VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belagavi-590018.

A Mini Project (21CSMP67) Synopsis on

"Real Time Drowsiness Detection using Machine Learning for enhanced Road Safety"

Submitted in the partial fulfilment of the requirements for the award of the degree of

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1. Abstract

This project involves developing a driver drowsiness detection system using OpenCV. The system monitors the driver's face through a camera, detects signs of drowsiness such as eye closure, and issues alerts to prevent accidents. The project leverages machine learning techniques and real-time image processing to enhance road safety by reducing the risk of accidents caused by driver fatigue.

1.1. Background

Driver drowsiness is a significant cause of road accidents worldwide. Traditional methods to counteract this issue include roadside tests and in-vehicle monitoring, but these methods often lack real-time detection and immediate response capabilities.

1.2. Objective

The primary objective of this project is to create a real-time driver drowsiness detection system that can alert drivers before they fall asleep, thus preventing potential accidents. The system aims to enhance road safety by providing timely warnings based on visual cues of drowsiness as mentioned below .

1. **Face Detection**: Using Haar Cascades, the system detects the driver's face in real-time.

2. **Eye Detection**: Once the face is detected, the system identifies the eyes to monitor their state (open or closed).

3. **Forehead Dot Tracking**: The system keep a track of the aerial distance between forehead and the steering wheel , and triggers an alarm when identifies the sign of drowsiness

4. **Blink Detection**: By analyzing the eye aspect ratio (EAR), the system determines whether the eyes are blinking normally or are closed for prolonged periods, which indicates drowsiness

5. **Alert System**: When signs of drowsiness are detected, various alarm sounds will be triggered based on the specific indicators identified, effectively alerting the driver.

2. Methodology

To achieve the primary objective of creating a real-time driver drowsiness detection system that alerts drivers before they fall asleep, thereby enhancing road safety, the following methodologies are employed:

1. **Face Detection:**
   - The system uses a camera mounted on the dashboard to capture the driver's facial features.
   - Haar Cascades are employed to detect the driver's face in real-time.

2. **Eye Detection**:
   - After detecting the face, the system identifies the eyes using facial landmark detection.
   - The state of the eyes (open or closed) is monitored continuously.

3. **Blink Detection**:
   - The eye aspect ratio (EAR) is analyzed to determine the blinking pattern.
   - Prolonged closure of the eyes, detected through deviations in the EAR, indicates drowsiness.

4. **Forehead Dot Tracking**:
   - A static reference line is placed on the driver's face and a dot on the forehead.
   - When the driver leans towards the steering wheel, the forehead dot moves below the reference line, signaling drowsiness.

5. **Alert System**:
   - When signs of drowsiness are detected, an alarm system is triggered.
   - Different alarm sounds are played based on the specific drowsiness indicators identified.

This methodology integrates image processing and machine learning techniques, primarily utilizing OpenCV for real-time video analysis. The advantages of this method include its non-intrusive nature and the ability to provide immediate feedback to the driver, thereby significantly improving road safety.

3. Expected outcome of the mini project

The mini project will be evaluated based on its accuracy in detecting drowsiness and the speed of issuing alerts. The expected outcome includes a functional prototype capable of real-time monitoring and alerting, with a high detection rate of drowsiness signs. The system should successfully alert drivers before they fall asleep, thus demonstrating its potential to reduce the incidence of drowsiness-related accidents on the road.