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Research on Real Time of Distracted Driver Detection Using Machine Learning

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Abstract— **An accident is an incident that happens suddenly, unintentionally, and under unanticipated conditions. Studies show that drivers controlling the car while severely sleepy are at blame for almost one-fourth of all serious highway accidents, suggesting that driver tiredness causes more accidents than drunk driving. A solution can be developed for the issue of detecting and alerting of driver drowsiness by utilising the technologies of computer vision, an interdisciplinary science that deals with how by creating methods that enable computers to derive high-level understanding from digital images or videos, we can increase their intelligence. The main goal of this project is to create a non-intrusive computer vision system using OpenCV that can identify driver fatigue in a real-time video stream. If the driver appears to be drowsy, the system willinform them by playing an alarm (beep). Additionally, we suggested a system for identifying and detecting traffic signs in the Traffic Sign Detection System. It is used in a way that makes quick decisions possible for drivers. Three phases make up the suggested architecture. The first is picture pre-processing, where we size the input files for the dataset, choose the input size for learning, and resize the data for the learning phase. In the course of the recognition process, the suggested algorithm classifies the observed symbol. This is accomplished in the second step using a convolutional neural network, and the third phase entails text-to-speech translation once the second phase's discovered sign has been delivered in text format.**

Keywords— OpenCV, CNN, OSLib, Scipy, Spacial, Scipy Full, Imutils, DLib, CV2, Win Sound, Accuracy Finder, TensorFlow , Numpy, Scipy.Stats

I. INTRODUCTION

A. DROWSINESS DETECTION SYSTEM **(MODEL 1)**:

One of the key contributing factors to serious auto accidents may be distracted driving. It has been proposed as a potential factor in the rise in fatal crashes and may be the cause of rising public anxiety. It has been discovered that various forms of distraction have various levels of risk for resulting in an accident. Therefore, it's crucial to accurately identify and classify driving distractions using photos of actual drivers. This study focuses on applying several machine learning approaches to detect driver distracted actions from photos. Our objective is to create a high-accuracy model that can determine whether a driver is operating a vehicle properly or engaging in a certain distraction-causing activity. Our study tries to address the aforementioned issue by accurately determining whether the driver is distracted or not. If the software and hardware are combined, it can alert the driver if he becomes preoccupied, helping to avoid an accident. We feed our model with pictures of the engine. Every image is a member of one of the classes listed in the dataset section. The model then makes a prediction about the category of a picture by producing a probability for each class. Images of the driver captured inside the vehicle serve as the input for our model. Using various classifiers (Confusion Matrix, SVM, Classification, and Convolutional Neural Network) to generate a predicted variety of distracting activity, we first preprocess these images to create urge input vectors.

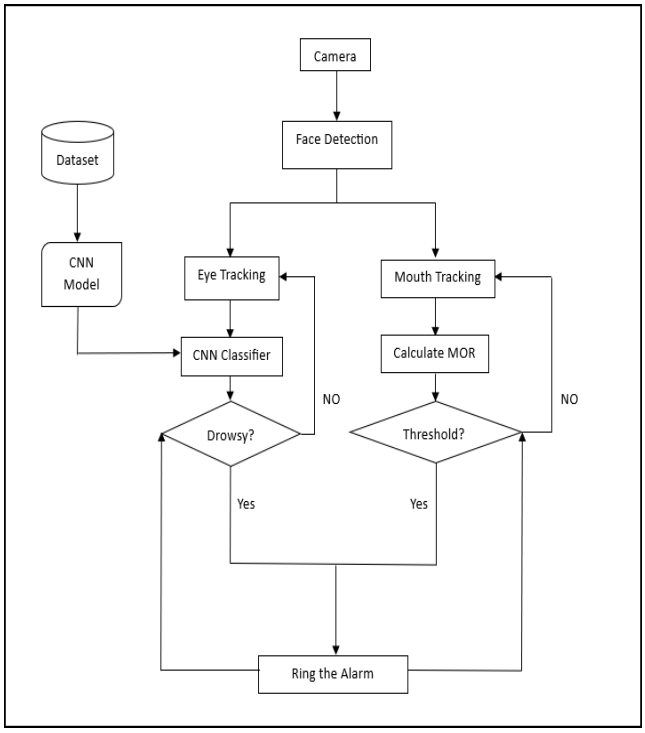
II. LITERATURE SURVEY

There was a thorough discussion of 10 research publications that are linked to Drowsiness Detection using machine learning applications. The papers were carefully selected from the internet database, Google Scholar, based on how well they ml model be used in actual situations. The Research papers are searched by using keywords like "Drowsiness" and “ML”, “CNN”, “Drowsiness Detection”, “python” which produced roughly (34,000 approx.) results, 12 paper works were selected for classification. Since the unknown developer S. E. Viswapriya, Singamsetti Balabalaji, Yedida Sireesha originally published the Drowsiness Detection using machine learning in 2021, there are undoubtedly a lot more articles on the topic. The proposed system efficiently recognizes the driver's alertness with an alarm and notification with alarm (beep).

[1], [2], [3], [4] and [5]: - These 5 Research papers entitles that Drowsiness Detect using ML This determines the state of the eye that is drowsy or non- drowsy when the eye is in a drowsy state, alert with an alarm. Using the Predict and Detection method, the face and eye region are located. Throughout the learning process, layered deep convolution neural networks are used to extract features. It employs an EAR equation to classify the driver as sleep or non-sleep. Proposed system achieved (95%>) accuracy. When the model constantly forecasts drowsy output state, the proposed method efficiently determines the driver's alertness with an alarm and notification with alarm in the app. In the future, transfer learning will be used to enhance the system's functionality. This will decrease the number of accidents and increase driver and vehicle safety. In that 6 paper check only theeye state feel drowsiness or not using machine learning.

[6], [7], [8], [9] and [10]: - These 6 Research papers entitles that Drowsiness Detect using CNN, Deep Learning, computer vision. This paper proposed a distraction detection system that enhances the performance of detection by using two CNN models. We created an assisted-driving testbed to gather our own data, run experiments, and assess the suggested system. It can be shown that VGG-16 is suitable for our testbed. In addition, using two sources ofdata from the face and body cameras this paper is capable ofdetecting drowsy by monitoring the eye and behavior of holefacial expression a prediction are used to detect important features of drowsiness detection.

III. FLOWCHART



A. *OpenCV*

Gray Scale Conversion: Removing unnecessary information from photos might help conserve space or reduce computing complexity in some circumstances grayscale photos from colourful images, for instance. This is thus because not all images in various objects can be recognised and perceived using colour. It might be enough to use grayscale to recognise these artefacts because colour photos contain more detail than black and white images, they might be more complicated and take up more memory. Grayscale picture conversion minimises the amount of processing required because colour images are represented by three channels. Gray values are suitable for recognising traffic signs.

Thresholding and Segmentation: Segmentation is the process of dividing a visual image into various subgroups (of pixels) known as Image Objects, which lowers the complexity of the image and facilitates image analysis. Thresholding is the process of creating a bi-level image from a grayscale input images.

B. *CNN*

Convolutional Neural Network (CNN): Neurons are arranged in layers in a neural network, which has a layered architecture. The layers of the network are connected to one another and have some initial weights. We input specific data into the network. The weights are updated as we train the network, indicating that the model has picked up on the characteristics of our dataset. Similar to neural networks, but for images, is the convolutional neural network. As a result, we feed the CNN model images. It has input and output layers in addition to several hidden layers.

The Convolution layer, Pooling layer, Rectified Linear Units layer, Dropout layer, and Fully Connected layer are examples of hidden layers.

C. *OS Library*

Python's OS module offers ways to communicate with the operating system. Python's primary utility modules include OS. This module gives you a portable way to benefit from operating system-specific features. Numerous file system-related functions can be found in the os and os. path modules..

D. *Scipy, Spatial*

To calculate the triangulations, voronoi diagrams, and convex hulls of a set of points, the scipy, spatial package uses the Q hull library. Additionally, it includes tools for computing distances in different metrics as well as KDTree implementations for nearest-neighbor point queries.

E. *Imutils*

With OpenCV and both Python 2.7 and Python 3, simple image processing tasks like translation, rotation, resizing, skeletonization, Matplotlib image display, sorting contours, edge detection, and more are made easier..

F. *DLIB*

Although the ability to recognise faces in pictures or videos is pretty cool, we need more information about the face of the person in order to develop effective applications, such as location, whether the mouth is open or closed, if the eyes are open or closed, if they are gazing up, and so on. I'll briefly and impartially introduce the Dlib, a library that can give you access to 68 points (landmarks) of the face, in this essay.

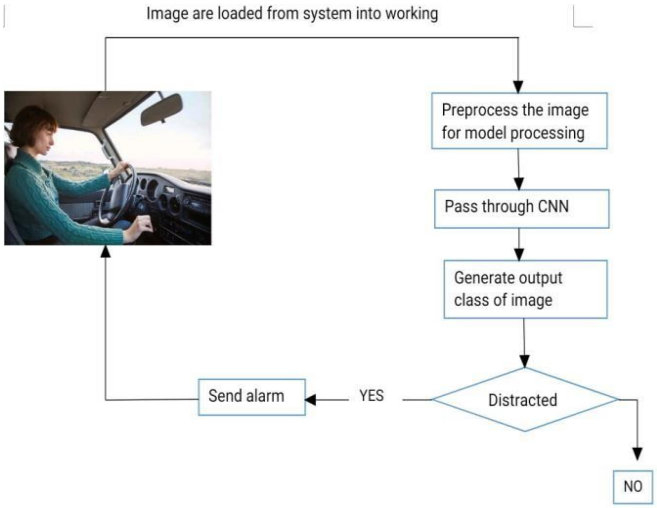
G. *WIN SOUND*

Python 3's winsound module offers a user interface for interacting with Windows' sound-playing technology. A beep with the set frequency and duration is played by the Beep function. If the system is unable to play the beep sound on the speaker, a RuntimeError is raised. The only result of this technique is the noise "Beep.

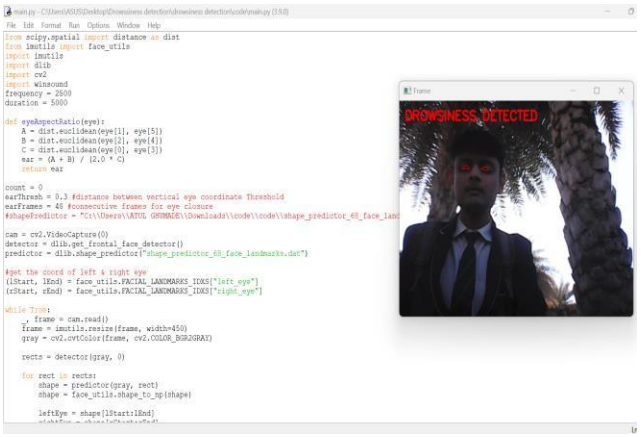
IV. SYSTEM ARCHITECTURE

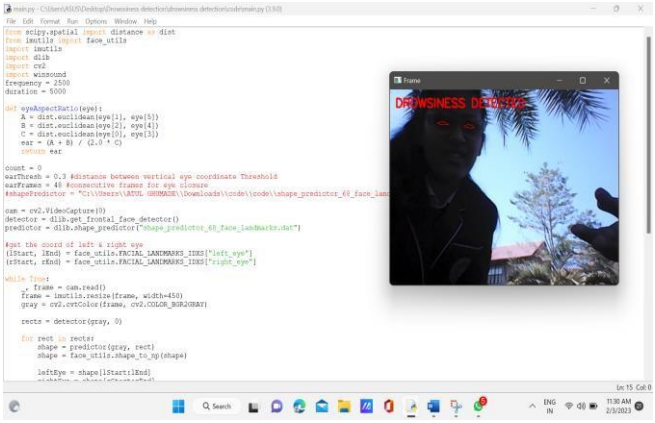
Real-time camera-based driver distraction detection is a popular topic in machine learning and computer vision field,

and many models and algorithms are proposed and analyzed by researchers. Two main topics that focus on are image preprocessing technique and classifying model selection. As for image preprocessing proposed that conducting feature extraction instead of directly conducting image flattening might, though not guaranteed, improve prediction accuracy. As for the classifying model, one main approach is to use convolutional neural work (CNN)-based models. Comparing with CNN-based model, the learning process is faster, and computational cost is lower than CNN.



V. OUTPUT





VI. INTRODUCTION

B. TRAFFIC SIGN DETECTION SYSTEM **(MODEL 2)**: In India, there are 400 business accidents per day, accordingto sanctioned statistics. Road signs insure the safety of both motorcars and climbers by precluding accidents from being. also, business signals reduce the prevalence of business offences by icing that motorists follow certain laws. The operation of business signals facilitates route navigation as well. All druggies of the road, including climbers and motorcars, should give precedence to business signals. We fail to see business signs for a variety of reasons, including difficulty fastening, fatigue, and sleep deprivation. Having poor vision, being influenced by the outside world, and environmental factors are additional excuses for ignoring the warning signs. Utilizing a system that can identify traffic lights and providethe driver with advice and warnings is considerably morecrucial. Real-time picture analysis by a car's front-facingcamera is used by image-based traffic-sign recognitionalgorithms to identify signals. They assist the motorist byissuing warnings. The main elements of a vision-based trafficsign recognition system are the identification and recognition modules. While the recognition module identifies the sign,the detecting module locates the sign area in the picture orvideo. During the detection procedure, the sign areas with thehighest probability are chosen and sent into the recognitionsystem to classify the sign. Different machine learning techniques, including SVM, KNN, and Random Forest, canbe utilized to recognize traffic signs. The main drawback ofthese algorithms, however, is that feature extraction must becarried out independently; CNN, on the other hand, will carryout feature extraction on its own. The suggested approachtherefore uses a convolutional neural network. The inputpreprocessing module will get the vehicle camera's imageready for the recognition stage first. After recognition, themotorist will hear a text warning message.

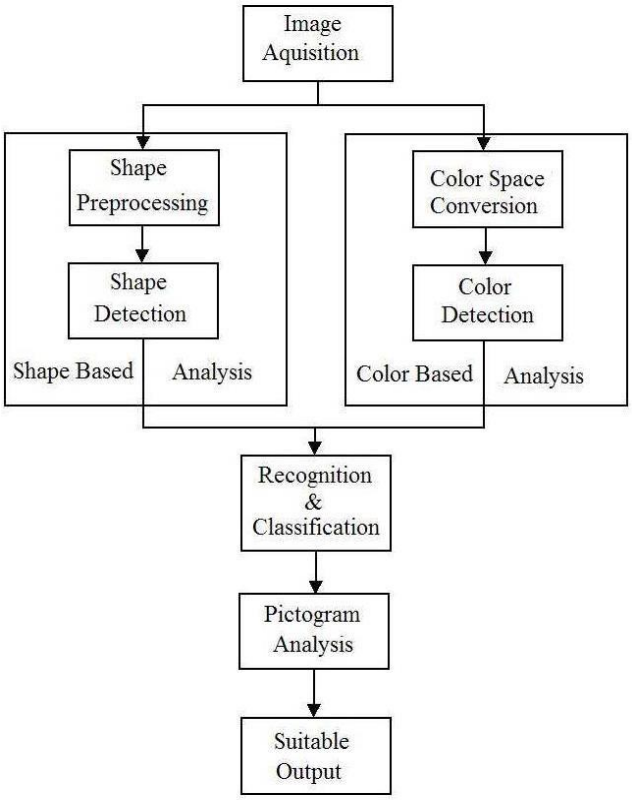
VII. LITERATURE SURVEY

There was a thorough discussion of 12 research publications that are linked to Traffic Sign Detection using machine learning applications. The papers were carefully selected from the internet database, Google Scholar, based on how well they ml model be used in actual situations. The Research papers are searched by using keywords like " Traffic Sign " and “ML”, “CNN”, “Traffic Sign Detection”, “python” which produced roughly (41,000 approx.) results, 12 paper works were selected for classification. Since the unknown developer G. Bharath Kumar, N. Anupama Rani, CH. Sanath Kumar, G. Dinesh originally published the Traffic Sign Detection using machine learning in 2020, there are undoubtedly a lot more articles on the topic. The proposed of this paper is to provide an efficient method for detection and recognition of traffic signs in India. The effectiveness of proposed methods, which improve the efficiency of detecting traffic signs and also reduce accidents, include feature extraction and neural networks, which circumvent the drawbacks of existing methods..

[1], [2], [3], [4], [5] and [6]: - These 6 Research papers entitles that Traffic Sign Detection using machine learning The model which we proposed will bring us a step there is much that can be improved to get closer to the ideal Advanced Driver Assistance System (Autonomous Car) or even a fully driverless system.. For detection of a sign, this

The colour and shape of the sign determine the paper. The CNN algorithm is more popular than other algorithms because it offers high efficiency. However, there is a problem if the sign reflects light, which changes the colour of the sign. Similar to the previous example, if the sign is improper or cut off, the shape of the sign is hampered, leading to improper detection of the sign, which results in incorrect fault detection. Another important issue to consider is detection in the night. The detection of signs is not a problem if the camera is infrared, but a non-infrared webcam may not accurately detect signs, increasing the risk of accidents. Adding text to speech module in ourmodel makes the driver effortless and makes him to concentrate completely on driving rather than checking for traffic signs. This lessens the likelihood of accidents both during the day and at night.

[7], [8], [9], [10], [11] and [12]: - These 6 Research papers entitles that Traffic Sign Detection using machine learning mentioned all the difficulties associated with traffics sign recognition and increased traffic jams on the Roads, project helps to reduce, all these kinds programs. TSRS(Traffic Sign Recognition System) getting popular day by day, which mainly involves image acquisition and processing. That paper have done the SVM and CNN classification algorithms which gives highest accuracy that is around 99%. There will be many research mainly focused on SVM and CNN to solve the specific problems associated with it.



A. CNN

A neural network is a multilayer structure made up of neurons. The network's layers are interconnected and start out with some initial weights. We feed the network with precise information. As we train the network, the weights are adjusted, demonstrating that the model has recognised the features of our dataset.The convolutional neural network is a kind of neural network for images. As a result, we supply CNN with model images. It has input and output layers in addition to several hidden layers. Examples of hidden layers include the Convolution layer, Pooling layer, Rectified Linear Units layer, Dropout layer, and Fully Connected layer.

B. CV2

The cv2 function in OpenCV can read video. VideoCapture (). By using pass 0 as the function parameter, we can access our webcam. We may pass an RTSP url in the function parameter to capture CCTV footage.

C. TensorFlow

Dataflow graph structures that depict how data travels across a graph or a collection of processing nodes can be created by developers using TensorFlow. Every connection connecting each node in the network, known as a tensor, represents a multidimensional data array. TensorFlow applications can be run on the majority of real-world targets, including local computers, cloud clusters, iOS and Android mobile devices, CPUs, and GPUs. If you use Google's own cloud for additional acceleration, TensorFlow can be run on the company's specialist TensorFlow Processing Unit (TPU) technology. However, practically any device can be configured to employ TensorFlow models, which can be used to predict the future.

D. Numpy

Python has a package called NumPy. "Numeric Python" or "Numerical Python" are abbreviations for the name. It is typically pronounced as "nmpa" (NUM-py) or, less frequently, "nmpi" (NUM-pee). As a result, Numpy's precompiled mathematical and numerical functionalities and functions ensure quick execution. NumPy and SciPy are frequently referenced in the same sentence. SciPy depends on Numpy since it uses its data structures and some of its fundamental creation and manipulation features. It adds more beneficial functions for minimization, regression, Fourier-transformation, and many other tasks to NumPy's repertoire.

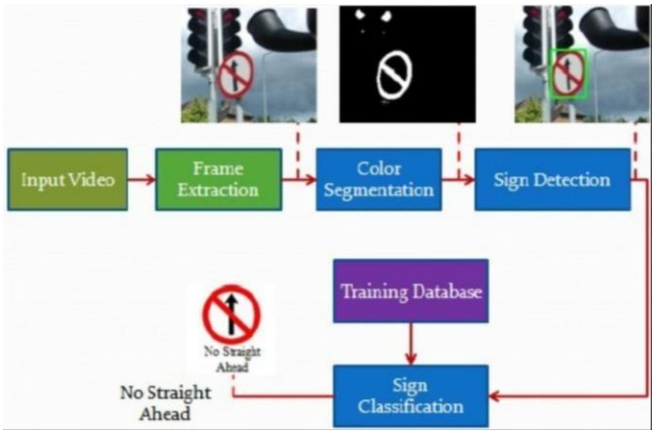
E. Scipy Stats

The sub-package scipy.stats contains all of the statistics routines, and the info(stats) function returns a rather comprehensive list of these functions. The list of possible random variables is also included in the stats sub-docstring package. In addition to a growing number of statistical functions, this module has a sizable library of probability distributions.

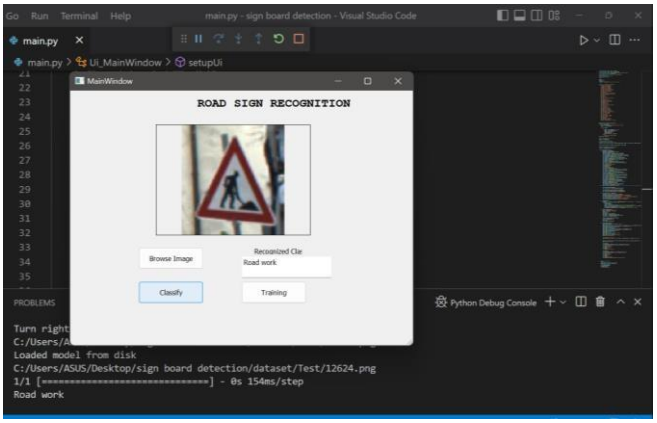
VIII. SYSTEM ARCHITECTURE

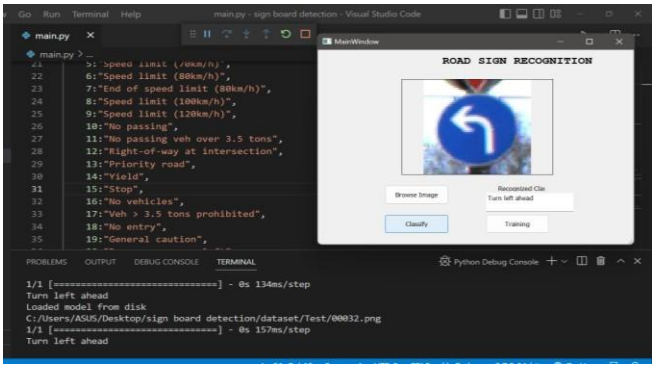
In the fields of machine learning and computer vision, real-time image-based driver distraction detection is a hot topic, and numerous models and algorithms are put forth and studied by researchers. Two main topics that focus on are image preprocessing technique and classifying model selection. As

It was suggested that performing feature extraction for image preprocessing rather than picture flattening directly could, but wasn't guaranteed to, increase prediction accuracy. As for the classifying model, one main approach is to use convolutional neural work (CNN)-based models.
Comparing with CNN-based model, the learning process is faster, and computational cost is lower than CNN.



IX. OUTPUT





X. CONCLUSION

This proposed study proposes a novel method for determining driver fatigue based on the state of the eyes. This determines if the eye is alert or drowsy, and when the eye is alert, an alarm sounds. The face and eye region are located using the Predict and Detection approach. Stacked deep convolution neural networks are developed and used throughout the learning process to extract features. The proposed system's accuracy was (95%>). When the model forecasts drowsy output state continually, the proposed system efficiently recognizes the driver's alertness with an alarm and notification with alarm (beep).

A traffic sign recognition system is another. Our project contributes to the reduction of all these sorts of programs because we have already discussed the challenges related to traffic sign recognition and increased traffic congestion on the roads. Our TSRS (Traffic Sign Recognition System), which mostly entails image gathering and processing, is growing in popularity every day. We used the CNN classification algorithms, which provide results with an accuracy of about 95%. To address the specific issues connected to CNN, there will be a lot of research.

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