), Haar Cascade Classifier, Video Processing.