Problem Statement: Computer Vision

Context:

According to the World Health Organization (WHO), road traffic accidents are a significant global health concern, with millions of lives lost annually. Among the leading causes of these accidents is driver fatigue, including drowsiness and unease, which severely impairs the driver's ability to react quickly and make sound decisions.

Recent advancements in computer vision technology offer a promising avenue for addressing this issue. By monitoring driver behavior and detecting signs of drowsiness or unease in real-time, we can alert drivers and potentially prevent accidents. The challenge is to develop a robust and effective Computer Vision algorithm capable of detecting driver unease, drowsiness, or sleepiness by analyzing data from in-car cameras.

Problem Statement:

Participants are tasked with developing a Machine Learning/Deep Learning algorithm capable of analyzing video feeds from an in-car camera and accurately detecting instances of driver drowsiness, unease, or sleepiness. The goal is to create a complete prototype that can be integrated into vehicles to enhance road safety.

Dataset:

Participants can use this dataset for making their model:
https://www.kaggle.com/datasets/dheerajperumandla/drowsiness-dataset

Note: Participants are not limited to only use this dataset and they can work with any dataset at their disposal which may include curating a dataset by themselves as well.

Requirements:

Develop a robust algorithm for real-time driver drowsiness detection using computer vision techniques.
Implement the algorithm as a working prototype, which can be demonstrated using a camera interfaced with a laptop.
Utilize Machine Learning or Deep Learning frameworks and programming languages of your choice for model development.
Clearly specify the hyperparameters, preprocessing techniques, and any limitations of your algorithm in the project documentation/presentation.
Evaluate the algorithm's performance using standard classification metrics and assess its computational complexity.
Participants must refrain from using additional data sources outside of the provided dataset.

Deliverables:

Participants are required to submit the following:

- A video recording showcasing the end-to-end functionality of the algorithm.
- A comprehensive document/presentation containing the following:
- Description of the developed model.
- Details of preprocessing and post-processing techniques applied.
- Explanation of hyperparameter choices.
- Presentation of results and model performance metrics.
- Identification of limitations and suggestions for future enhancements.
- Codebase hosted on a public repository, such as GitHub, for review and evaluation.

Final Notes:

The primary goal of this hackathon is not only to develop an accurate driver drowsiness detection algorithm but also to understand and demonstrate the entire workflow, from data preprocessing to algorithm deployment. Participants are encouraged to consider real-world applications of their solution, with a focus on improving road safety and preventing accidents caused by driver fatigue.