DROWSINESS DETECTION SYSTEM

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1. PROBLEM DESCRIPTION

Nowadays roads accidents are rising in the world. The reason can be partially because the number of vehicles is increasing significantly and weak surveillance. However, the main reason stays the same which is the lack of attention of the drivers behind the steering wheels. Out of different possibilities for lack of attention, the one which is most prominent is the drowsiness of the driver. It is natural for drivers who take long drives to doze off behind the steering wheel. In this project, we will discuss methods to detect a person being drowsy and ways to mitigate such a situation which can put someone's life to critical situations.

Drowsiness is identified by using vision-based techniques like eye detection, yawning and nodding. It is tackling to identify a sleepy person just based on yawning and nodding as those gestures can be natural without sleep requirements. Hence, we will be using only the eye movements detection to classify if the person is drowsy or not. Another method is by using physiological sensors like biosensors. However, the persons may hesitate to wear such devices or forget to wear them while on the road which puts these methods out of our scope.

2. BUSINESS UNDERSTANING

Many people face long nights at work. Truck drivers, security guards, healthcare professionals. Jobs that are fundamental to our society and to the health, wellbeing, and comfort of the general population. Exhaustion can be as bad as driving under the influence of alcohol. As a result, getting behind the wheel while being tired is not very uncommon. It can be dangerous unless we find a way to warn drivers when their tiredness has become too severe and is impacting their driving.

By utilizing data science tools like computer vision and deep learning, we can design application to make driving safer and lessen the chances of human error resulting in catastrophic road traffic accidents. These use cases can range from warning drivers if there's something in their blind spot, to automatic emergency braking. Our application can utilize the cameras nowadays available in the rear-mirror to capture eye movements and blinking frequencies to notice if the driver is feeling sleepy.

This project Drowsiness Detection System is a one of the core parts of ADAS (Advanced Driver Assistance Systems) which are becoming the standard in cars today. In 2015, US carmakers pledged to have many types of ADAS equipment as standard by 2022, which shows the exemplary growth of this type of products and applications.

3. **METHODOLOGY**

In this project, I will use different existing methods to build a deep learning classification model using the computer vision, machine learning and neural network techniques. I also plan to use transfer learning to build the preliminary model. Transfer learning is a machine learning method where we use a pre-trained model for a new model with related problem statement.

4. **PROJECT LIFECYCLE**

Week	Date	Task	Comments
8	26 July 2024	Dataset understanding and Exploratory Data Analysis (EDA)	
9	2 August 2024	Data modeling and transformation	
10	9 August 2024	Transfer Learning and Feature engineering	
11	16 August 2024	Model fitting and EDA Presentation	
12	23 August 2024	Model selection and Best Model selection with dashboards of results.	