REAL TIME DROWSINESS DETECTION SYSTEM FOR DRIVERS

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Abstract **– Driver errors are a contributing factor to the increasing number of road accidents. They are caused by a variety of reasons, including alcohol, irresponsible driving, and tiredness. This project aims to develop a system that can detect the abnormal behavior of a driver using a single board computer. One of the most important factors that can prevent road accidents is the detection of the level of alertness of a driver. This can be done by monitoring the movement of the eyes and blinking patterns. In this project, we will develop a vision-based fatigue monitoring system for bus drivers. This system can be easily deployed in buses and large vehicles. demonstrates a novel method for detecting tiredness in drivers and talks driver safety on the road. There is a major absence of a trustworthy ocular dataset in the field of eye closure detection.**

INTRODUCTION

Today, a growing number of vocations demand long-term focus. To be able to respond quickly to unexpected incidents, drivers must maintain a watchful eye on the road. Many road accidents frequently include driver weariness as their primary reason. The incidence of incidents involving drivers who are fatigued might be greatly reduced if methods are developed to identify and alert them when they are in a poor psychophysical condition. The creation of such systems, however, has several challenges in terms of accurately and quickly identifying a driver's signs of sleepiness. Utilizing a vision-based technique is one of the technological options for driver sleepiness detection systems implementation. Advanced driver distraction warning systems, driver drowsiness warning systems, and other similar systems must be built so that they don't constantly record or store data beyond what is required for the purposes for which they were acquired or otherwise processed within the closed-loop system. These data must also be immediately erased after processing and must never be accessible to or made available to third parties. Additionally, those systems must be made to prevent overlapping and refrain from alerting the driver in two different ways at the same time or in a confusing way where one action activates both systems. Nobody considers travelling without their own automobile. The majority of car accidents are caused by driver weariness, while two- wheeler accidents are less common. Four- wheeler drivers are prone to falling into a resting posture and occasionally becoming tired. gaining knowledge of behavioural patterns that are typically hidden from unconscious reflection. Drowsiness can be thought of as a condition of diminished alertness that is frequently accompanied by behavioural and psychophysiological changes that cause loss of alertness. A system specifically devoted to detecting human blink has been developed with computer vision research. Eye movement control, learning about behaviour patterns that are often inaccessible to conscious reflection, and examining information processing processes all need the measurement of eye movement during psychophysical tasks and studies.

LITERATURE REVIEW

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[1]. 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[2]. 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[3]. System makes use of the number of eye blinks for detecting the state of drowsiness in a driver. The system makes use of OpenCV and Raspberry Pi module with a single camera view. The eye status is obtained through image processing algorithms. This paper takes into account only the state of the eyes, it does not focus on the frequency of yawning[4]. 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. A drawback for EEG is the spatial resolution – as the electrodes measure electrical activity at the surface of the brain, it is difficult to know whether the signal was produced near the surface or from a deeper region[5]. Driver drowsiness detection using facial dynamic fusion information and a DBN Driver drowsiness detection using facial dynamic fusion information and a DBN. DBN requires huge data to perform better techniques.DBN is expensive to train because it has complex data models[6] In this system computer vision and alcohol gas sensor combination is used to detect drowsiness and alcohol

intoxication. This system makes use of Raspberry-pi and Arduino UNO with I2C protocol. The proposed system is based on computer vision and embedded system applications. Eye closure is detected using HAAR based cascade classifier and an alcohol gas sensor which functions as a Breathalyzer[7]. If eyes are blinking normally no warning is issued. If the eyes are closed for more than 0.5 seconds, this system issues warning to the driver. The warning is in form of an alarm and vibration. MATLAB is used for the processing of the image[8]. The developed system is a real time system. It uses image processing for eye and face detection. 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 issued[9]. This system includes two modules. The two modules are the face and eye detection module followed by the face tracking module. CAMSHIFT algorithm is used for continuous face tracking. This system also uses cascade classifiers in order to improve the accuracy of face detection. The system is a real time nonintrusive model[10].

EXISTING SYSTEM

Support Vector Machine (SVM)

The primary function of the SVM is to find an ideal hyperplane for various unique cases in a high dimensional space. Multiple hyperplanes exist to realise this paradigm. This procedure is dependent on the support vector, which is the data that corresponds to the ideal choice surface and is located closest to the closed surface. It carries out classification by generating a hyperplane to divide the data and planning the input vectors into a high dimensional space. This approach is mostly used to resolve non-convex, unconstrained minimization problems and quadratic programming problems. The SVM is the classifier process's most successful technique.

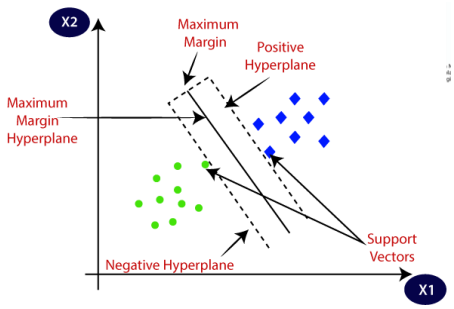


Fig:1 svm hyperplane

- Time Consuming Process.
- Recognition accuracy is less.
- Increased overhead.
- Existing method configuration is not applicable for buses and large vehicles.

PROPOSED SYSTEM

Convolutional Neural Network

A convolutional neural network (CNN, or ConvNet) is a type of deep neural network that is often used to analyse visual images in deep learning. CNN are regularised versions of multilayer perceptrons. CNNs use a different approach to regularisation: they use the hierarchical structure in data to construct more complex patterns from smaller and simpler patterns. As a result, CNNs are at the bottom end of the connectivity and complexity spectrum.

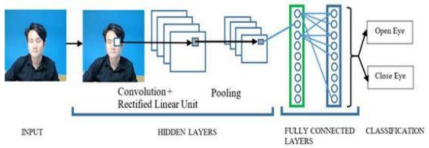


Fig 2: convolutional neural network

- Significant reduction in the size of the computational complex
- Reduced time / Estimation time is Low
- Region of interest is clear to identify
- Bounding box creation and tracking

METHODOLOGY

Convolutional neural networks (CNN, or ConvNet) are a class of deep neural networks used most frequently to analyse visual vision in deep learning. As a result of their shared-weights architecture and translation invariance properties, they are often referred to as shift invariant or space invariant artificial neural networks (SIANN). They can be used in a variety of fields, including image

and video recognition, recommender systems, image classification, image segmentation, and medical image analysis. They can also be used in brain-computer interfaces, natural language processing, and financial time series. Because of how closely the connectivity pattern between neurons mirrors the structure of the animal visual cortex, convolutional networks were inspired by biological processes. Only in the constrained area of the visual field known as the receptive field do individual cortical neurons respond to inputs. Different neurons' receptive areas partially overlap one another to fill the whole visual field. In order to identify driver drowsiness, the suggested system employs a convolutional neural network (CNN). Since each drowsy image requires a feature vector that can be compared to other feature vectors in a database to determine whether or not the image is drowsy.
Typically, CNNs require fixed size pictures as input, necessitating preprocessing. In the preprocessing, the important frames from the video are extracted based on temporal changes and stored in a database. Convolutional layers of CNN create feature vectors from these saved pictures.
Then, the driver sleepiness is detected using these feature vectors. Convolutional layers, pooling (max, min, and average) layers, ReLU layers, and fully connected layers are some of the layers in CNN. Each kernel (or filter) in a convolution layer has a width, depth, and height. In order to expedite computations, CNN employs pooling layers (Max or Average) to reduce the size of the feature maps. This layer divides the input picture into several areas before performing actions on each region. Max Pooling selects a maximum value for each region and sets it in the appropriate location in the output. Rectified Linear Units, or ReLU, is an online layer.
All values in the input data are subjected to the max function by the ReLU layer, which converts all negative values to zero. The ReLU activation function is shown in the following equation.

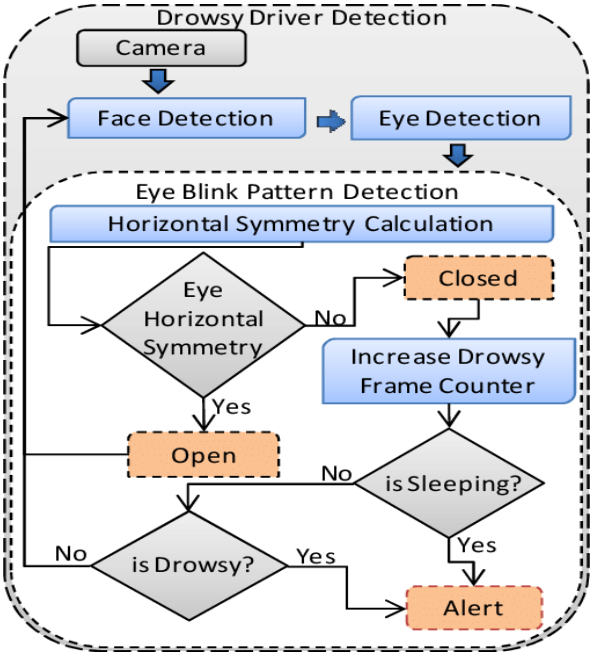
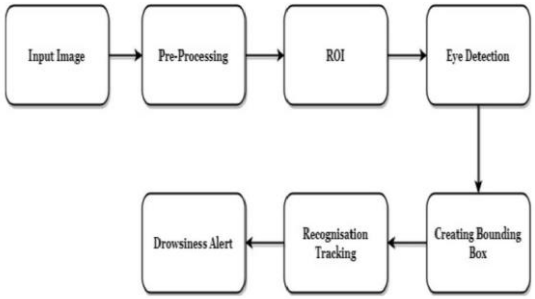


Fig 3: drowsy driver detection

MODULES
Image Acquisition:
The technology employs a web camera that is pointed directly at the driver's face and tracks head motions to identify driver weariness. The three processes involved in acquiring a picture are: energy reflected from the object of interest, An optical system that concentrates the energy and, ultimately, a sensor that calculates the total amount of energy.
Pre processing:
The purpose of pre-processing is to enhance certain picture characteristics necessary for later processing or to prevent unintentional distortions in the image data. Image conversion to a grayscale version eliminating noise from an image's input improved picture input quality.
Contrast Enhancement:
Digital pictures are adjusted using the contrast enhancement technique to make them more acceptable for display or additional image analysis. Enhancement includes sharpening or brightening an image to make it simpler to spot important details. By altering the initial values, more of the available range may be utilised, enhancing the contrast between the backgrounds of targets and their backgrounds.
ROI Segmentation:
For the categorization of image pixels, segmentation of a picture is used. Image segmentation is the division of a digital image into a number of parts. Simplifying and/or altering an image's representation such that it is more meaningful and understandable



is the aim of segmentation.

Fig 4: modules

CONCLUSION

The created driver abnormality monitoring system is able to quickly identify drowsy, intoxicated, and hazardous driving behaviours. The Tiredness Detection System, which was created based on the driver's eye closure, is able to distinguish between regular eye blinking and drowsiness and can identify drowsiness while driving. The suggested technique can avoid accidents brought on by drivers who are sleepy. If the camera produces superior results, the system still functions effectively even when the driver is wearing eyeglasses and in low light. Several in-house image processing methods are used to gather information about the location of the head and eyes. The monitoring device can determine if the eyes are open or closed. A warning indication appears when the eyes are closed for an extended period of time.

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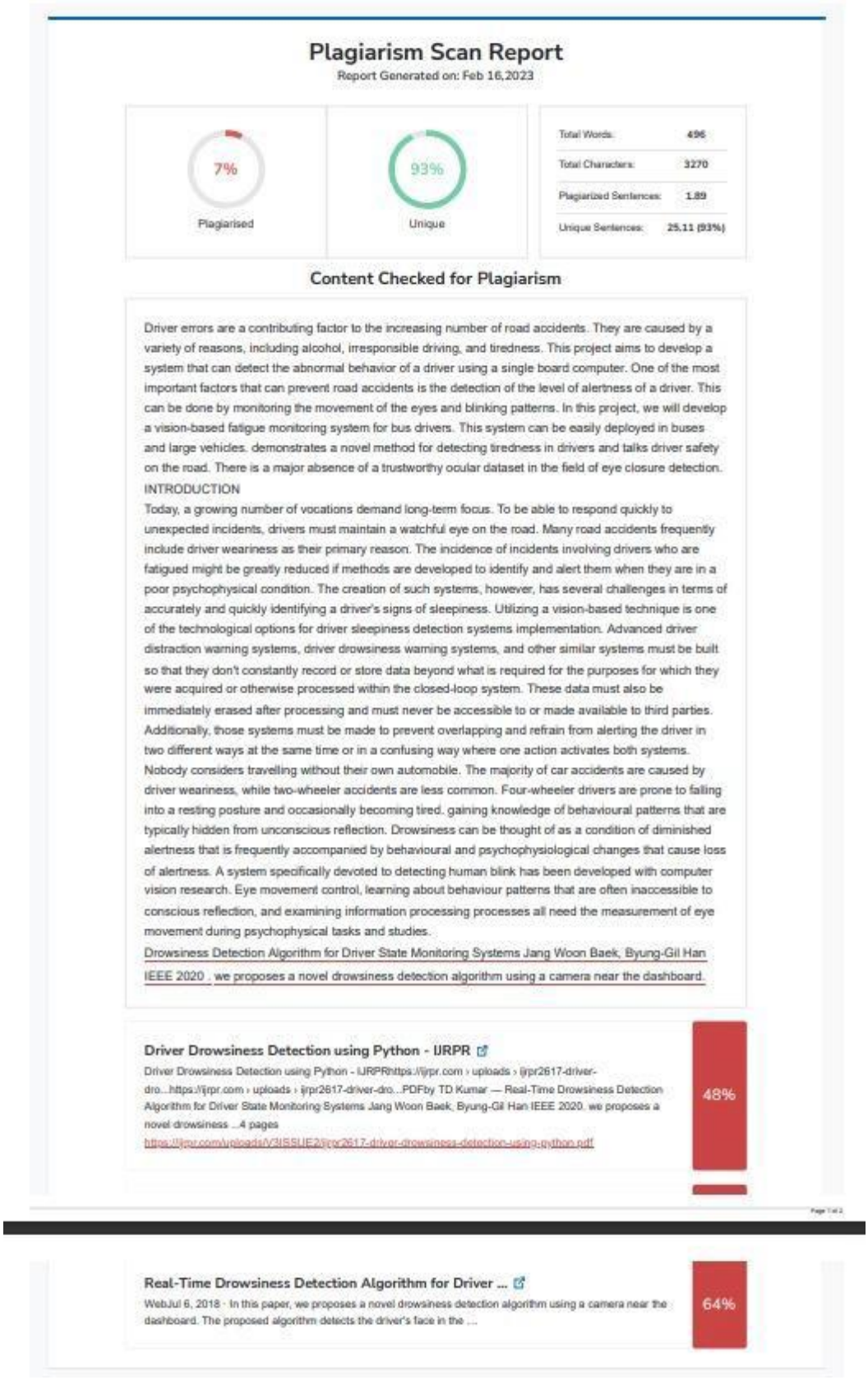

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