Project Abstract

Dimensional Image Transformation

Team Name -AI Avengers

Team Members -

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Objective-

* To develop an innovative Drowsiness Detection System that surpasses conventional approaches, our project aims to take significant steps in reducing the risks associated with drowsy driving, ultimately saving lives and reducing accidents happening on the road. Through the deployment of this solution, we aspire to contribute to a safer and more secure transportation ecosystem, promoting greater public awareness and obedience to road safety regulations.
* To create a model that reconstructs 3D scenes from 2D images, employ computer vision techniques to create a detailed and accurate 3D representation of the objects and scenes captured in the images.

Description-

* The Drowsiness Detection System is a crucial application aimed at enhancing road safety by detecting signs of driver drowsiness in real-time. Leveraging computer vision techniques, the system analyzes live video feeds to monitor facial features and eye movements, accurately identifying indicators such as heavy eyelids or prolonged eye closures. Upon detecting drowsiness, the system prompts timely interventions to prevent potential accidents, thereby safeguarding lives on the road.
* Our approach commences by acquiring depth images, enabling us to extract crucial depth information. Subsequently, leveraging this depth data, we derive a set of 3D points corresponding to the spatial layout of the depicted scene or object. Employing triangulation techniques, we carefully reconstruct the 3D model. Finally, we present the generated 3D model through visualization tools, facilitating comprehensive analysis and interpretation of the underlying data.

Features-

* Real-time Drowsiness Detection: Analyzes live video feeds to detect signs of drowsiness in drivers.
* Facial Feature Monitoring: Focuses on facial landmarks and eye movements for precise detection of drowsiness indicators.
* Customizable Threshold: Allows users to set a threshold for drowsiness detection, ensuring flexibility and adaptability to different scenarios.
* Interactive Feedback: Provides visual and auditory alerts to notify drivers when drowsiness is detected, promoting immediate corrective actions.
* Random Arithmetic Verification: Engages drivers with random arithmetic challenges to ensure alertness and responsiveness during drowsiness episodes.

Tech Stack –

* OpenCV: Used for real-time video processing and facial feature extraction.
* Dlib: Utilized for face detection and facial landmark identification.
* NumPy: Employed for numerical computations and data manipulation.
* Scipy: Used for calculating the Euclidean distance between facial landmarks.
* Pygame: Utilized for playing audio alerts
* Time: Incorporated for tracking time durations and intervals during drowsiness detection.
* Random: Utilized for generating random arithmetic challenges to assess driver alertness.

Methodology / Work Plan –

The system begins by capturing live video feeds from a camera connected to the device. It employs OpenCV and Dlib libraries for face detection and facial landmark identification, allowing it to track key features such as eyes. A custom algorithm calculates the Eye Aspect Ratio (EAR) to assess the level of eye closure. When the EAR falls below a predefined threshold for a specified duration, indicating drowsiness, the system triggers visual and auditory alerts to notify the driver. Additionally, random arithmetic challenges are presented to the driver to verify alertness and facilitate timely response.

Resources Referred –

* OpenCV and Dlib documentation for facial feature extraction and manipulation.
* Scientific literature on drowsiness detection algorithms and methodologies.
* Online tutorials and forums for implementing real-time computer vision applications.
* Pygame, NumPy and various Python libraries documentation for audio playback and numerical computations.