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DRIVER DROWSINESS DETECTION BASED ON MONITORING OF EYE BANK RATE

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ABSTRACT

Researchers have been studying the potential of facial expression recognition for the last decade. One of the most important steps in the analysis of facial expressions is the extraction of features. This process can help improve the accuracy of recognition.

Different types of emotions are known to exist in two categories: non-positive and positive. There are four types of systems used for analyzing facial expressions: face detection, extraction, classification, and recognition.

Keywords: Facial Expression Recognition, EAR Eye Aspect Ratio, HOG Histogram Of Gradients, Haar Cascade.

I. INTRODUCTION

Drowsy driving is one of the major causes of deaths in road accidents. Truck drivers who drive for continuous long hours (especially at night), long long-continuous bus drivers on long-distance routes, or overnight buses are more susceptible to this problem. Driver drowsiness is an overcast nightmare for passengers in every country. Every year, many injuries and deaths occur due to fatigue-related road accidents. Hence, detection of driver's fatigue and its indication is an active area of research due to its highly sensitive applicability. The basic drowsiness detection system has three blocks or modules: an acquisition system, a processing system and a warning system. Here, the video of the driver's frontal face is captured in an acquisition system and transferred to the processing block in which it's far processed on-line to discover drowsiness. The driver will get an alert sound when drowsiness is detected for ease of use.

II. LITERATURE SURVEY

1. PHYSIOLOGICAL CHARACTERISTICS SENSING

The most accurate method is based on human physiological activity [1]. The sensing technique can be implemented in two ways: the first is measuring changes in physiological signals, such as brain waves, heart rate, and eye blinking; and the second one is measuring the physical changes, which can be sagging posture, leaning of the driver's head and the open/closed states of the eyes.

2. VEHICLE RESPONSE SENSING

Driver and vehicle operations can be constantly monitored by steering wheel movement, acceleration and braking patterns, linear speed of vehicle, lateral acceleration and displacement [3]. The suggested technique is a non-intrusive method of drowsiness detection but is generally limited to vehicle type and driver's driving style.

3. MONITORING DRIVER RESPONSE

The approach used in drowsiness detection involves monitoring the driver response. This requires periodic need of input from the driver to the system to indicate alertness. This technique involves a major problem in terms of tiring and annoying the driver of the vehicle at regular intervals.

III. PROPOSED SYSTEM

Most of them, in a few ways, relate to highlights of the eye (ordinarily reflections from the eye) inside a video picture of the driver. The first point of this venture was to utilize retinal reflection as an impression of finding the eyes on the face, and after that, it utilized the nonappearance of this reflection as a way of identifying when the eyes are closed. Applying this calculation on sequential video outlines may help within the calculation of the eye closure period. Eye closure periods for lazy drivers are longer than ordinary blinking. It is additionally an

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exceptionally short time and may result in an extreme crash. So, we'll caution the driver immediately as closed eye is identified.

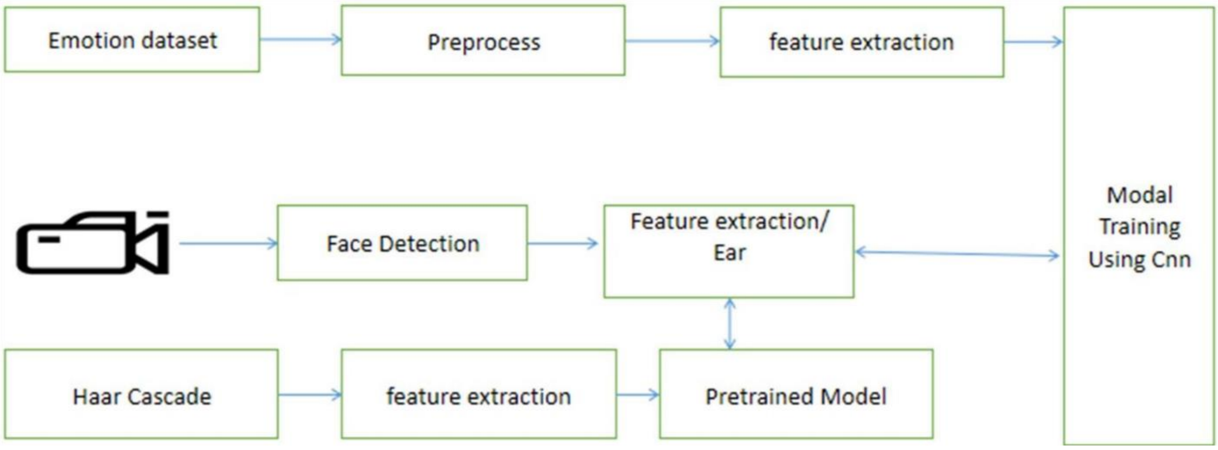

Fig: 1

IV. EXISTING SYSTEM

Existing systems used the eye closure ratio as an input parameter to detect the drowsiness of the driver. Then Noise and rotation invariant facial expression recognition, which is based on statistical movement, which is Zernike moments. Extracted features from Zernike moments are given as input to the Navie Bayesian classifier for emotion recognition. If the attention closure ratio deteriorates from the usual ratio, the driving force is alerted with the help of a buzzer. For our system, a camera is used to capture the images of the driver's eye and the entire system is incorporated using CNN.

V. MODULE DESCRIPTION

1. **Pre-Processing**
2. **Segmentation**
3. **Face Registration**

After surveying a number of different papers, the following methodologies have been identified:

Initially, in order to identify the drivers' drowsy state using PERCLOS, we need to perform the following steps :

- Perception of face and face pursuit.
- Position of eye and eye pursuit.
- Identification of the state of the eyes.
- Calculation of percentage of eyelid closure.
- Identification of the drowsy state.

PERCLOS is one of the measures to notice the state of drowsiness.

LITERATURE REVIEW

The developed system is a real time system. It uses image processing for eye and face detection. The HAAR based cascade classifier is used for face detection. An algorithm to track objects is used to track the eyes continuously. In order to identify the drowsy state of the driver, the PERCLOS algorithm was published . The paper focuses on developing a non- intrusive system which can detect fatigue and issue a warning on time. The system will monitor the drivers' eyes using a camera. By developing an algorithm, the symptoms of driver fatigue can be detected early enough to avoid an accident. When the signs of fatigue have been identified, output in the form of sound and seat belt vibration is provided to alert the driver. Warnings will be deactivated manually rather than automatically. This paper uses a faster algorithm than PERCLOS. This system will detect driver fatigue by the processing of the eye region.

VI. HAAR TRAINING

The OpenCV library provides numerous functions for face and feature (eyes, mouth, sunglasses, etc) detection. Some of these functions can be used to train classifiers. The classifiers can be trained for the process of

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detection of face. This is known as HAAR training. Object. Here, a cascade function is trained from a number of images, both positive and negative. Each feature is a single value obtained by subtracting sums of pixels from various regions of the image. The pixels used for extraction are different for each feature. All the extracted features will not be useful for the required process.

The Ada boost technique is used to extract the relevant features. Each and every feature is applied to the training images. The best threshold is determined for each feature which classifies images from positive to negative. Features which provide the least error rate are chosen. Initially, each feature was given an equal weight. As the process continues, the weights are updated according to the results obtained in order to improve the accuracy.

VII. ANACONDA NAVIGATOR

Anaconda Navigator is a desktop graphical user interface (GUI) included in Anaconda® distribution that allows you to launch applications and easily manage packages, environments, and channels without using command-line commands. Navigator can search for packages on Anaconda.org or in a local Anaconda Repository.

Anaconda Now, if you are primarily doing data science work, Anaconda is also a great option. Anaconda is created by Continuum Analytics, and it is a Python distribution that comes preinstalled with lots of useful python libraries for data science.

Anaconda is a distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.), that aims to simplify package management and deployment.

In order to run, many scientific packages depend on specific versions of other packages. Data scientists often use multiple versions of many packages and use multiple environments to separate these different versions.

The command-line program conda is both a package manager and an environment manager. This helps data scientists ensure that each version of each package has all the dependencies it requires and works correctly.

Navigator is an easy, point-and-click way to work with packages and environments without needing to type anaconda commands in a terminal window. You can use it to find the packages you want, install them in an environment, run the packages, and update them – all inside Navigator.

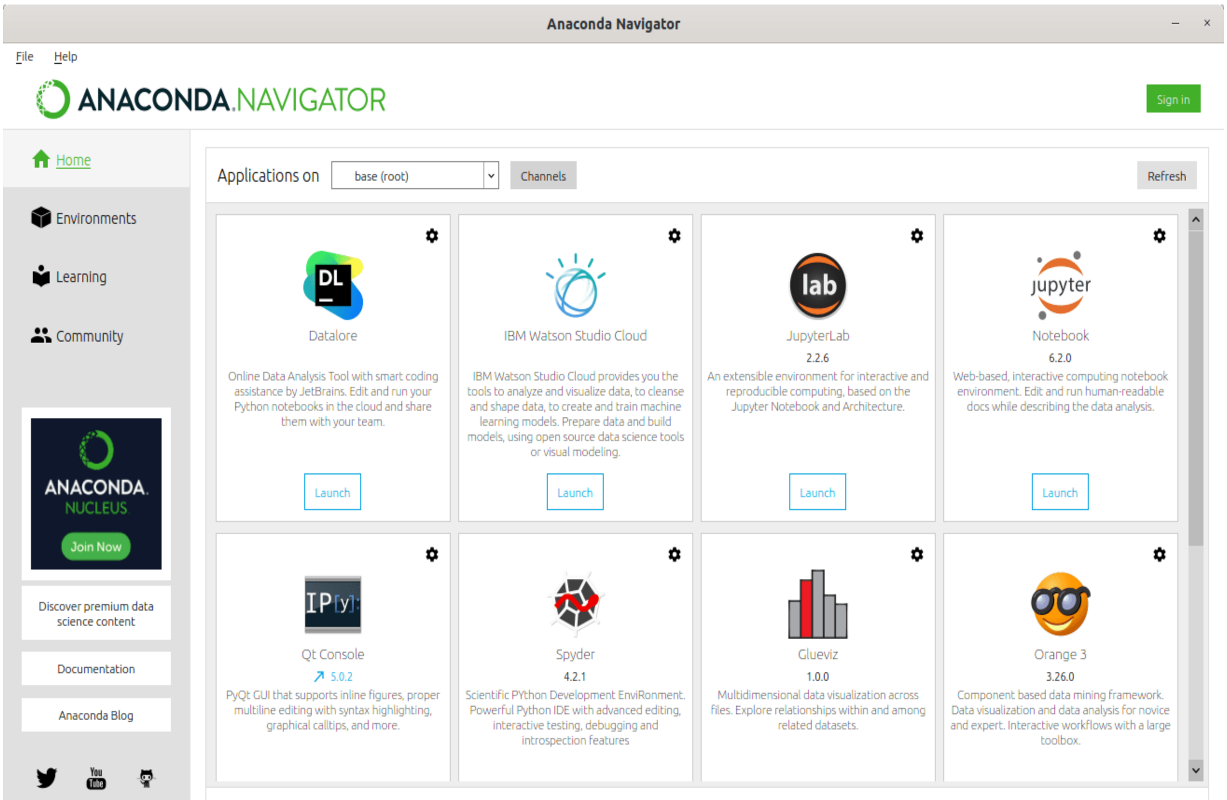

Fig: 2 Anaconda Navigator

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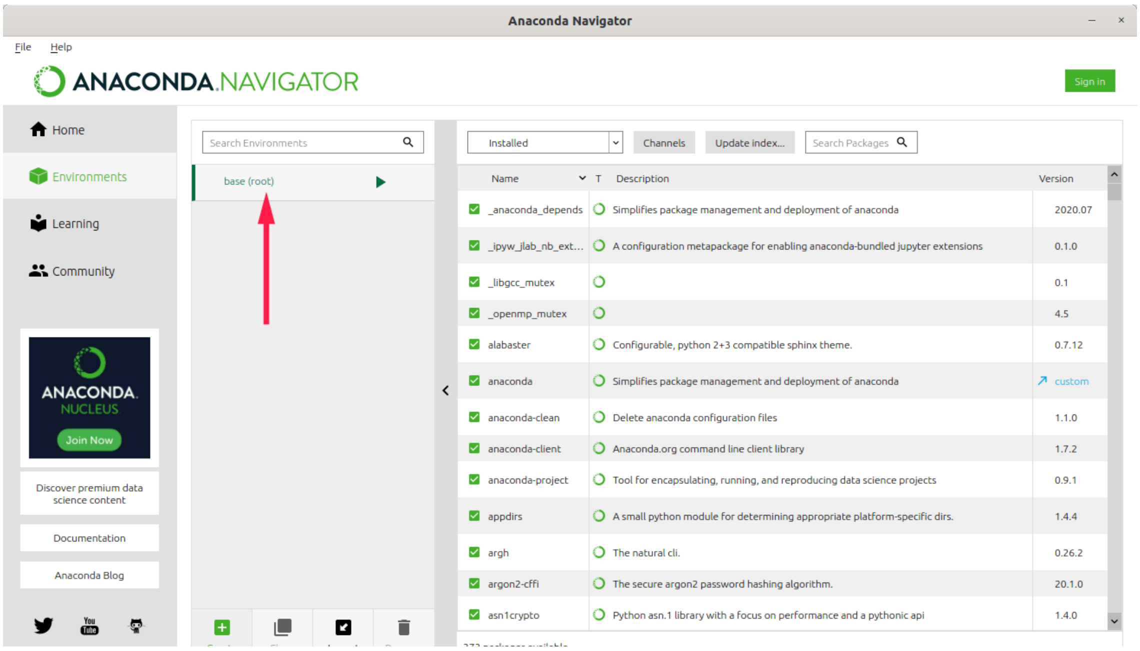

Fig: 3 Anaconda Navigator Application 1

VIII. JUPYTER NOTEBOOK

This website acts as “meta” documentation for the Jupyter ecosystem. It has a collection of resources to navigate the tools and communities in this ecosystem, and to help you get started.

Project Jupyter is a project and community whose goal is to "develop open-source software, open-standards, and services for interactive computing across dozens of programming languages". It was spun off from IPython in 2014 by Fernando Perez.

Notebook documents are documents produced by the Jupyter Notebook App, which contain both computer code (e.g. python) and rich text elements (paragraph, equations, figures, links, etc…). Notebook documents are both human-readable documents containing the analysis description and the results (figures, tables, etc.) as well as executable documents which can be run to perform data analysis.

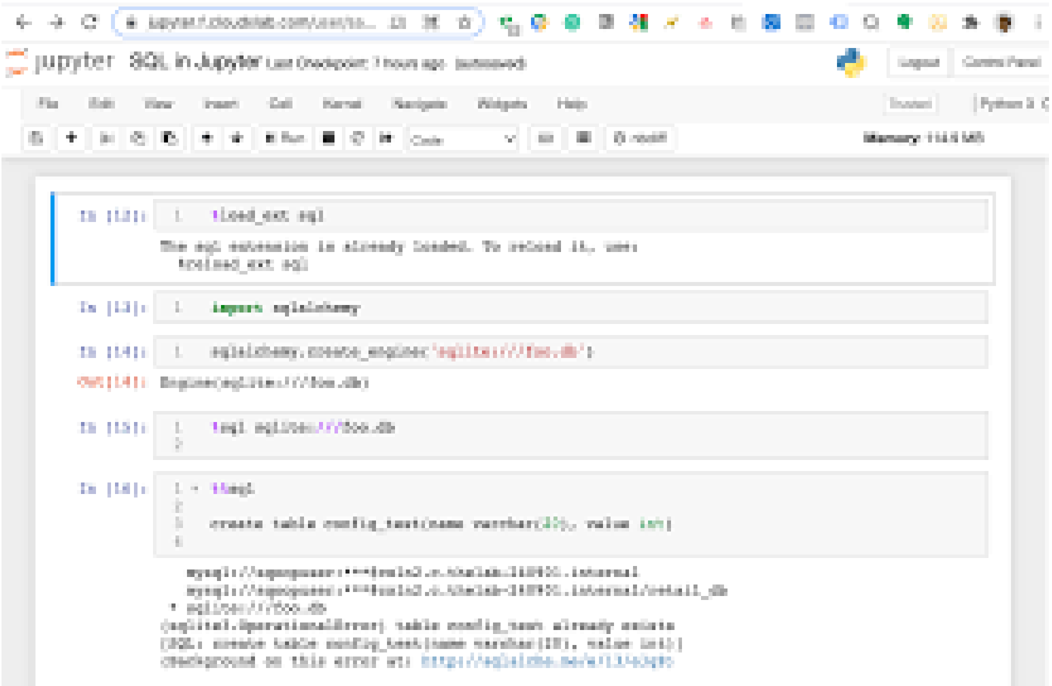

Fig: 4

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IX. RESULTS AND DISCUSSION

SAMPLE IMAGE

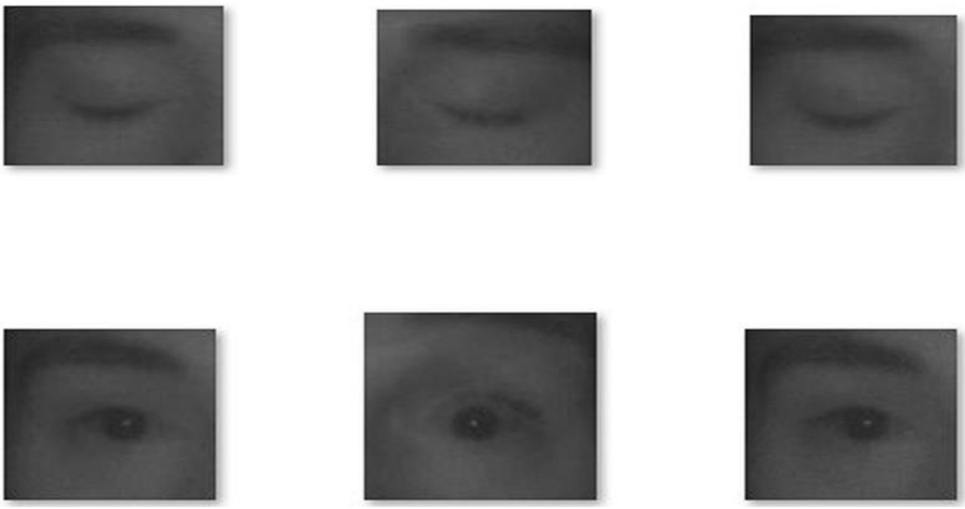

Fig: 5 Sample Input Dataset

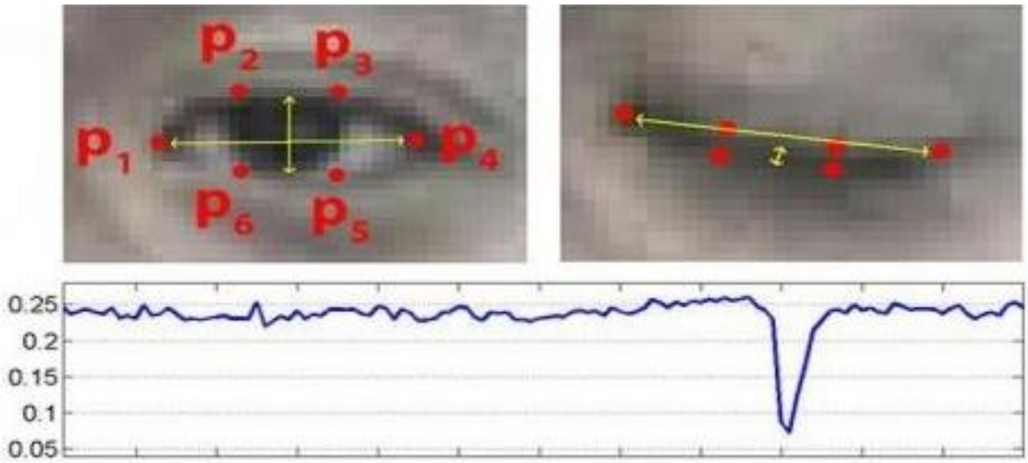

Fig: 6 Sample Input Face Analysis

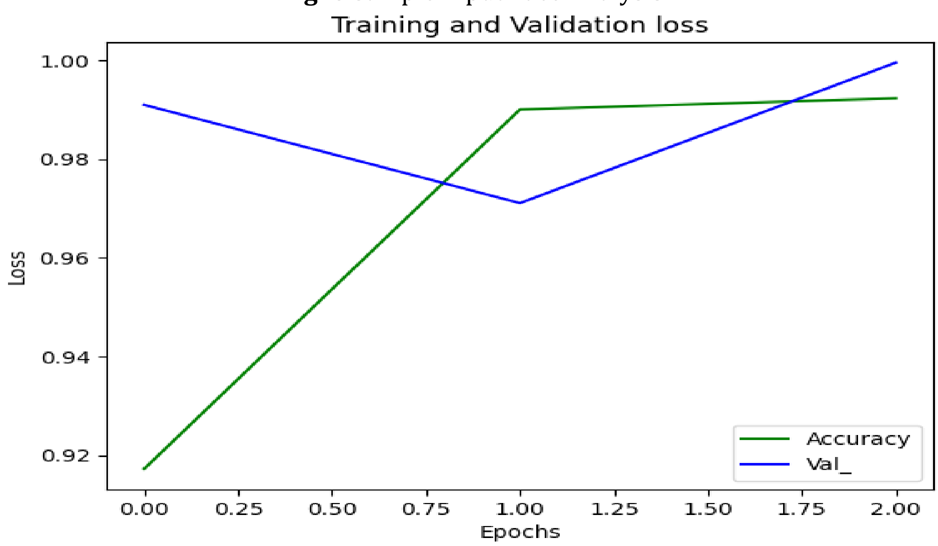

Fig: 7 Sample Input Epochs and loss plots

X. CONCLUSION

Drowsiness Detection and facial emotion was built to help a driver stay awake or to stay calm while driving, in order to reduce car accidents caused by drowsiness and a person's emotions. The system which can differentiate normal eye blink and drowsiness can prevent the driver from entering a state of sleepiness while driving. During the monitoring, the system is able to decide if the eyes are closed or opened. When the eyes have been closed for too long and if the person is angry or sad, a warning signal is issued. The ultimate goal of the system is to check the drowsiness condition of the driver. Based on the eye movements of the driver, drowsiness is detected and, according to an eye blink, the alarm will be generated to alert the driver and to reduce the speed of the vehicle. By doing this, many accidents will be reduced and provide safety for the driver and vehicle.

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