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Driver Fatigue Prediction with Real Time Alert System Using Deep Learning

Mohamed Farveez B [1], Rajagopal B [2], Sasi Prince D [3], Prof Rajammal K [4]

[1]EGS Pillay Engineering College (Autonomous), Nagapattinam, Tamilnadu, India
E-Mail: mohamedfarveez1810@gmail.com
[2]EGS Pillay Engineering College (Autonomous), Nagapattinam, Tamilnadu, India
E-Mail: haribaskaran770@gmail.com
[3]EGS Pillay Engineering College (Autonomous), Nagapattinam, Tamilnadu, India
E-Mail: dsasiprince@gmail.com
[4]Assistant professor, EGS Pillay Engineering College (Autonomous), Nagapattinam, Tamilnadu, India
E-Mail: rajammal@egspec.org

ABSTRACT

To lessen car crashes brought about by weakness driving, an exhaustion driving recognition calculation is proposed in view of profound gaining and facial multi-file combination from the drivers facial highlights. Since the scene in the genuine driving cycle is exceptionally mind boggling and alterable, this calculation initially moves along the perform multiple tasks flowed convolution brain organization (MTCNN) so it can rapidly and precisely find the face and identify the facial central issues. As indicated by the facial central issues, the driver's eyes and mouth not entirely settled. Second, these locales are input into the eyes and mouth state acknowledgment organization (E-MSR Net) for state acknowledgment. The E-MSR Net is a profundity divisible convolution brain network that is improved and upgraded in light of MobilenetV2. At long last, the three facial elements of eye conclusion rate (ECR), mouth opening rate (MOR), and head non-positive face rate (HNFR) are combined to pass judgment on the driver's weakness state. This calculation can rapidly and precisely make decisions despite intricate and variable scenes. Simultaneously, it can stay away from the disappointment of the calculation brought about by the impediment of the eyes or mouth because of wearing shades or veils during driving. The precision of the proposed calculation on the independent informational index accomplished 97.5%, which demonstrated the possibility of the calculation.

Keywords:Weariness driving discovery, further developed MTCNN, E-MSR Net, facial multi-list combination.

1. INTRODUCTION

Deep studying is a device studying method that teaches computer systems to do what comes certainly to people: study via way of means of example. Deep studying is a key era in the back of driverless cars, permitting them to understand a prevent sign, or to differentiate a pedestrian from a lamppost. It is the important thing to voice manage in purchaser gadgets like phones, tablets, TVs, and hands-loose speakers. Deep studying is getting masses of interest recently and for proper reason. It's attaining effects that have been now no longer viable before. In deep studying, a pc version learns to carry out class obligations at once from photos, text, or sound. Deep studying fashions can acquire modern accuracy, once in a while exceeding human-stage overall performance. Models are skilled via way of means of the use of a massive set of categorised records and neural community architectures that incorporate many layers. Deep studying achieves reputation accuracy at better tiers than ever before. This facilitates purchaser electronics meet consumer expectations, and it's miles essential for safety-important packages like driverless cars. Recent advances in deep studying have advanced to the factor wherein deep studying outperforms people in a few obligations like classifying items in photos. While deep studying turned into first theorized withinside the 1980s, there are major motives it has best lately come to be useful: Deep studying calls for massive quantities of categorised records. For example, driverless automobile improvement calls for hundreds of thousands of photos and hundreds of hours of video. Deep studying calls for considerable computing power. High-overall performance GPUs have a parallel structure this is green for deep studying. When mixed with clusters or cloud computing, this permits improvement groups to lessen education time for a deep studying community from weeks to hours or less.

* Rajagopal B. Tel.:+919159211743
E-mail address: haribaskaran770@gmail.com

2. METHODOLOGY

APPLICATIONS OF DEEP LEARNING

Deep learning applications are used in industries from automated driving to medical devices.

Automated Driving: Automotive researchers are using deep learning to automatically detect objects such as stop signs and traffic lights. In addition, deep learning is used to detect pedestrians, which helps decrease accidents.

Aerospace and Defense: Deep learning is used to identify objects from satellites that locate areas of interest, and identify safe or unsafe zones for troops.

Medical Research: Cancer researchers are using deep learning to automatically detect cancer cells. Teams at UCLA built an advanced microscope that yields a high-dimensional data set used to train a deep learning application to accurately identify cancer cells.

Industrial Automation: Deep learning is helping to improve worker safety around heavy machinery by automatically detecting when people or objects are within an unsafe distance of machines.

Electronics: Deep learning is being used in automated hearing and speech translation. For example, home assistance devices that respond.

DEEP LEARNING WORKS

Most profound learning techniques utilize brain network structures, which is the reason profound learning models are frequently alluded to as profound brain networks.The term "profound" ordinarily alludes to the quantity of secret layers in the brain organization. Conventional brain networks just hold back 2-3 secret layers, while profound organizations can have upwards of 150.

Profound learning models are prepared by utilizing enormous arrangements of marked information and brain network structures that gain includes straightforwardly from the information without the requirement for manual component extraction.

Quite possibly the most famous kinds of profound brain network is known as convolutional brain organizations (CNN or ConvNet). A CNN convolves learned highlights with input information, and utilizations 2D convolutional layers, making this design appropriate to handling 2D information, like pictures.

Training from Scratch

To prepare a profound organization without any preparation, you accumulate an extremely enormous marked informational index and plan an organization engineering that will become familiar with the elements and model. This is really great for new applications, or applications that will have countless result classes. This is a more uncommon methodology in light of the fact that with the huge measure of information and pace of learning, these organizations normally require days or weeks to prepare.

Prescient ANALYSIS

Prescient examination utilizes verifiable information to foresee future occasions. Commonly, verifiable information is utilized to fabricate a numerical model that catches significant patterns. That prescient model is then utilized on current information to anticipate what will occur straightaway, or to recommend moves to initiate for ideal results.Prescient examination has gotten a ton of consideration lately because of advances in supporting innovation, especially in the space of large information and AI.

MACHINE LEARNING

Machine learning is a data analytics technique that teaches computers to do what comes naturally to humans and animals: learn from experience. Machine learning algorithms use computational methods to “learn” information directly from data without relying on a predetermined equation as a model. The algorithms adaptively improve their performance as the number of samples available for learning increases. Deep learning is a specialized form of machine learning. With the rise in big data, machine learning has become a key technique for solving problems in areas, such as:

- **Computational finance**, for credit scoring and algorithmic trading
- **Image processing and computer vision**, for face recognition, motion detection, and object detection
- **Computational biology**, for tumor detection, drug discovery, and DNA sequencing
- **Energy production**, for price and load forecasting
- **Automotive, aerospace, and manufacturing**, for predictive maintenance
- **Natural language processing**, for voice recognition applications

Machine learning uses two types of techniques: supervised learning, which trains a model on known input and output data so that it can predict future outputs, and unsupervised learning, which finds hidden patterns or intrinsic structures in input data.

Supervised Learning

Supervised machine learning builds a model that makes predictions based on evidence in the presence of uncertainty. A supervised learning algorithm takes a known set of input data and known responses to the data (output) and trains a model to generate reasonable predictions for the response to new data. Use supervised learning if you have known data for the output you are trying to predict. Supervised learning uses classification and regression techniques to develop predictive models.

Unsupervised Learning

Unsupervised learning finds hidden patterns or intrinsic structures in data. It is used to draw inferences from datasets consisting of input data without labeled responses.

Clustering

Clustering is the most common unsupervised learning technique. It is used for exploratory data analysis to find hidden patterns or groupings in data. Applications for cluster analysis include gene sequence analysis, market research, and object recognition.

3. MODELING AND ANALYSIS

Interoperability

Because computer systems commonly require interaction between newer and older applications, the .NET Framework provides means to access functionality implemented in newer and older programs that execute outside the .NET environment. Access to COM components is provided in the System.Runtime.Interop Services and System. Enterprise Services namespaces of the framework; access to other functionality is achieved using the P/Invoke feature.

Base Class Library

The Base Class Library (BCL), part of the Framework Class Library (FCL), is a library of functionality available to all languages using the .NET Framework. The BCL provides classes that encapsulate a number of common functions, including file reading and writing, graphic rendering, database interaction, XML document manipulation, and so on. It consists of classes, interfaces of reusable types that integrate with CLR (Common Language Runtime).

Simplified deployment

The .NET Framework includes design features and tools which help manage the installation of computer software to ensure it does not interfere with previously installed software, and it conforms to security requirements.

Security

The design addresses some of the vulnerabilities, such as buffer overflows, which have been exploited by malicious software. Additionally, .NET provides a common security model for all applications

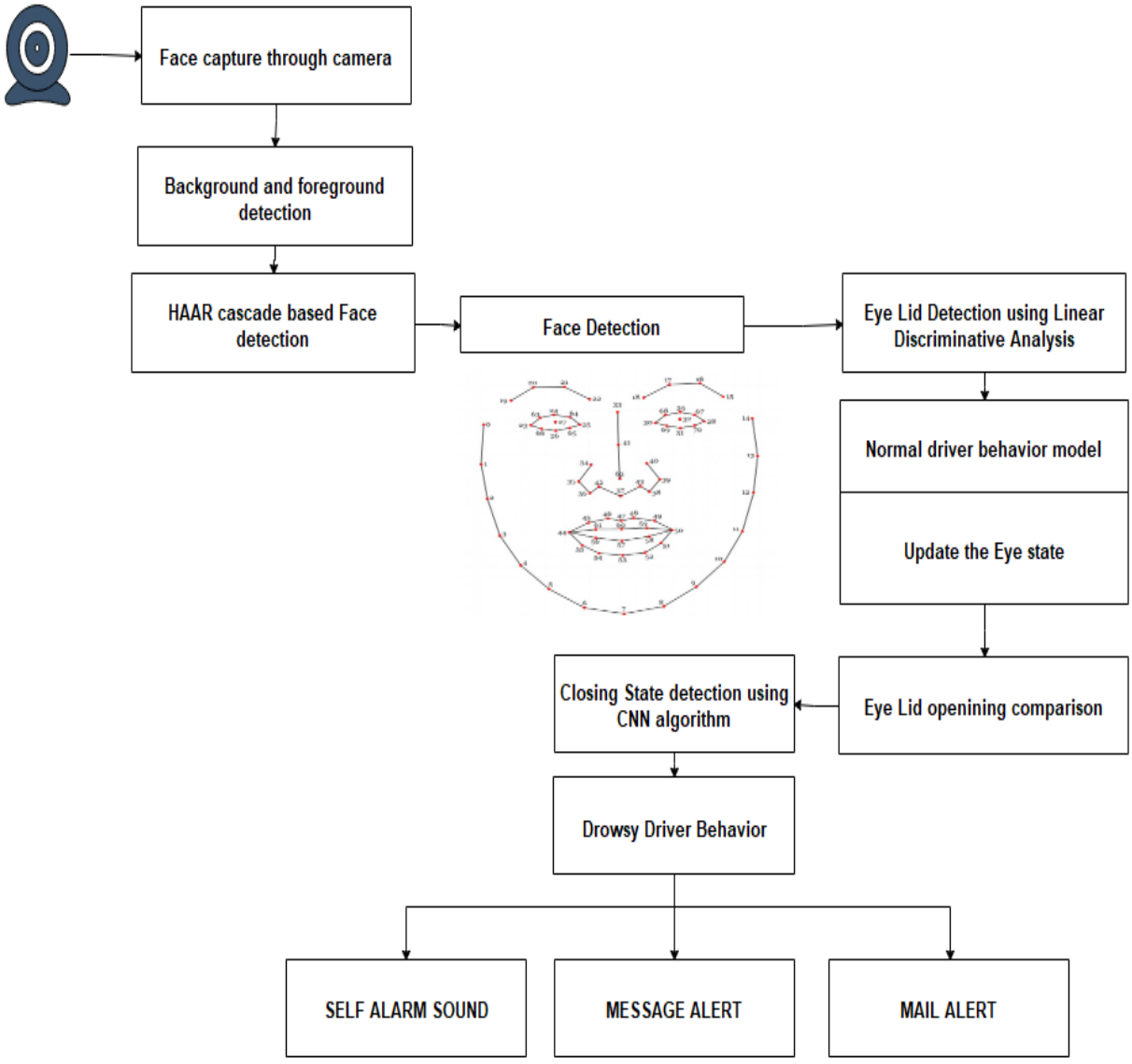
Portability

While Microsoft has never implemented the full framework on any system except Microsoft Windows, it has engineered the framework to be platform-agnostic,[3] and cross-platform implementations are available for other operating systems (see Silverlight and the Alternative implementations section below). Microsoft submitted the specifications for the Common Language Infrastructure (which includes the core class libraries, Common Type System, and the Common Intermediate Language), the C# language, and the C++/CLI language to both ECMA and the ISO, making them available as official standards. This makes it possible for third parties to create compatible implementations of the framework and its languages on other platforms.

Memory management

The .NET Framework CLR frees the developer from the burden of managing memory (allocating and freeing up when done); it handles memory management itself by detecting when memory can be safely freed. Memory is allocated instantiations of .NET types (objects) from the managed heap, a pool of memory managed by the CLR. As long as there exists a reference to an object, which might be either a direct reference to an object or via a graph of objects, the object is considered to be in use. When there is no reference to an object, and it cannot be reached or used, it becomes garbage, eligible for collection. NET Framework includes a garbage collector which runs periodically, on a separate thread from the application's thread, that enumerates all the unusable objects and reclaims the memory allocated to them.

SYSTEM ARCHITECTURE :



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RESULTS AND DISCUSSION

This project is mainly developed to detect the driver drowsiness while he was driving. This identifies every person's face when driving. If the driver is drowsy an alert message is sent to driver mobile number and also email is sent to vehicle owner with the clear image of the driver. It also detect the driver's eye by how much he opened his eyes. If he opened half of the eyes, it indicates 50% of the eyes is open or If he opened full eyes the it indicates 100% of the eyes is opened. This helps to reduce the accident taking place in our surroundings.

CONCLUSION

Drowsiness and fatigue of automobile drivers reduce the drivers' abilities of vehicle control, natural reflex, recognition and perception. Such diminished vigilance level of drivers is observed at night driving or overdriving, causing accident and pose severe threat to mankind and society. The proposed system can be used for driver's safety and its consequences. The system detects drowsiness of driver through eye conditions. It based on face detection using well known Linear Discriminative algorithm, eyes are detected through proposed crop Eye algorithm which segments the face in different segments in order to get left and right eye. Conditions of open and close eye are determined by intensity values, distance between eye brow and eye lash is calculated. If calculated distance is greater than threshold value, eyes are closed otherwise open. An alarm is triggered if eyes are found to be closed for consecutive frames. The proposed method was tested in video sequence recorded in vehicle as well as in lab environment. The proposed system works in real time with minimal computational complexity. Therefore it is also suitable for implementing in surveillance environment. The system produces 90% accurate results for different faces.

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