

Task 1

Drowsiness Detection Using Deep Learning

1. Introduction: -

An Automated Approach to Enhance Road Safety In today's fast-paced world, road safety is of paramount importance. Drowsy driving poses a significant threat, contributing to a substantial number of accidents each year. This project aims to address this critical issue through the application of deep learning techniques for real-time drowsiness detection. By leveraging the power of neural networks, we aim to create an automated system capable of identifying signs of driver drowsiness and alerting them, thereby mitigating the risks associated with fatigue-induced accidents.

2. Background: -

Drowsy driving is a widespread issue with severe consequences. According to Statistics around 20% of accidents are attributed to driver fatigue. These incidents result in 1550 fatalities and 71,000 injuries annually according to National Safety Council (NSC). Traditional methods of addressing drowsy driving rely on subjective assessments or are not real-time, necessitating the need for automated, proactive solutions.

The Need for Automated Drowsiness Detection

Automated drowsiness detection systems offer a promising avenue for enhancing road safety. By utilizing deep learning algorithms, we can analyze driver behavior and physiological signals to detect signs of drowsiness accurately. This project aligns with the growing trend of employing advanced technologies to prevent accidents and save lives on the road.

3. Learning Objectives

- Acquire proficiency in deep learning techniques for image and real time video. Understand the principles and architectures of neural networks, specifically tailored for drowsiness detection.
- Gain hands-on experience in implementing and fine-tuning deep learning models using popular frameworks like TensorFlow .
- Develop the ability to analyze and interpret the results of drowsiness detection algorithms.

4. Activities and Tasks

Project Workflow

Data Collection: Used the mriEyes_2018_01 data set which contains the image of different people with eyes open and closed, it also contained the image with eyes with glasses and without glasses.

Data Preprocessing: Cleaned the preprocessed dataset to ensure consistency and remove noise and separated the data into open and closed eyes.

Model Selection: Choose a suitable deep learning architecture for drowsiness detection (e.g., CNN, LSTM). Using the CNN for final model.

Model Training: Train the selected model using the preprocessed dataset.

Model Testing: Evaluate the model's performance on a separate test dataset.

Alert System Integration: Integrate the drowsiness detection model with an alert mechanism, with sound.

Performance Evaluation: Assess the overall accuracy.

5. Skills and Competencies

- Key Skills and Competencies to Develop
- Proficiency in Python programming.
- Familiarity with deep learning frameworks, such as TensorFlow.
- Understanding of convolutional neural networks (CNN)
- Problem-solving skills for addressing challenges in model training and deployment.

6. Feedback and Evidence

To provide continuous feedback, regular code reviews and milestone evaluations was conducted. I was expected to submit well-documented code, and evidence of successful completion of tasks will include trained models, performance metrics, and a functioning drowsiness detection system.

7. Challenges and Solutions

- Anticipated Challenges
- Limited and unbalanced dataset.
- Model convergence issues during training.
- Integration complexities with real-time alert systems.
- Proposed Solutions
- Experiment with different model architectures and hyperparameter tuning.

8. Outcomes and Impact

Upon successful completion of the project, I anticipate a robust drowsiness detection system with high accuracy and reliability. The real-world impact includes a reduction in drowsy driving-related accidents, contributing to improved road safety and saved lives.

9. Conclusion

In conclusion, this project not only equips participants with valuable skills in deep learning but also addresses a critical societal issue. By implementing an automated drowsiness detection system, we contribute to the ongoing efforts to make our roads safer and reduce the toll of accidents caused by driver fatigue. The knowledge and experience gained throughout this project have the potential to make a lasting impact on road safety.