Abstract

This research aims to study and implement a driver drowsiness detection system, which addresses a critical factor contributing to road accidents in society. By employing driver drowsiness analysis techniques, the system detects whether the driver is in an Awake, Drowsy, or Distracted state. This, in turn, is intended to significantly enhance road safety.

This document presents an automated driver drowsiness alert system. The research utilizes Machine Learning, specifically Deep Learning, for its core functionality. A total of 19,679 facial image samples were collected from various platforms including Kaggle, Roboflow, and the Faculty of Computer Science, Department of Computer Science, as well as from within Vientiane Capital. This dataset was divided into two parts: 80% for training data and 20% for testing data.

For model creation, the architectural backbones used were ResNet50 and MobileNetV3-Large, both of which are Convolutional Neural Networks (CNNs). For the web application development, JavaScript (React Framework**)** was used for the frontend to display the UI, leveraging HTML/CSS (Tailwind Framework) for styling. The backend is responsible for streaming data to the frontend, developed using Python (FastAPI Framework) to create APIs for real-time inference. The trained models were then integrated into this web application to provide automated driver drowsiness alerts.

The results show that the model built with ResNet50 achieved a test accuracy of 99.2% with a 0.43% error rate, while the model using MobileNetV3-Large achieved a test accuracy of 98% with a 0.3% error rate. The developed web application allows users to activate their camera directly on the website, enabling the model to automatically predictthedriver'sdrowsinessstate.