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Driver Drowsiness Detection using Python

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ABSTRACT:

The majority of today's traffic accidents are caused by driver errors and carelessness. Drowsiness, intoxication, and reckless driving are the leading causes of major driver errors. This project focuses on a driver drowsiness detection system for the Intelligent Transportation System, which focuses on anomalous behavior displayed by the driver when using a computer. The ability of driving assistance systems to determine a driver's level of alertness is critical for guaranteeing road safety. Driver weariness can be diagnosed early enough to prevent crashes caused by drowsiness by observing blink patterns and eye movements. A nonintrusive driver sleepiness monitoring system has been built employing computer vision techniques in the proposed system. According to the simulation results, the system was able to detect tiredness despite the driver wearing spectacles and the amount of darkness inside the vehicle. Furthermore, the device is capable of detecting drowsiness in less than two seconds. The discovered aberrant behavior is remedied in real time through alarms. Image processing, picture analysis, image pattern recognition, and computer vision, as well as human vision, can all benefit from edge detection. In our project, the accuracy of drowsiness detection is predicted using a Convolution Neural Network (CNN) technique.

INTRODUCTION:

In today's world, a growing number of jobs need long-term attention. Drivers must keep a careful eye on the road in order to react quickly to unexpected incidents. Many road accidents are caused directly by driver sleepiness. There is a need to develop technologies that can detect and alert a driver when they are in a negative psychophysical state, which could help to reduce the frequency of fatigue-related car accidents. However, the development of such systems has numerous challenges, including the rapid and accurate assessment of a driver's fatigue symptoms. The employment of a vision-based technique is one of the technical options for implementing driver drowsiness detection systems. We present a vision-based fatigue detection system for bus driver monitoring that is simple and adaptable to install in buses and large vehicles in this paper. Head detection, face detection, eye detection, eye openness estimation, fusion, sleepiness measure estimation, and classification are among the system's modules.
The current technique is less accurate in predicting tiredness and takes more time.It can't be used on all datasets or with a complicated model.The proposed approach has the advantages of requiring less time and eliminating manual labor.It may be used on any dataset and has a higher accuracy rate for predicting drowsiness.It's a model that's easy to use.

SYSTEM REQUIREMENTS:

The system requirements include Hardware and Software requirement, which are provided below:

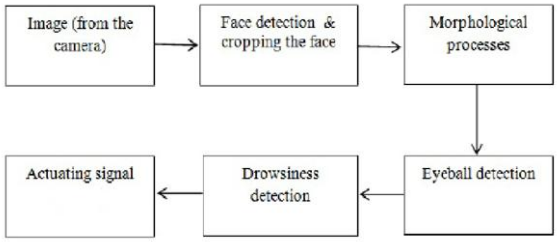
HARDWARE REQUIREMENTS:
Processor : Any Processor above 500 MHz.
Ram : 4 GB
Hard Disk :More than 256 GB
Input device:System Camera
Output device : High Resolution Monitor.

SOFTWARE REQUIREMENTS:
Operating System : Windows 7 or higher
Programming :Python 3.6.4 and relateable libraries
Web Server : Jupyter Notebook
IDE : Python IDE

SYSTEM DESIGN:

This chapter gives overview of architecture design

Architecture Diagram



The above figure represents architecture of proposed system, in which all modules of the work are represented. User gives input through camera, can get the signal of Drowsiness Detection.

MODULES:

1. Image Acquisition
2. Image Preprocessing
3. Image Segmentation
4. Feature Extraction
5. Classification.

1. Image Acquisition

The process of collecting photographs is known as acquisition. These photographs were obtained from Kaggle.com, an online dataset source.

2. Image Preprocessing

Converting normal images into resize images is part of image preprocessing. Grayscale images are made up of black and white pixels.Grayscale photos help to reduce noise while also neutralizing the background.It also aids in the enhancement of visual brightness.

Data augmentation is a method of generating new data that has the advantages of being able to generate more input from less data and avoiding overfitting..

3. Image Segmentation

Image segmentation divides an image into useful parts.

It separates a digital image into several pieces. The idea is to make the representation more meaningful by simplifying or changing it.It distinguishes between the objects we want to look at more closely and the other objects or their surroundings.It entails segmenting the transformed grayscale images with the K segmentation method

4. Feature Extraction

Feature extraction is the process of extracting or displaying the segmented component of an image in order to facilitate categorization.To distinguish between the photos, features are extracted.Almost all machine vision algorithms involve feature extraction.Feature extraction and representation strategies all have the same goal: to turn segmented objects into representations that better characterize their major characteristics and properties.The contour of the twins' facial spots is extracted here..

5. Classification

The concept of a classification algorithm is used here. The classification in the final module will be done using Tensor Flow and Machine Learning algorithms.Tensor Flow is an open source numerical computing package for Matlab that makes machine learning faster and easier.

Developers can use Tensor Flow to design dataflow graphs, which are structures that explain how data flows across a graph or a set of processing nodes.Each node in the graph symbolizes a mathematical process, and each node-to-node connection or edge is a tensor, or multidimensional data array..

LITERATURE SURVEY:

- **Real-Time Drowsiness Detection Algorithm for Driver State Monitoring Systems Jang Woon Baek, Byung-Gil Han IEEE 2020.**

we proposes a novel drowsiness detection algorithm using a camera near the dashboard. The proposed algorithm detects the driver's face in the image and estimates the landmarks in the face region. In order to detect the face, the proposed algorithm uses an AdaBoost classifier based on the Modified Census Transform features. And the proposed algorithm uses regressing Local Binary Features for face landmark detection.

- **Driver Drowsiness Detection based on Multimodal using Fusion of Visual-feature and Bio-signal Hyung-Tak Choi, Moon-Ki Back IEEE 2020.**

In this study, we propose a system based on Multimodal Deep Learning that recognizes both visual and physiological changes in drowsiness. Because using different kind of data, heterogeneity problem arise. So in order to eliminate heterogeneity between data, using generative model to representation. Since drowsiness is a change that occurs with time, we use a deep learning network consisting of Long Short-Term Memory (LSTM) to classify the driver's condition.

- **Driver Drowsiness Detection System Based on Visual Features Fouzia, R. Roopalakshmi IEEE 2020.**

The proposed framework, continuously analyzes the eye movement of the driver and alerts the driver by activating the vibrator when he/she is drowsy. When the eyes are detected closed for too long time, a vibrator signal is generated to warn the driver. The experimental results of the proposed system, which is implemented on Open CV and Raspberry Pi environment with a single camera view, illustrate the good performance of the system in terms of accurate drowsiness detection results and thereby reduces the road accidents.

- **Smartwatch-Based Wearable EEG System for Driver Drowsiness Detection Gang Li ; Boon-Leng Lee ; Wan-Young Chung IEEE 2020.**

This paper proposes a support vector machine-based posterior probabilistic model (SVMPPM) for DDD, aimed at transforming the drowsiness level to any value of 0~1 instead of discrete labels. A fully wearable EEG system which consists of a Bluetooth-enabled EEG headband and a commercial smartwatch was used to evaluate the proposed model in a real-time way. Twenty subjects who participated in a 1-h monotonous driving simulation experiment were used to develop this model with fifteen subjects for a building model and five subjects for a testing model.

- **Driver Behavior Analysis for Safe Driving: A Survey Sinan Kaplan ; MehmetAmacGuvensan ; Ali GokhanYavuz ; YasinKaralurt IEEE 2020.**

This paper discusses and provides a comprehensive insight into the well-established techniques for driver inattention monitoring and introduces the use of most recent and futuristic solutions exploiting mobile technologies such as smartphones and wearable devices. Then, a proposal is made for the active of such systems into car-to-car communication to support vehicular ad hoc network's (VANET's) primary aim of safe driving. We call this approach the dissemination of driver behavior via C2C communication. Throughout this paper, the most remarkable studies of the last five years were examined thoroughly in order to reveal the recent driver monitoring techniques and demonstrate the basic pros and cons.

PROPOSED SYSTEM:

Convolution Neural Network:

Convolutional neural networks (CNNs, or ConvNets) are a type of deep neural network used to analyze visual imagery in deep learning. Because of its shared-weights architecture and translationinvariance qualities, they are also known as shift invariant or space invariant artificial neural networks (SIAN tilayer perceptrons are typically completely connected networks, meaning that each er. These networks' "complete connectivity" makes them vulnerable to data overfi to the loss function is a common approach of regularization. CNNs take a differ in data to piece together more complicated patterns from smaller, simpler patter d complexity spectrum.

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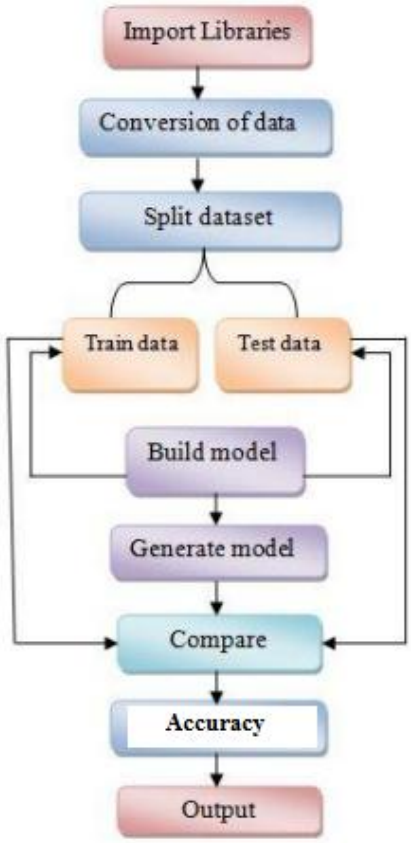
Work



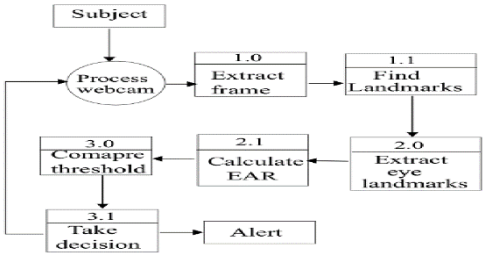
heck it for classifier analysis.

lependent variables from independent variables. Split the dataset into train set

ıme model for testing.

f the model.

Class Diagram:



Deployment Diagram:

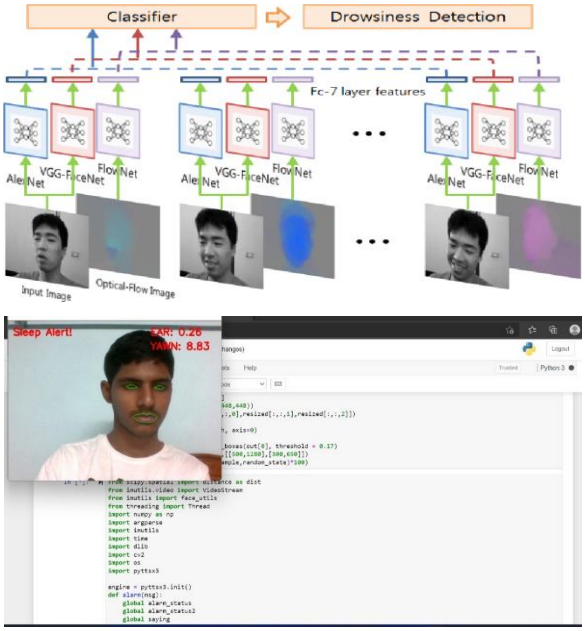


Fig: System giving sleep alert signal

CONCLUSION :

The designed driver abnormality monitoring system is capable of identifying drowsiness, intoxication, and hazardous driving behaviors in a short period of time.The Tiredness Detection System, which is based on the driver's eye closure, can distinguish between normal eye blink and drowsiness, as well as identify drowsiness while driving. The proposed technology can help avoid accidents caused by drowsy driving. Even if the driver wears glasses, the device functions effectively in low light settings if the camera produces a higher output. Various self-developed image processing methods are used to collect information about the head and eye positions. The technology can determine if the eyes are open or closed during the monitoring. A warning signal is given when the eyes are closed for an extended period of time. Continuous eye closures are used to determine the driver's alertness state.

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