

SEED TESTING USING IMAGE PROCESSING

Submitted in partial fulfilment of the requirements for the award
of Bachelor of Technology Degree in Information Technology

by

PRIYADHARSHINI P(38120064)

GNANAMANI CT(38120026)



**DEPARTMENT OF INFORMATION
TECHNOLOGY SCHOOL OF COMPUTING**

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

JEPPIAARNAGAR, RAJIV GANDHI SALAI, CHENNAI-600119

MAY 2022



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

DEPARTMENT OF INFORMATION TECHNOLOGY

BONA FIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **PRIYADHARSHINI P(38120064), GNANAMANI CT (38120026)** who carried out the project entitled "**SEED TESTING USING IMAGE PROCESSING**" under our supervision from November 2021 to April 2022.

INTERNAL GUIDE

Dr. V. Nirmal Rani

HEAD OF THE DEPARTMENT

Dr. R. Subhashini M.E., Ph.D.,

Submitted for Viva Voce Examination held on -----

Internal Examiner

External Examiner

DECLARATION

I, **GNANAMANI CT Reg no: (38120026)** hereby declare that the project report entitled “ **SEED TESTING USING IMAGE PROCESSING** ” done by me under the guidance of **Dr.V. Nirmal Rani** at “Sathyabama Institute of Science and Technology (Deemed to be University), Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai–600119” is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering/Technology degree in Information Technology.

DATE:

PLACE: CHENNAI

SIGNATURE OF CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management of SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey our thanks to **Dr. T. Sasikala M.E., Ph.D., Dean, School of Computing** and **Dr. R. Subhashini M.E., Ph.D., Head of the Department, Department of Information Technology** for providing us the necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. V. Nirmal Ran** for his valuable guidance, suggestions, and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all teaching and non-teaching staff members of the **DEPARTMENT OF INFORMATION TECHNOLOGY** who was helpful in many ways for the completion of the project.

ABSTRACT

Since the advent of high-speed motorized vehicles drowsy driving accidents have claimed the lives of millions of people across the globe. With more research happening in advanced high-speed engines, the risk of such accidents has increased ten-fold times. To avoid such accidents, this paper proposes a Computer Vision-based system drowsiness system for motorized vehicles with Web Push Notifications to notify the driver before any accident occurs. A real-time video system captures the face of the driver and a pre-trained machine learning model detects the eye boundaries from that real-time video stream. Then each eye is represented by 6 –coordinates (x,y) starting from the left corner of the eye and then working clockwise around the eye. The EAR (Ear Aspect Ratio) is calculated for 20 consecutive frames, which if less than a threshold sounds an alarm and sends an alert on your mobile device through a Web Push Notification. The alert when opened also shows some coffee shops near the driver's location to increase the driver's alertness.

TABLE OF CONTENTS

CHAPTER NO:	TITLE	PAGE NO
	ABSTRACT	i
	LIST OF FIGURES	v
	LIST OF ABBREVIATIONS	vi
1	INTRODUCTION	1
	1.1 GENERAL	1
	1.2 MOTIVATION	1
	1.3 OUTLINE OF THE PROJECT	2
	1.3.1 PROBLEM STATEMENT	2
	1.3.2 OBJECTIVE OF THE PROJECT	2
2	LITERATURE SURVEY	3
3	AIM AND SCOPE OF THE PRESENT INVESTIGATION	5
	3.1 AIM	5
	3.2 SCOPE	5
	3.3 PROBLEM DEFINITION	5
	3.4 EXISTING SYSTEM	5
	3.5 PROPOSED SYSTEM	6
	3.5.1 ADVANTAGES OF PROPOSED SYSTEM	6
4	EXPERIMENTAL METHODS OR ALGORITHM USED	7
	4.1 ALGORITHM	7
	4.2 ALGORITHM DESIGN AND DEVELOPMENT	7
	4.2.1 VIOLA-JONES ALGORITHM STAGES	7
	4.2.2 VIOLA-JONES FACE DETECTION ALGORITHM	8

4.2.3	CASCADE OF CLASSIFIERS	9
4.3	ANALYSIS AND TESTING	11
4.4	MODULES	11
4.4.1	FACE DETECTION	12
4.4.2	FACIAL MAPPING	12
4.4.3	EYE DETECTION	13
4.4.4	DROWSINESS DETECTION	15
4.4.5	ALARM	16
4.5	MACHINE LEARNING	16
4.5.1	K-MEANS ALGORITHM	17
4.5.2	NORMAL OR NAÏVE BAYES CLASSIFIER ALGORITHM	17
4.5.3	DECISION TREES ALGORITHM	17
4.5.4	BOOSTING	17
4.5.5	RANDOM TREES ALGORITHM	18
4.5.6	FACE DETECTOR ALGORITHM	18
4.5.7	EXPECTATION MAXIMIZATION (EM) ALGORITHM	18
4.5.8	K-NEAREST NEIGHBOURS	18
4.5.9	NEURAL NETWORKS / MULTILAYER PERCEPTRON (MLP) ALGORITHM	19
4.5.10	SUPPORT VECTOR MACHINE (SVM) ALGORITHM	19
4.6	SYSTEM ARCHITECTURE	19
4.7	USE CASE DIAGRAM	20
4.8	REQUIREMENT	20
4.8.1	HARDWARE REQUIREMENT	20

	4.8.2 SOFTWARE REQUIREMENT	21
4.9	SOFTWARE DESCRIPTION	21
	4.9.1 THE MATLAB SYSTEM	21
	4.9.2 DEVELOPMENT ENVIRONMENT INTRODUCTION	21
	4.9.3 MATLAB APPLICATION	21
4.10	IMAGE PROCESSING TOOLBOX	22
5	RESULTS AND DISCUSSION	23
5.1	EXPERIMENTAL RESULTS	23
5.2	LIMITATIONS	26
6	CONCLUSION	27
6.1	CONCLUSION	27
6.2	FUTURE ENHANCEMENT	28
	REFERENCES	29
	APPENDICES	30
	A. SOURCE CODE	30
	B. PUBLICATION WITH PLAGIARISM	35
	REPORT	

LISTOFFIGURES

FIGURE NO.	FIGURENAME	PAGE.NO
4.1	HAARFEATUREUSEDINVIOLA-JONES	8
4.2	INTEGRALIMAGE	9
4.3	CASCADEOFCLASSIFIERS	10
4.4	FEATUREFOR FACEDETECTION	11
4.5	FACIAL LANDMARKSBYDIP	12
4.6	FACIAL LANDMARKSSETWHICHISDETECTED VIADIB	13
4.7	EYEASPECTRATIO	15
4.8	BLOCKDIAGRAMOFDROWSINESS EVALUATORMODULEFORAVIDEOSEGMENT	16
4.9	SYSTEMARCHITECTURE	19
4.10	USECASEDIAGRAM	20
5.1	MATLABSNAP	23
5.2	COMMANDTODETECTEYES	24
5.3	COMMANDTODETECTMOUTH	24
5.4	CASCADEDETECTORSFORFACE,EACHEYE ANDMOUTH	24
5.5	SAMPLEOUTPUT 1	25
5.6	SAMPLEOUTPUT 2	25
5.7	ALERTNOTIFICATION	25
6.1	ACCURACY	27

LIST OF ABBREVIATIONS

ABBREVIATIONS	EXPANSION
DIP	DIGITAL IMAGE PROCESSING
ML	MACHINE LEARNING
DL	DEEP LEARNING
EAR	EYE ASPECT RATIO
CV	COMPUTER VISION
PERCLOS	PERCENTAGE OF EYE CLOSURE
ANN	ARTIFICIAL NEURAL NETWORKS
CNN	CONVOLUTIONAL NEURAL NETWORKS
SVM	SUPPORT VECTOR MACHINE
EM	EXPECTATION MAXIMIZATION
MLP	MULTILAYER PERCEPTRON
ECG	ELECTROCARDIOGRAPHY
EEG	ELECTROENCEPHALOGRAPHY
EOG	ELECTROOCULOGRAPHY

CHAPTER

1 INTRODUCTION

N

1.1 GENERAL

Drowsy driving has become a serious issue in our society not only because it affects those who are driving, but also all other road users in danger. Accidents due to sleep deprivation is a common problem all around the world. According to a database study conducted by the Australian Transport Bureau in 2002 about fatality crashes it is found that 16.6% of fatal crashes were caused by sleep deprivation and based on the reports submitted by Ministry of Transportation of Ontario in 2004, 25.5% of injury causing crashes and 17.8% of crashes with fatality related to sleep deprivation. All of the above statistics is an estimate because in several cases the drivers will not admit the real cause to the Police. The aim of this project is to develop a prototype for detecting drowsiness called drowsiness detection system. The focus will be placed on designing a system that will accurately monitor the driver's facial expressions in real-time. Our first challenge is how to define fatigue exactly and how to measure it. Despite the progress of science, there is still no precise definition for fatigue. Certainly, due to the lack of precise definition of fatigue, there is not any measurable criterion or tool. However, a precise definition for fatigue is not defined yet, but there is a relationship between fatigue and some symptoms including body temperature, eye movement, heart rate. One of the most important symptoms of fatigue appears in the eye. This project helps drivers to get prevented from drastic accidents and the loss of life and property can be saved.

1.2 MOTIVATION

- Driver's safety is an important factor in today's generation. Accidents occur mainly because of aging factor, fatigue, alcohol and distraction.
- The U.S. National Highway Traffic Safety Administration has reported that driving while drowsy is one of the reasons behind road accidents.

- Based on the Ontario Ministry of Transportation's Driver's Handbook, drivers' abilities are affected by drowsiness and fatigue long before they notice that they are getting tired.
- The above are therefore motivations to design and implement an assistive monitoring system in order to detect drivers' drowsiness and fatigue.

1.3 OUTLINE OF THE PROJECT

The project is all about detecting drowsiness for drivers. This project helps the driver to avoid accidents. We are using DIP technique for detecting the facial points. An alarm is been set up so that the driver wakes up. Alarm is issued when the driver closes his eye for a substantial amount of time. In this case, an alarm is issued and the driver wakes up.

1.3.1 PROBLEM STATEMENT

Designing a prototype Drowsiness Detection System which will focus on continuously and accurately monitoring the state of the driver's eyes in real time to check whether they are open or closed for more than a given period of time. Driver's inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when an object or event draws a person's attention away from the driving task. Unlike driver distraction, driver drowsiness involves not triggering an event but, instead, is characterized by a progressive withdrawal of attention from the road and traffic demands. Both driver drowsiness and distraction, however, might have the same effects, that is decreased driving performance, longer reaction time, and an increased risk of crash involvement.

1.3.2 OBJECTIVE OF THE PROJECT

Driver drowsiness detection is a car safety technology which spares the life of the driver by avoiding mishaps when the driver is getting languid. The framework works disregarding driver wearing displays and in different lighting conditions.

CHAPTER

2 LITERATURE REVIEW

W

According to the Survey on Driver Drowsiness Detection System, the detection system includes the processes of face image extraction, the human skin mapping, face part extraction, classification approaches have been used to reach the objective of the work.

Tuncer et al. [1] proposed an assistant system to track a lane, which will be activated for those drivers who are not able to perform a good job of lane keeping. Another method of face detection based on locating facial features is developed by Graf et al. [2]. This method states that the morphological operations will be applied to find the areas that have high intensity with certain shapes. In the drowsiness detection method proposed by Piliutti et al. [3] driver assessment is determined in the context of a road departure warning and intervention system. This method states that the vehicle lateral position is used as the input and steering wheel position as the output in order to develop a system that will be updated during driving. Craw et al. [4] proposed the following method: the frontal view face is detected based on template matching. The edges extracted from Sobel filtering will be grouped together to locate the face.

The same procedure has to be repeated for finding other facial features such as eyes, mouth and nose in the candidate face. Sigary, [5] proposed a method for hypovigilance detection by processing of the eye region and without an explicit eye detection stage.

Tabrizi and Zoroofi [6] proposed a non-intrusive and simple way of fatigue detection by determining whether the eye is open or closed. The algorithm consists of three steps which were analyzed, such as determining eye regions by eye map and locating pupil center by the center of mass of the eye region image and refining the pupil center and detecting the iris boundary. Omidyeganeh et al. [7] used a method of fatigue detection by applying the Structural Similarity Measure to find the eye location. In this method, the structural similarity value will be evaluated between -1 and 1. When images are the same, the max gained value will be 1 and when there are some differences, the result will be -

1. Then the horizontal and vertical projection will be applied on the eye region to determine the

amount of eye closure and align the detected eye region. M. Saradadevi and P. Bajaj, [8] proposed Driver Fatigue Detection Using Mouth and Yawning Analysis,

IJCSNS International Journal of Computer Science and Network Security, vol. 8, no. 6, pp.183-188, June 2008.

The robust and reliable method of face detection based on the Viola-Jones theory has been used by Wang and Shi [9] in order to limit the mouth search area to the face region. The mouth region is located based on multi-threshold binarization in intensity space and by using the Gaussian model in RGB color space. The lip corner will be found by calculating the integral projection of the mouth in the vertical direction. The two lines which are running through the lower and upper lip boundaries that is resulting from the integral projection which represents the mouth openness. In this method, the yawning will be determined by finding the degree of mouth opening in terms of the aspect ratio of the mouth bounding rectangle. A huge mouth opening over a predefined threshold for a continuous number of frames means that the driver is in a state of drowsiness.

A. Cheng et. al. [10] described 'Driver Drowsiness Recognition Based on Computer Vision Technology'. They presented a nonintrusive drowsiness recognition method using eye-

tracking and image processing. Robust eye detection algorithm was introduced to address the problems caused by changes in illumination and driver posture.

CHAPTER 3

AIM AND SCOPE OF THE PRESENT INVESTIGATION

3.1 AIM

The aim of our project is to design a system that will detect drowsiness and take necessary steps to avoid accidents. The driver drowsiness detection system, which is being implemented in this project, aims that it can easily be available and can be used with different types of vehicles.

3.2 SCOPE

- To automatically recognize the sleep and drowsiness of the driver and its detection.
- To analyze the focus of driver while driving.
- To determine concentration of drivers while driving.
- To detect whether the camera is focusing properly and the driver's face.
- To verify the drowsiness.

3.3 PROBLEM DEFINITION

Fatigue is a safety problem that has not yet been deeply tackled by any country in the world mainly because of its nature. Fatigue, in general, is very difficult to measure or observe unlike alcohol and drugs, which have clear key indicators and tests that are available easily. Probably, the best solutions to this problem are awareness about fatigue-related accidents and promoting drivers to admit fatigue when needed. The former is hard and much more expensive to achieve, and the latter is not possible without the former as driving for long hours is very lucrative.

3.4 EXISTING SYSTEM

In the driver face monitoring systems, useful symptoms for fatigue and distraction detection can be divided into three general categories:

- (i) symptoms related to the eye region;
- (ii) symptoms related to the mouth region;
- (iii) symptoms related to the head.

Eye is the most important area of the face where the symptoms of fatigue and distraction appear in it. Therefore, many of the driver face monitoring systems detect driver fatigue and distraction only based on the symptoms extracted from the eyes. The symptoms related to eye region include PERCLOS eyelid distance, eye blink speed, eye blink rate, and gaze direction. Yawning is one of the hypovigilance symptoms related to the mouth region.

This symptom was extracted by detecting the open mouth. The existing system of driver drowsiness detection system has following disadvantages. There are mainly, using of two cameras in the system one for monitoring the head movement and the other one for facial expressions. The other disadvantage is aging of sensors and all these sensors are attached to the driver's body which may affect the driver.

3.5 PROPOSED SYSTEM

3.5.1 ADVANTAGES OF PROPOSED SYSTEM

- Efficiency while driving and safe driving.
- Decreased death rates.
- Reduced manual work.
- As the system is automated it doesn't require
- more resources like handwritten record of
- Driver's safety, but the record is maintained in the database.
- The system has less hardware requirements in comparison to the other biometric system.
- As the system uses fewer resources therefore the cost of the system is less.
- The system also reduces the human effort.

CHAPTER 4

EXPERIMENTAL METHODS OR ALGORITHMS USED

4.1 ALGORITHM:

The overall algorithm is pretty straightforward. First, we have used a camera which is set up at a desirable position in a car that looks for faces stream.

Once we get the eye region, we calculate the Eye Aspect Ratio to find out if the eye-lids are down for a substantial amount of time.

The implementation of the drowsiness detector system includes machine learning algorithms which is Viola-Jones algorithm. It is used for face detection only. It can be trained to detect a variety of object classes; it was primarily by the problem of face detection.

4.2 Algorithm Design and Development

A few algorithms and techniques have been used in the process of detecting face, eyes, and mouth.

The algorithm and technique used is Cascade Object Detector. The Cascade Object Detector uses the Viola-Jones algorithm to detect people's face, nose, eyes, mouth, or upper body.

4.2.1 Viola-Jones algorithm stages:

- Selection of the Haar Feature for image.
- Creating the specified Integral Images.
- AdaBoost Training for the image dataset.
- Cascading method for the Classifier.

4.2.2 Viola-Jones Face Detection Algorithm

Viola-

Jones object detection framework can be used to detect a variety of object classes, but it is more focused on the detection of face and facial features. This algorithm uses the concept of rectangle features which involves the sums of pixels within the rectangular areas. From Figure 8, the sums of the pixels that lie within the white rectangles are subtracted from the sum of

pixels in the grey rectangles.

The value of a *two-rectangle feature*, which are represented by A and B is the difference between the sum of pixels within two rectangular regions. The regions have the same size and shape. They are also horizontally or vertically oriented and adjacent to each other. A three-rectangle feature, which is represented as C, computes the sum within two outer rectangles subtracted from the sum in a center rectangle. Finally, a *four-rectangle feature*, which is represented as D computes the difference between diagonal pairs of rectangles.

The classifiers use Haar features in order to encode facial features. Features used in are seen on Figure.4.1.

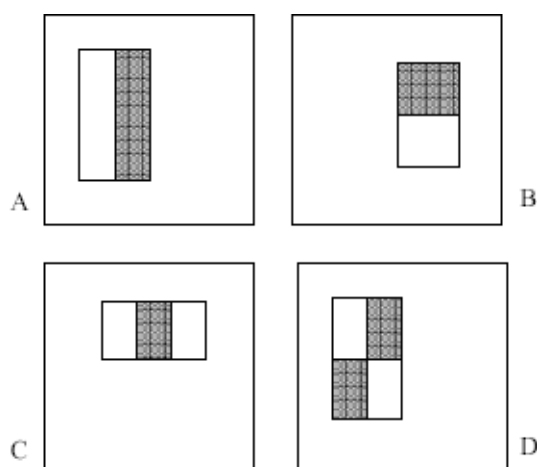


Fig.4.1 HaarFeatureUsed inViola-Jones

For each feature, the value is the difference between the sum of the pixels in black regions and the sum of the pixels in white regions.

Rectangle features can be computed rapidly using a representation for the image which is called integral image. which is an intermediate representation. The integral image at location pixels (x, y) contains the sum of the upper left pixels of the original image, inclusively. As seen on Figure.4.1.

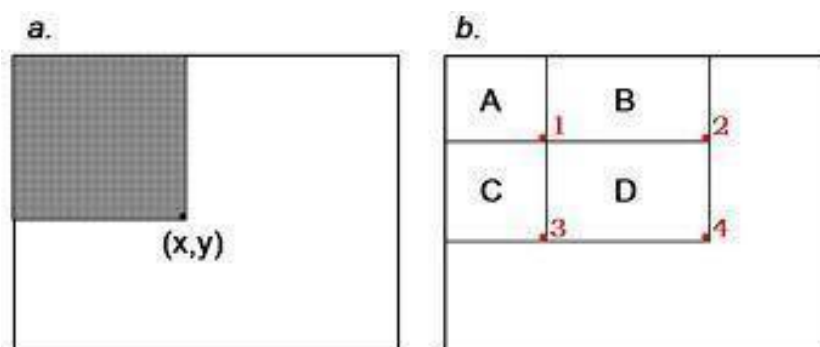


Fig.4.2IntegralImage

The value of the integral image at point (x,y) is the sum of all the pixels above and to the left. Based on the integral image, the sum of the pixels within rectangle D can be computed with four array references. The value of the integral image at location 1 is the sum of the pixels in rectangle A. The value at location 2 is $A + B$, at location 3 is $A + C$, and at location 4 is $A + B + C + D$. Then, the sum within D is computed as $4 + 1 - 2 - 3$ that means the sum of the pixels within rectangle D is computed with four array references. Integral image provides the advantage of fast feature evaluation.

Adaboost is used to select a small set of features and train the classifiers. The learning algorithm for weak classifiers is designed to select the single rectangle feature best separating the positive and negative examples. For each feature, the weak classifier determines the optimal threshold.

4.2.3 Cascade of Classifiers

In a standard 24x24 pixel sub-window, there are a total of 45,396 possible features that are detected. This is a number that is too large and prohibitively expensive to be evaluated. In order to improve detection performance, features need to be added to the classifiers. However, this step directly increases the computation time and making the detection process much slower. Therefore, a cascade of classifiers is constructed to increase detection performance while radically reducing computation time.

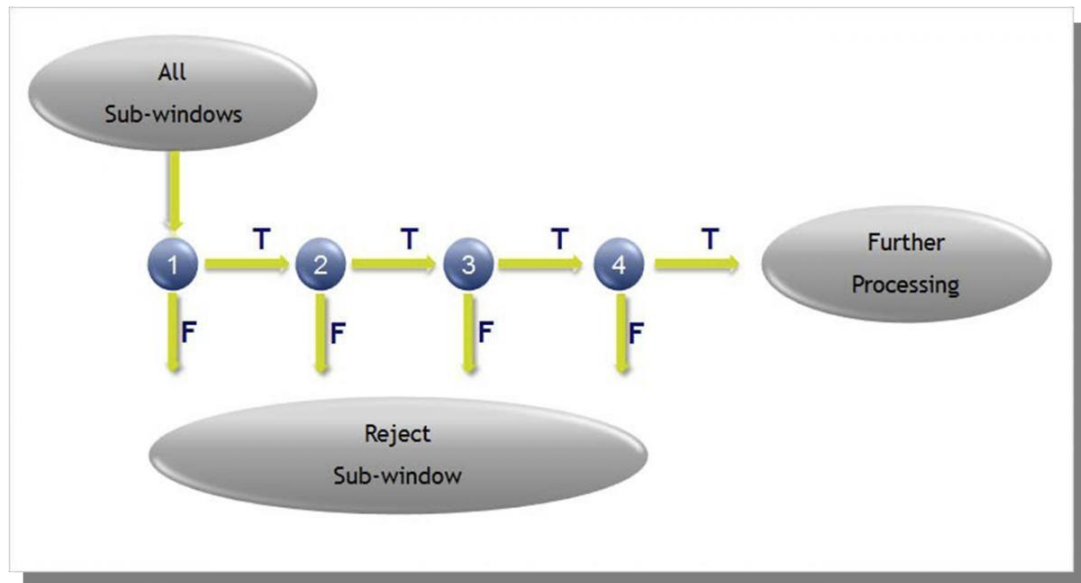


Fig.4.3 Cascade of Classifiers

The evaluation of the strong classifiers generated by the learning process can be done quickly but it is not fast enough to run in real-time. Therefore, the strong classifiers are arranged in a cascade in order of complexity. Each successive classifier is trained only on selected samples which pass through the preceding classifiers. If at any stage in the cascade a classifier rejects the sub-window under inspection, no further processing is performed and it continues to search the next sub-window.

Weak classifiers rejecting non-face regions and accepting face regions, are trained in such a way that their false negative rate approaches 0. Then, they are combined in a form of a degenerate decision tree which is called "cascade".

For the task of face detection, the features that are selected to detect the location of the face are shown in Figure 10. The two features are shown in the top row and are overlaid on a typical training face in the bottom row. The first feature measures the difference in intensity between the region of the eyes and a region across the upper cheeks. This is because the region of the eyes is often darker than the region of the nose and upper cheeks. The second feature compares the intensities in the eye regions to the intensity across the bridge of the nose.

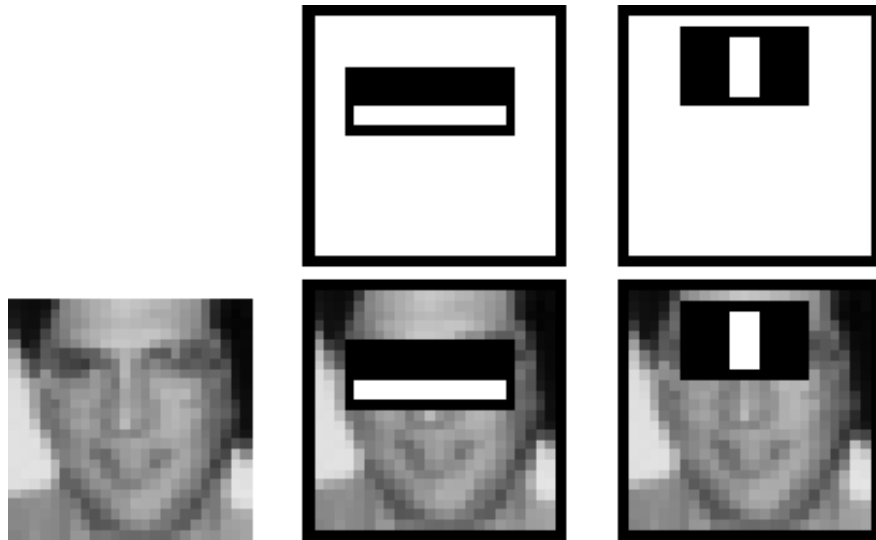


Fig.4.4 Feature for Face Detection

4.3 Analysis and Testing

In order to detect eye and mouth area, the face area need to be detected first. However, this step will reduce the performance and the speed of the system due to a large area of detection. The project objective is the detection of the drowsiness signs which is eye and mouth area. Therefore, this project limited the area of detection to eye and mouth. This will enhance the performance of the system. Cascade Object Detector algorithm is being tested by using MATLAB® software to get the detection area for the system that will be developed. Testing needs to be done to ensure it fulfills the required parameters needed.

4.4 MODULES

- Face detection
- Facial Mapping
- Eye detection
- Drowsiness detection
- Alarm

4.4.1 FACE DETECTION

For face detection itself, several approaches have been used in the related literature. Knowledge based methods try to encode human knowledge about the characteristics of a typical face, such as the relationships between facial features, and use them as a way to detect faces in an image. The goal of the feature invariant approaches is to find structural face features, such as eyebrows, eyes, nose, mouth and hairline, which persist under various poses, viewpoints or lighting and use those features to detect faces. Such features are mostly extracted using edge detectors. The video is obtained from a camera focused on the driver's face. The Haar-based classifier contains several features such as heights, weights, face features, the threshold of face colours. It is constructed by using a lot of positive and negative samples. The cascade consists both positive and negative samples. Eyes and mouth features are extracted and parallel processing is preceded by successful driver's face detection.

4.4.2 FACIAL MAPPING

The algorithm is implemented using a DIP that contains a landmark's facial detector with pre trained models. The 68-point shape predictor dataset was used to train the DIP facial landmark predictor and is the source of the semarking.

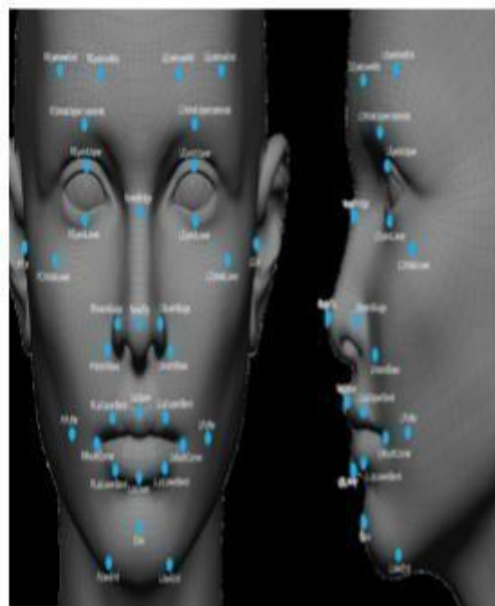


Fig.4.5 Facial landmarks by DIP

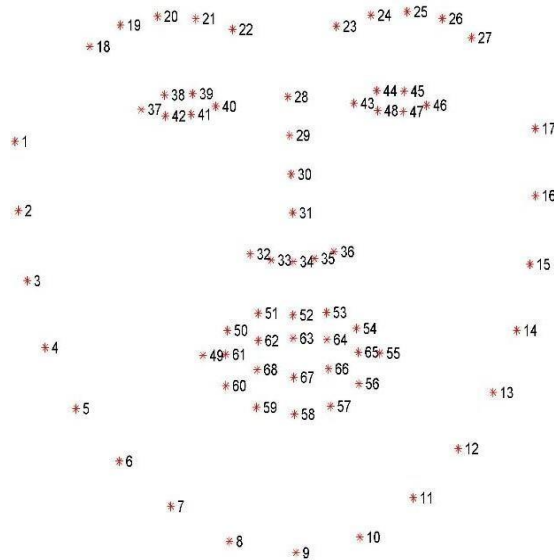


Fig.4.6Facial landmarks set which is detected via diib

4.4.3 EYE DETECTION

Eye tracking is the process of measuring either the point of gaze (where one is looking) or the motion of an eye relative to the head. An eye tracker is a device for measuring eye positions and eye movement. Eye trackers are used in research on the visual system, in psychology, in psycholinguistics, marketing, as an input device for human-computer interaction, and in product design. Eye trackers are also being increasingly used for rehabilitative and assistive applications (related for instance

to control of wheelchairs, robotic arms and prostheses). There are a number of methods for measuring eye movement. The most popular variant uses video images from which the eye position is extracted. We here are using eye tracking in detecting the drowsiness of the driver. Eye tracking is helping us to detect and sense the sleep of the driver, whether he is sleeping, wanting to sleep, getting exhausted while driving etc. We are first trying to generate a preview of the driver through the web camera

of the laptop. The driver's preview image is being captured simultaneously by the web

camera and the camera forms to give us a preview image. The camera now starts to record the video and automatically saves it in the backend so that it can be analyzed. After the images, videos, frames are being recorded and saved, the eyes are detected from them and then tracked.

4.4.3.1 EYE ASPECT RATIO (EAR)

The eye tracking involves to calculate the value for the eye aspect ratio. Eye aspect ratio (EAR) is a parameter that determines eye state used to figure out if it is open or closed. It can be calculated using facial landmarks plotted by the 68 facial landmark point plot provided by python's dlib library. Once we get the eye region, we calculate the Eye Aspect Ratio to find out if the eye-lids are down for a substantial amount of time. Once we get the eye region, we calculate the Eye Aspect Ratio to find

$$EAR = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

nd

out if the eye-lids are down for a substantial amount of time. Where $p_1 \dots p_6$ are 2D facial landmark location.

The numerator of this equation computes the distance between the vertical eye landmarks while the denominator computes the distance between horizontal eye landmarks, weighting the denominator appropriately since there is only one set of horizontal points but two sets of vertical points.

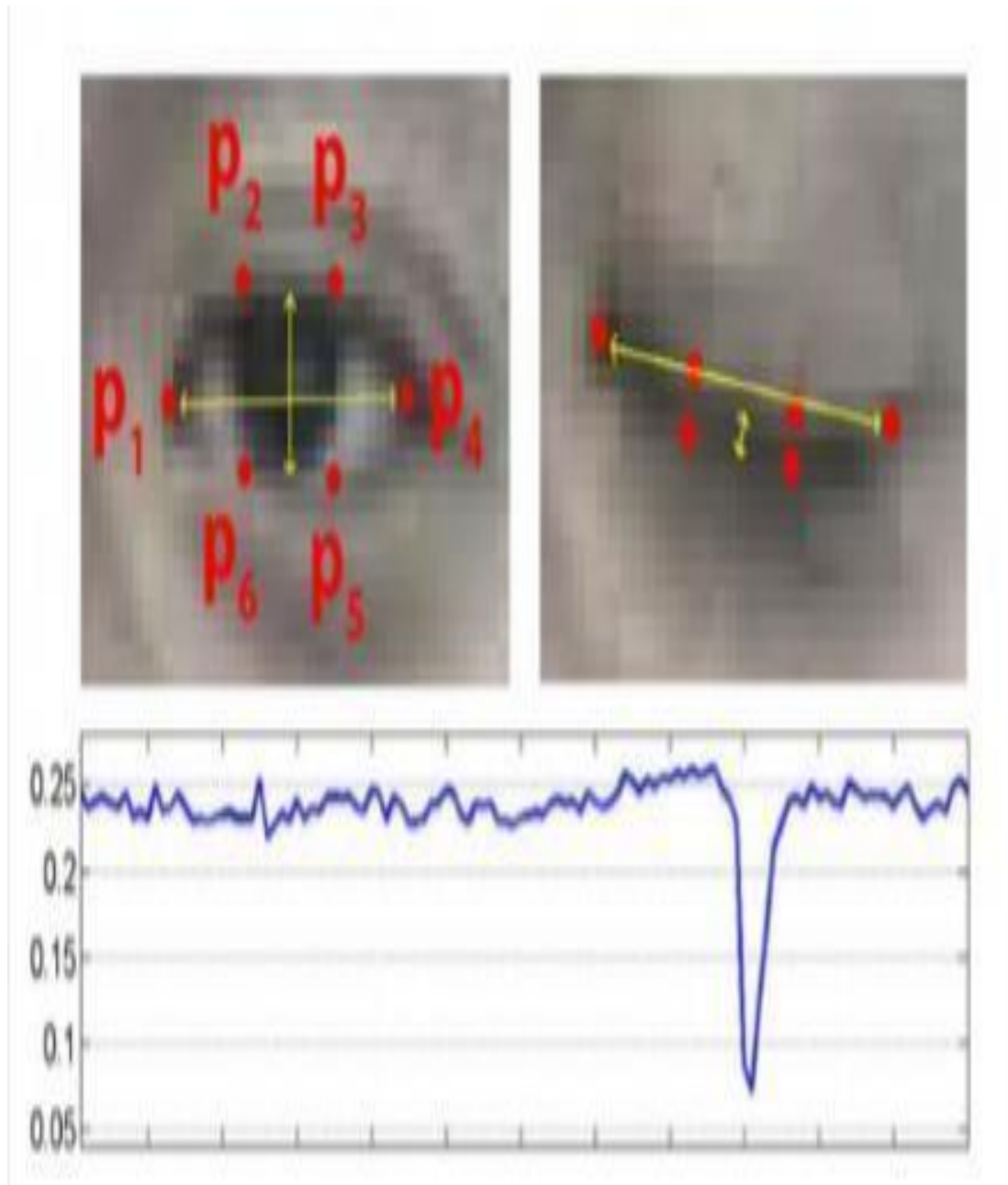


Fig.4.7Eyeaspectratio

4.4.4 DROWSINESS DETECTION

Drowsiness is characterized by a widely opened mouth. Yawning detection is performed in two main steps: In the first step, the yawn component will be detected in the face independent of the mouth location. This component is basically the hole in the face as the result of wide mouth opening. In the second step, the mouth location will be used to verify the validity of the detected component. Like the eye closure detection, the facial

landmarks are used to detect an open mouth. Lip distance is the parameter used to determine if the subject's mouth is open. The lip distance calculated from the frame is above lip distance threshold, the subject is determined to be drowsiness. An alarm is raised if the subject have drowsy more than the set boundary value consecutively. Small opening that in reality are construed as a result of talking, eating are ignored.

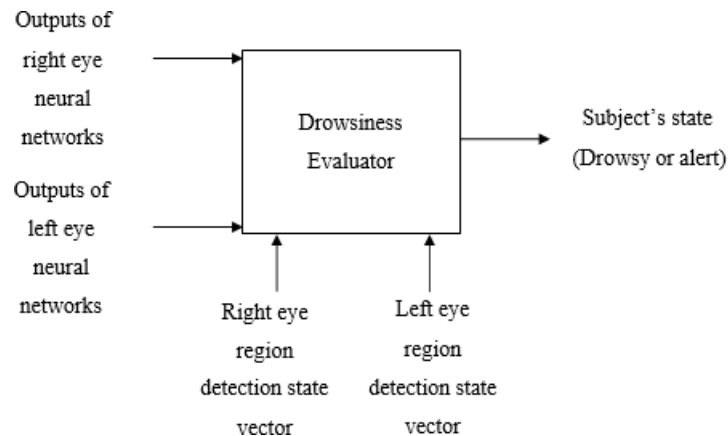


Fig4.8: Block diagram of Drowsiness Evaluator module for a video segment

4.4.5 ALARM

The alarm sound alerts the driver in case of drowsiness is detected. Instead of an alarm i.e. buzzer we are giving here an text voice to alert the driver. For that we are using a module called web push notifications.

Web Push Notifications are platform independent for linux, windows and

other

operating

Systems.

4.5 MACHINE LEARNING

Machine learning (ML) is the study of computer algorithms that improve automatically through experience. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to do

so. Machine learning involves computers discovering how they can perform tasks without

being explicitly programmed to do so. It involves computers learning from data provided so that they carry out certain tasks. For simple tasks assigned to computers, it is possible to program algorithms telling the machine how to execute all steps required to solve the problem at hand; on the computer's part, no learning is needed. For more advanced tasks, it can be challenging for a human to manually create the needed algorithms. In practice, it can turn out to be more effective to help the machine develop its own algorithm, rather than having human programmers specify every needed step.

4.5.1 K-means Algorithm

It is an unsupervised clustering algorithm which signifies a distribution of data w.r.t. K centers, K being chosen by the coder. The difference between K-means and expectation maximization is that in K-means the centers aren't Gaussian. Also the clusters formed look somewhat like soap bubbles, as centers compete to occupy the closest data points. All these cluster areas are usually used as a form of sparse histogram bin for representing the data.

4.5.2 Normal or Naïve Bayes classifier algorithm

It is a generative classifier where features are often assumed to be of Gaussian distribution and also statistically independent from one another.

4.5.3 Decision tree algorithm:

It is a partially discriminative classifier. The tree we talk about just finds a singular data feature and determines a threshold value of the current node which best divides the data into different classes. The data is broken into parts and the procedure is recursively repeated through the left as well as the right branches of the decision tree. Even if it is not the top performer, it's usually the first thing we try as it is fast and has a very high functionality.

4.5.4 Boosting:

It is a discriminative group of classifiers. In boosting, the final classification decision is made by taking into account the combined weighted classification decisions of the group of classifiers. We learn in training the group of classifiers one after the other. Each

classifier present in the group is called a weak classifier. These weak classifiers are usually composed of single-variable decision trees known as —stumps. Learning its classification decisions from the given data and also learning a weight for its vote based on its accuracy on the data are things the decision tree learns during training. While each classifier is trained one after the other, the data points are re-weighted to make more attention be paid to the data points in which errors were made. This continues until the error over the entire dataset, obtained from the combined weighted vote of all the decision trees present, falls below a certain threshold. This algorithm is usually effective when a very large quantity of training data is available.

4.5.5 Random trees algorithm

It is a discriminative woods of a great deal of choice trees, every one of which is worked down to a maximal part profundity. At the season of adapting, each hub of each tree is permitted a decision of part factors, however just from an arbitrarily produced subset of the considerable number of information highlights. This makes sure that all the trees become statistically independent and a decision maker. In the run mode, all the trees get an unweighted vote. Random trees are usually quite effective. They can also perform regression by taking the average of the output numbers from every tree.

4.5.6 Face detector algorithm

It is an object detection application. It is based on a smart use of boosting. A trained frontal face detector is available with the OpenCV distribution. This works remarkably well. We can train the algorithm for other objects by using the software provided. This works wonderfully for rigid objects.

4.5.7 Expectation maximization (EM) algorithm

It is used for clustering. It is a generative unsupervised algorithm. It fits N multidimensional Gaussians to the data, N being chosen by the user. It can act as an efficient way for representing a more complex distribution using only a few parameters (i.e. means and variances). Usually used in segmentation, it can be compared with K-means.

4.5.8 K-nearest neighbours

A lot of It is one of the simplest discriminative classifier. The training data is simply stored using labels. Then, a test data point is classified in accordance to the majority vote

of the K nearest data points. K-nearest neighbours is probably the simplest algorithm we can use. It is usually effective but it can be slow. It also requires memory.

4.5.9 Neural networks/Multilayer perceptron (MLP) algorithm

It is a discriminative algorithm which almost always contains hidden units in between the output and the input nodes for better representation of the input signal. It is slow to train, however it is quite fast to run. It remains the best performer for applications like letter.

4.5.10 Support vector machine (SVM) algorithm

It is a discriminative classifier that is likewise equipped for doing relapse. Here, a separation work in the middle of two information focuses is characterized in a higher-dimensional space. (Anticipating information onto higher measurements helps in making the information more probable for direct division.) Support vector machine (SVM) gets the hang of isolating hyperplanes which maximally separate every one of the classes in the higher measurement. This will in general be the best when there is restricted information. Be that as it may, when huge informational indexes are accessible, boosting or arbitrary trees are liked.

4.6 SYSTEM ARCHITECTURE

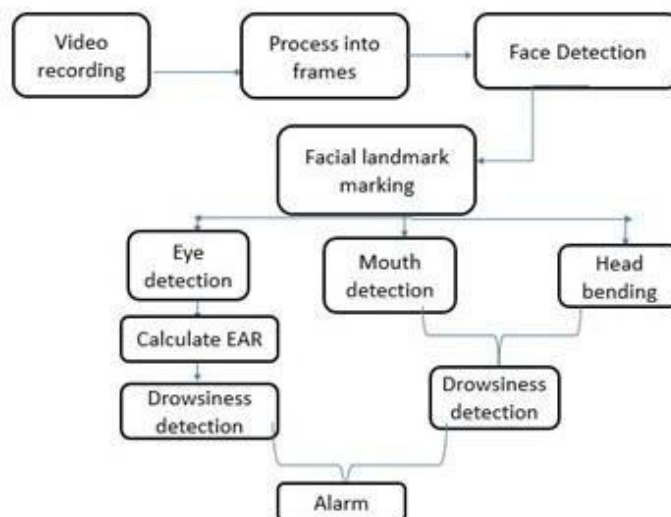


Fig.4.9 system architecture

4.7 USECASEDIAGRAM

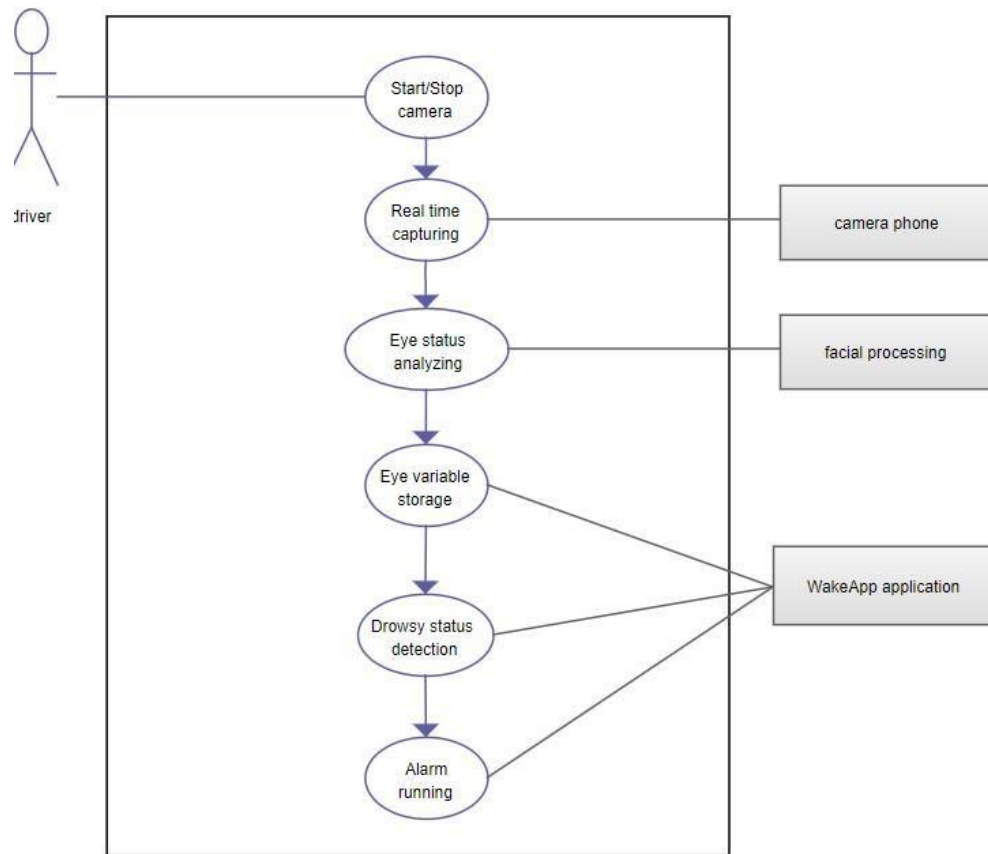


Fig.4.10usecasediagram

4.8 REQUIREMENT

4.8.1 HARDWAREREQUIREMENT

- A system with minimum 8GB RAM.
- Camera
- Alarm
- NodeMCU
- UART Protocol

4.8.2 SOFTWARE REQUIREMENT

- MATLAB2021a
- Imageprocessingtoolbox

4.9 SOFTWARE DESCRIPTION

4.9.1 The MATLAB System

The MATLAB system consists of five main parts:

4.9.1.1 Development Environment:

This is the set of tools and facilities that help you use MATLAB functions and files. Many of these tools are graphical user interfaces. It includes the MATLAB desktop and Command Window, a command history, and browsers for viewing help, the workspace, files, and the search path.

4.9.2 MATLAB Application

The MATLAB application is consisted of several files, each one is responsible for a certain functionality, and it's divided into three parts:

- **Learning Model:** This part is related to the learning model training and evaluation, and is executed once a new model to be trained and it contains loading the data using Image Datastore object and feed it to the model to be trained as explained in section.
- **Server Connection:** This part is related to establishment of the connection between the MATLAB and the server, and it consists of two parts: the first one for establishing the connection, called once at the beginning and is used to set the host address, the port used, username, the password, java database connector path and string, then use the JDBC driver to connect to the database server.
- **Preprocessing and image manipulation:** This part includes several preprocessing functions which are applied to the data before the training or for the data to be classified, and contains functions for.
- The MATLAB application is running always on the server side and this function

is listening to any changes in the database server, any addition in the database server means that the android application wrote a new input, then this function triggers the MATLAB application to process the new input.

- When the MATLAB discovers a new input from the database server, this function reads the image path from the database and uses that path to load the image into the application to perform a classification task.
- This task is to load a pre-trained model and use it to classify the input data into a suitable class of skin diseases, this function is the main function of the application.

4.10 IMAGE PROCESSING TOOL BOX:

In computer science, digital image processing is the use of computer algorithms to perform image processing on digital images. Image Processing Toolbox™ provides a comprehensive set of reference-standard algorithms and workflow apps for image processing, analysis, visualization, and algorithm development. You can perform image segmentation, image enhancement, noise reduction, geometric transformations, and image registration using deep learning and traditional image processing techniques. The toolbox supports processing of 2D, 3D, and arbitrarily large images.

Image Processing Toolbox apps let you automate common image processing workflows. You can interactively segment image data, compare image registration techniques, and batch-process large datasets. Visualization functions and apps let you explore images, 3D volumes, and videos; adjust contrast; create histograms; and manipulate regions of interest (ROIs).

You can accelerate your algorithms by running them on multicore processors and GPUs. Many toolbox functions support C/C++ code generation for desktop prototyping and embedded vision system deployment.

The Image Processing Toolbox provides a set of functions and applications for image processing, analysis, and visualization. There are many functions available for image analysis, image segmentation, image enhancement, noise reduction, geometric transformations, and image registration.

5.1 EXPERIMENTAL RESULTS

The screenshot shows the SQL Server Enterprise Manager interface. The left pane displays the 'Adventureworks2008' database structure, including tables like 'tblColors'. The right pane shows a T-SQL query in the 'Query Editor' window. The query is as follows:

```

-- Update the color column in the tblColors table based on the ReturnedColorSpace property
-- of the tblColors table.

-- Create a cursor to iterate through the rows of the tblColors table
DECLARE cur CURSOR FOR
SELECT id, color, ReturnedColorSpace
FROM tblColors

-- Open the cursor
OPEN cur

-- Loop through the rows of the table and update the color column
WHILE @@FETCH_STATUS = 0
BEGIN
    -- Fetch the next row
    FETCH NEXT FROM cur INTO @id, @color, @ReturnedColorSpace

    -- Update the color column with the value of the ReturnedColorSpace property
    UPDATE tblColors SET color = @ReturnedColorSpace WHERE id = @id
END

-- Close the cursor
CLOSE cur

```

The query is designed to update the 'color' column in the 'tblColors' table based on the 'ReturnedColorSpace' property of the 'tblColors' table. The query uses a cursor to iterate through the rows of the table and update the 'color' column with the value of the 'ReturnedColorSpace' property. The 'tblColors' table has columns 'id', 'color', and 'ReturnedColorSpace'. The 'tblColors' table is located in the 'Adventureworks2008' database.

27

```

Editor - C:\Users\Badiuzaman\Documents\MATLAB\Badiuzaman\MATLAB.m
Badiuzaman\MATLAB.m x FaceTrackingFromVideo1.m x Irisdetection.m x
1 % Create a cascade detector object.
2 faceDetector = vision.CascadeObjectDetector();
3
4 % Create a cascade detector to detect Left eye.
5 LeftEyeDetector = vision.CascadeObjectDetector('LeftEye');
6
7 % Create a cascade detector to detect Right eye.
8 RightEyeDetector = vision.CascadeObjectDetector('RightEye');
9
10 % Read a video frame and run the detector.
11 videoFileReader = vision.VideoFileReader('video5.mp4');
12 videoFrame = step(videoFileReader);
13 bbox = step(faceDetector,videoFrame);
14
15 cgface=[bbox(1,1)+bbox(1,3)/2, bbox(1,2)+bbox(1,4)/2];
16
17 videoFileReader = vision.VideoFileReader('video5.mp4');
18 videoFrame = step(videoFileReader);
19 bbox_1 = step(LeftEyeDetector,videoFrame);
20
21 % Remove outlier left eye
22 [n1,nc]=size(bbox_1);
23
24 for i=1:n1
25     cgtmp=[bbox_1(i,1)+bbox_1(i,3)/2, bbox_1(i,2)+bbox_1(i,4)/2 ];
26     if ( cgtmp(1,1)<cgface(1,1) && (cgtmp(1,2)<cgface(1,2) ) )
27         CoordLeftEye=bbox_1(i,:);
28     end
29

```

Fig.5.2 Command to Detect Eyes

```

Editor - C:\Users\Badiuzaman\Documents\MATLAB\mouthdetection.m
Badiuzaman\MATLAB.m x FaceTrackingFromVideo1.m x Irisdetection.m x mouthdetection.m x
1 % Create a cascade detector object.
2 Detector = vision.CascadeObjectDetector('Mouth');
3
4 % Read a video frame and run the detector.
5 videoFileReader = vision.VideoFileReader('Video2.mp4');
6 videoFrame = step(videoFileReader);
7 bbox = step(Detector,videoFrame);
8
9 % Draw the returned bounding box around the detected face.
10 videoOut = insertObjectAnnotation(videoFrame,'rectangle',bbox,'Mouth');
11 figure, imshow(videoOut), title('Detected Mouth');

```

Fig.5.3 Command to Detect Mouth

```

MATLAB R2013a
HOME PLOTS APPS EDITOR PUBLISH VIEW
New Open Save Compare Print Insert Comment Indent Go To Breakpoints Run Run and Run and Run and Run and
FILE EDIT NAVIGATE BREAKPOINTS RUN
Editor - C:\Users\Badiuzaman\Documents\MATLAB\FINALcode.m
FINALcode.m x UpdateEndEyeBlinkDetect... x getframes.m x
1 clear; close all; clc;
2
3 % Creation of the detectors for Face, Eyes (left and right) and Mouth
4
5 % Create a cascade detector object to detect Face.
6 FaceDetector = vision.CascadeObjectDetector();
7
8 % Create a cascade detector to detect Left eye.
9 LeftEyeDetector = vision.CascadeObjectDetector('LeftEye');
10
11 % Create a cascade detector to detect Right eye.
12 RightEyeDetector = vision.CascadeObjectDetector('RightEye');
13
14 % Create a cascade detector to detect Mouth.
15 MouthDetector = vision.CascadeObjectDetector('Mouth');
16
17 % Create an edge detector to detect if the eye is open or closed
18 EdgeDetector = vision.EdgeDetector('BinaryImageOutputPort',false,'GradientComponentOut');
19 nbpix=6;
20 t=linespace(-nbpix,nbpix,2*nbpix+1);
21 sig=1.5;
22 x=exp(-(t.^2)/(2*sig^2))./(sqrt(2*pi)*sig);
23 figure, plot(x);
24 y=(-(2*pi)/(2*sig^2)).*exp(-(t.^2)/(2*sig^2))./(sqrt(2*pi)*sig);
25 figure, plot(y);
26 Hx=x'*y;
27 Hy=y'*x;

```

Fig.5.4 Cascade Detectors for Face, Each Eye and Mouth

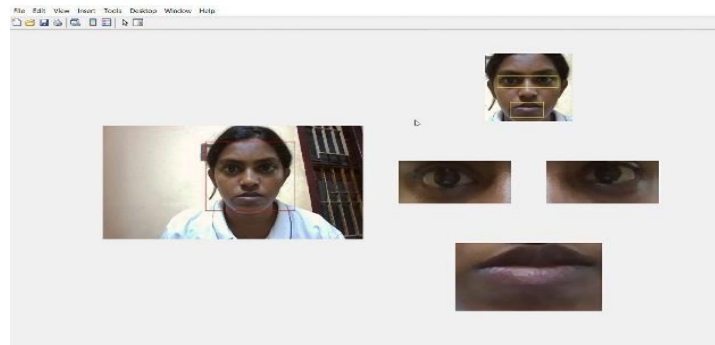


Fig.5.5sampleoutput1

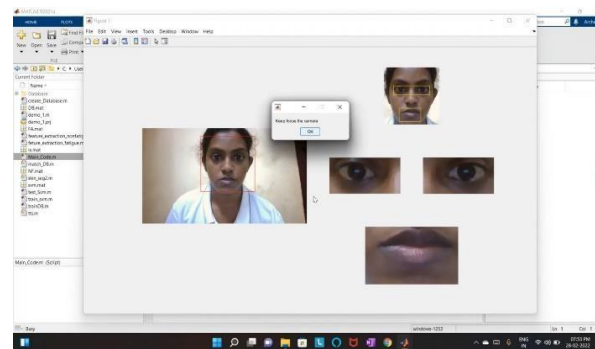


Fig.5.6sampleoutput2



Fig.5.7AlertNotification

5.2 LIMITATIONS

1. Dependence on ambient light

With poor lighting conditions even though face is easily detected, sometimes the system is unable to detect the eyes. So it gives an erroneous result which must be taken care of. In real time scenario infrared backlights should be used to avoid poor lighting conditions.

2. Hardware requirements

Our system was run in a PC with a configuration of 1.6GHz and 1GB RAM Pentium dual core processor. Though the system runs fine on higher configurations, when a system has an inferior configuration, the system may not be smooth and drowsiness detection will be slow. 46 The problem was resolved by using dedicated hardware in real time applications, so there are no issues of frame buffering or slower detection.

3. Poor detection with spectacles

When the driver wears glasses the system fails to detect eyes which is the most significant drawback of our system. This issue has not yet been resolved and is a challenge for almost all eye detection systems designed so far.

4. Problem with multiple faces

If more than one face is detected by the webcam, then our system gives an erroneous result. This problem is not important as we want to detect the drowsiness of a single driver.

CHAPTER

6 CONCLUSION

N

6.1 CONCLUSION

Hence driver drowsiness detection is a very important part for the driver while he drives the car. So every driver should have a drowsiness detection system in his vehicle so that he can be almost safe and secure from road accidents, deaths from road accidents. A sleep of even a second can take the life of the driver. Then why to take any risk? This risk can be prevented when the driver uses the drowsiness detection system. The truck drivers, car passengers, taxi drivers, all can be aware about this system. They can manage to get help through it. Also they must be tracked on every route where they are driving to prevent any mishap. The fatigue detection system in drivers has thus been simulated in OpenCV. The real-time system has been successfully created to detect the face and hence the eyes and mouth of the driver to check whether he is blinking or yawning to acquire information about this level of alertness. The alarm that has been implemented is a web push notification software which converts text to speech to alert the driver. To realize the drowsiness detection on the real roads, the head posture is also a good choice in the future work.

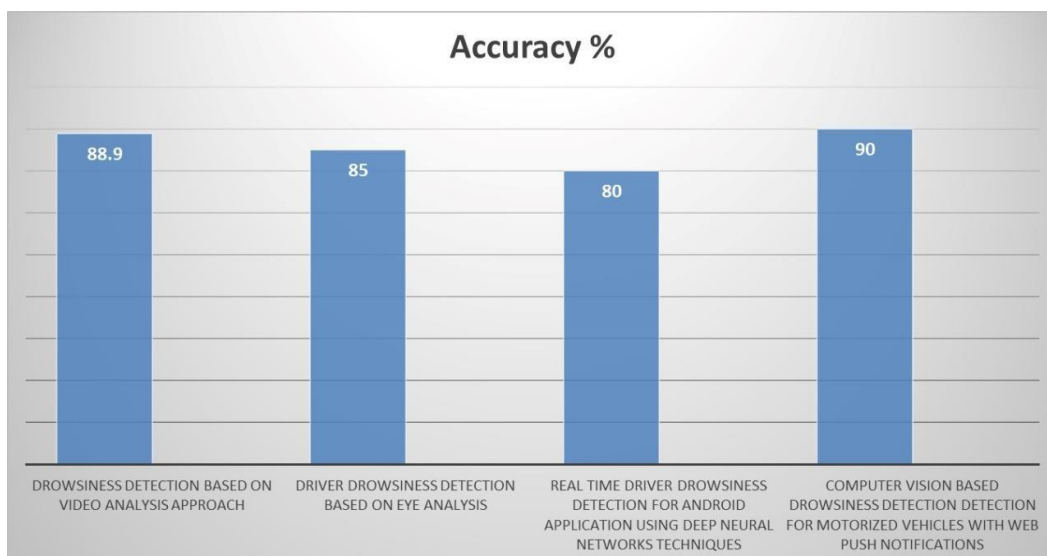


Fig6.1Accuracy

6.2 FUTURE ENHANCEMENT

Some drivers cover their mouth while yawning or they have different signs of sleepiness like eye closure or falling head; in this case, future work may consist of combining the detection of different fatigue signs.

When the driver wears glasses the system may not detect eyes which is the most noteworthy disadvantage of these systems. This issue has not yet been settled in near future it can be sorted out.

REFERENCES

- [1].O. Tuncer, L. E. Karsl Gil, “Vision based lane keeping assistance control triggered by adriver inattention monitor”, IEEE International Conference on Systems Man and Cybernetics(SMC),Istanbul, 10-13Oct.2010.
- [2].H. Graf, and E. Cosatto, “Locating Faces and Facial Parts”, in Proc. First Intl WorkshopAutomaticFaceandGestureRecognition, 1995.
- [3].T.Pilutti,A.Ulsoy,“Identificationofdriverstateforlane-keepingtasks”,IEEETransactions on Systems, Man and Cybernetics, Part A: Systems and Humans, vol. 29, no. 5,pp.486-502, 1999
- [4].I. Craw, J. Lishman, “Automatic Extraction of Face Features”, Pattern RecognitionLetters,vol. 5, pp. 183-187, 1987.
- [5].M. Sigari, “Driver Hypo-vigilance Detection Based on Eyelid Behaviour”, in SeventhInternationalConferenceon Advances inPattern Recognition,2009.
- [6].P.TabriziandR.Zoroofi,“OpenorClosedEyeAnalysisforDrowsinessDetection”,FirstWorksh opsonImageProcessing Theory,Tools and Applications, 2008.
- [7].M. Omidyeganeh, A. Javadtalab and S. Shirmohammadi, “Intelligent driver drowsinessdetection through fusion of yawning and eye closure”, in IEEE International Conference onVirtual Environments Human-Computer Interfaces and Measurement Systems (VECIMS),2011.
- [8].M. Saradadevi and P. Bajaj, “Driver Fatigue Detection Using Mouth and YawningAnalysis” IJCSNS International Journal of Computer Science and Network Security, vol. 8,no.6, pp. 183-188, June2008.
- [9].T.WangandP.Shi,“Yawningdetectionfordeterminingdriverdrowsiness”,inProceedings of 2005 IEEE International Workshop on VLSI Design and Video Technology,2005.
- [10]. Zhang,Wei;Cheng,Bo;Lin,Yingzi,“Driverdrowsinessrecognitionbasedoncomputervision technology.” Published in: Tsinghua Science andTechnology (Volume: 17, Issue: 3)Page(s):354-362 Date of Publication: June2012.

APPENDICES

A. SOURCECODE:

```
clc;clear
all;close
all;
%%
delete(imaqfind)vid=videoinput('winvideo',1);triggerconfig(vid,'manual');set(vid,'FramesPerTrigger',1);set(vid,'TriggerRepeat',Inf);%start(vid);

%View the default color space used for the data — The value of theReturnedColorSpace property indicates the color space of the image data.color_spec=vid.ReturnedColorSpace;

% Modify the color space used for the data — To change the color space of thereturnedimagedata,setthevalueoftheReturnedColorSpaceproperty.
if~strcmp(color_spec,'rgb')set(vid,'ReturnedColorSpace','rgb');
end

start(vid)
%Createa detectorobject
faceDetector=vision.CascadeObjectDetector;
faceDetectorLeye = vision.CascadeObjectDetector('EyePairBig');faceDetectorM=vision.CascadeObjectDetector('Mouth');
loadix
for ii = 1:100trigger(vid);
im=getdata(vid,1); % Get the frame in
imimshow(im)
subplot(3,4,[1 2 5 6 9 10]);imshow(im)
```

```
%Detectfaces  
bbox=step(faceDetector,im);
```

```

if
    ~isempty(bbox);bb
    ox=bbox(1,:);
    % Plot
    boxrectangle('Position',bbox,'edgecolor','r');

    lc =
    imcrop(im,bbox);sub
    plot(3,4,[3
    4]);imshow(lc)

    bboxeye = step(faceDetectorLeye,

lc);if~isempty(bboxeye);
    bboxeye=bboxeye(1,:);
    Eeye=imcrop(lc,bboxeye);
    % Plot
    boxrectangle('Position',bboxeye,'edgecolor','y');
else
    disp('Eyes not
    detected')end

if
    isempty(bboxeye
    )continue;
endlc(1:bboxeye(2)+2*bboxeye(4),:,:)
=0;
%DetectMouth
bboxM=step(faceDetectorM,lc);

if
    ~isempty(bboxM);bbo
    xMtemp=bboxM;

    if~isempty(bboxMtemp)

        bboxM =
        bboxMtemp(1,:);Emouth=imc
        rop(lc,bboxM);
        % Plot
        boxrectangle('Position',bboxM,'edgecolor','y')
        ;

```

```
    else
        disp('Mouthnot detected')end
else
    disp('Mouth not
detected')end
```

```

[nrencek ] =size(Eeye);

%Divideintotwoparts
Leye=Eeye(:,1:round(nce/2),:);Reye=
Eeye(:,round(nce/2+1):end,:);

subplot(3,4,7)imshow(Le
ye);subplot(3,4,8)imshow
(Reye);subplot(3,4,[11,12
]);imshow(Emouth);

Leye=rgb2gray(Leye);Reye
=
rgb2gray(Reye);Emouth=rgb
2gray(Emouth);

imwrite(Leye,['Database/LE/' num2str(ix)
'.bmp']);imwrite(Reye,['Database/RE/' num2str(ix)
'.bmp']);imwrite(Emouth,['Database/M/' num2str(ix)
'.bmp']);ix= ix+1;
save ix
ixpause(0.0000
5)
end
end

clc;clear
all;close
all;
%%
delete(imaqfind)vid=videoinpu
t('winvideo',1);triggerconfig(vid
,'manual');set(vid,'FramesPerT
rigger',1
);set(vid,'TriggerRepeat',Inf);
%start(vid);

%View the default color space used for the data — The value of
theReturnedColorSpace property indicates the color space of the image
data.color_spec=vid.ReturnedColorSpace;

```

```

% Modify the color space used for the data — To change the color space of
thereturnedimagedata, setthevalueoftheReturnedColorSpaceproperty.
if~strcmp(color_spec,'rgb')set(vid,'Returned
    ColorSpace','rgb');
end

start(vid)
%Createa detectorobject
faceDetector=vision.CascadeObjectDetector;
faceDetectorLeye =
vision.CascadeObjectDetector('EyePairBig');faceDetectorM=visi
on.CascadeObjectDetector('Mouth');

for ii =
    1:500trigge
r(vid);
im=getdata(vid,1); % Get the frame in
imimshow(im)

subplot(3,4,[1 2 5 6 9
10]);imshow(im)
%Detectfaces
bbox=step(faceDetector,im);

if
    ~isempty(bbox);bb
ox=bbox(1,:);

    % Plot
    boxrectangle('Position',bbox,'edgecolor','r');

    lc =
    imcrop(im,bbox);sub
    plot(3,4,[3
    4]);imshow(lc)

    bboxeye = step(faceDetectorLeye,

    lc);if~isempty(bboxeye);
        bboxeye=bboxeye(1,:);

        Eeye=imcrop(lc,bboxeye);
        % Plot

```

```
        boxrectangle('Position',bboxeye,'edgecolor','y');  
else  
    msgbox('Alert!... Sleeping  
Condition')end
```

```

if
    isempty(bboxeye
    )continue;
endlc(1:bboxeye(2)+2*bboxeye(4),:,:)
=0;

%DetectMouth
bboxM=step(faceDetectorM,lc);

if
    ~isempty(bboxM);bbo
    xMtemp=bboxM;

    if~isempty(bboxMtemp)

        bboxM =
        bboxMtemp(1,:);Emouth=imc
        rop(lc,bboxM);

        % Plot
        boxrectangle('Position',bboxM,'edgecolor','y')
        ;
    else
        msgbox('50% Sleeping
        Condition')end
    else
        msgbox('Keep focus the
        camera')end

[nrencek ] =size(Eeye);

%Divideintotwoparts
Leye=Eeye(:,1:round(nce/2),:);Reye=
Eeye(:,round(nce/2+1):end,:);
%
Emouthsubplot(3,4,7
)imshow(Leye);subpl
ot(3,4,8)imshow(Rey
e);subplot(3,4,[11,12]
);imshow(Emouth);p
ause(0.00005)
end

```

end

B. PUBLICATIONWITHPLAGIARISMREPORT

Decision of Submission Ref. No.80 Inbox x



ICE ICT <iceict@goel.edu.in>
to me ▾

Wed, Mar 30, 10:40 AM



Dear Author

We have received the reports from our reviewers on your manuscript, "Computer Vision based drowsiness detection for motorized vehicles with Web Push Notifications.", submitted to ICE ICT-2022.

After a careful study of the manuscript, based on the advice received, we have decided that your manuscript can be **provisionally accepted** for publication after you have carried out the corrections as suggested by the reviewer(s).

Below, please find the reviewers' comments for your perusal.

ICEICT-2022 submission 80 Inbox x



ICEICT-2022 <iceict2022@easychair.org>
to me ▾

Dear authors,

We received your submission to ICEICT-2022 (International Conference on Emerging Trends in IoT and Computing Technologies-2022):

Authors : Archana C and Abirami R

Title : Computer Vision based drowsiness detection for motorized vehicles with Web Push Notifications.
Number : 80

The submission was uploaded by Archana C <archu2762@gmail.com>. You can access it via the ICEICT-2022 EasyChair Web page

<https://easychair.org/conferences/?conf=iceict2022>

Thank you for submitting to ICEICT-2022.

Best regards,
EasyChair for ICEICT-2022.

Computer Vision based drowsiness detection for motorized vehicles with Web Push Notifications

Abirami R, DR V.Nirmalrani, Archana
C Department of IT – School of Computing
Sathyabama Institute of Science and Technology Chennai -
600119 abirami25aug@gmail.com, archu2762@gmail.com, nirmalrani.it@gmail.com

Abstract

Considering that the appearance of fast mechanized vehicles tire utilizing mishaps have killed huge number of individuals all through round. Further prominent examinations occurring in unparalleled rapid engines, the risk of such setback has chipped away at multiple times. To keep away such mishaps, this thesis offers a PC inventive and perceptive based machine laziness machine for mechanized automobile with web message pop-up to illuminate to main impetus sooner than any occurrence happens. A continuous video device catches the substance of the driver and a pre-prepared contraption acquiring information on variant recognizes the consideration restrictions from that ongoing video dissemination. Then, at that point, both sight addressed via niche of the consideration after which running clockwise determined for twenty back to back outlines, which if considerably less than angles sounds a caution and sends an alarm in your cell phone through message pop-up. When unlocked likewise demonstrates a couple of café close to the driver's area to develop the main thrust's readiness.

Keywords

Digital image processing technique (DIP), Drowsy, Alarm, Eye detection, Human Skin Mapping, Face Part Extraction.

1. Introduction

Sleepy riding has ended up being a top notch inconvenience in the past years and years with the development of guests and studies in fast mechanized engines

thewounds in light of tiredness has raised drastically. With almost 328,000
crashes every buyer in the US.

This is the fundamental justification for why such countless analysts are chipping away at laziness recognition algorithms. The essential goal of the proposed canvas is to plan and grow the driver help model or main thrust language or ready device through the utilization of the edge location, viola jones calculation to alarm the main thrust if there should be an occurrence of any extraordinary interest on the face it takes note. The admonition message should assist the main thrust with pulling together and include as a safe excursion to him and also to different people groups. Up to five devices can be bought into the web Push Notifications all together that know not best the main impetus but rather his advisers can likewise be advised. Net Push Notifications are stage fair and subsequently might be sent on any web empower tool. To keep away from such wounds, this endeavor a pc innovative and insightful based contraption language or device.

Steady with Turkish Statistical Institute, the amount of site guests wounds in increments step by step every year. This isn't generally just an issue of four usofa, it's far rather a worldwide issue. With regards to connection for safe overall road travel, around 1. Three million people kick the bucket in street crashes like clockwork, this implies that 3287 passings every day. The situation is comparative inside the U.S.A.. Data show that like clockwork 37000 individuals bite the dust in road crashes and a couple of thirty five million are harmed or debilitated. Road crashes esteem the usa \$230.6 billion with regard to yr. One of the dominating intentions of autocollisions is sluggish utilizing. In accordance with the assessment made through US country wide motorway traffic security the board, every year around 100,000 guests wounds get up from thought process forces sluggishness and exhaustion. With regard to information assembled via national government, inside the U.S. No less than 1500 people kick the bucket and 40000 people are harmed in lazy thought process force crashes each yr. Those numbers are most extreme plausible and genuine misrepresentation.

2. Literature Review

Tuncer et al.[1] has presented path global positioning framework that will be started for individuals who can't keep a path following. One more strategy for face discovery in light of finding facial highlights is created by Graf et al. [2]. In this technique expresses geomorphology activities functional to observe the regions which have extreme focus with specific shapes. sluggishness discovery proposed Pilutti et al.[3] the driver evaluation will be noticed for street advance notice and mediation framework. The accompanying methodology was proposed by Craw et al.[4] The layout framework distinguishes the front facing view face. Sigary [5] discovered a strategy the discovery of hypovigilance medicaments for eye area except an express period of eye identification.

By choosing in any case for examine the eyes are open or shut Tabrizi and Zoroofi [6] proposed a non-meddling and basic approach to identifying exhaustion by deciding conclusion of eyes. Calculation comprises of three stages that have been dissected, for example, the ID of eye districts by eye area and the area of eye. Omidyeganeh et al.[7] the eye not set in stone by utilizing the action called Structural closeness. On the off chance that the edges are comparative, in general addition esteem is 1, and when there are varieties, the impact is - 1. The eye region will then, at that point, be projected on a level plane and in an upward direction to survey and notice the eye. Saradadevi and Bajaj,[8] proposed Driver Exhaustion Identification.

3. Proposed Work

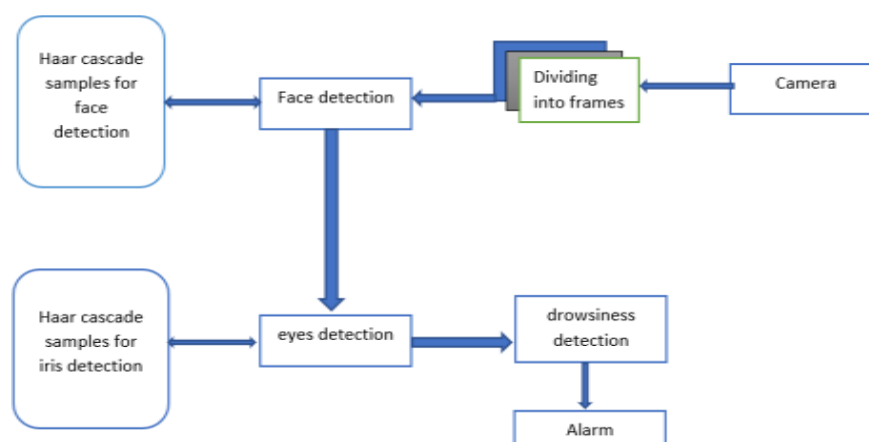


Figure.3.1BlockDiagram

3.1 Existing system

Snoozing, drowsing conclusion of the eyes can be examine drowsiness. One of the primary components of drowsiness is eyes. For identifying an individual is drowsy that are different qualities. So far, for sorting out the drowsy conducts somebody best exactness might be determined. A caution or an alarm isn't generally given to the individual that is encountering steady conduct. Simion recognized laziness inside the eyes through identifying eye squints and afterward estimated time in middle both progressive eye flicker. Through sum up the wide assortment of edges wherein the driver's eyes are shut and on the off chance that that surpasses a limit, the main thrust gets a visual admonition on his route show.

3.2 Proposed System

In this proposed work we have proposed the idea by utilizing the advanced picture handling techniques (DIP) in MATLAB for identification of driver language or by utilizing the Viola-Jones calculation. The human skin planning, face part extraction, characterization approaches has been utilized to arrive at the goal of the work.

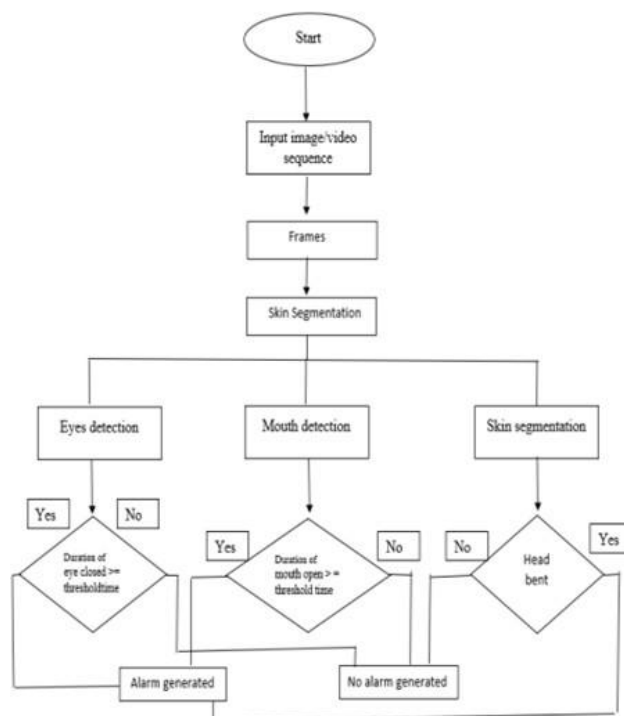


Figure.3.2 Data flow diagram

3.3 System architecture

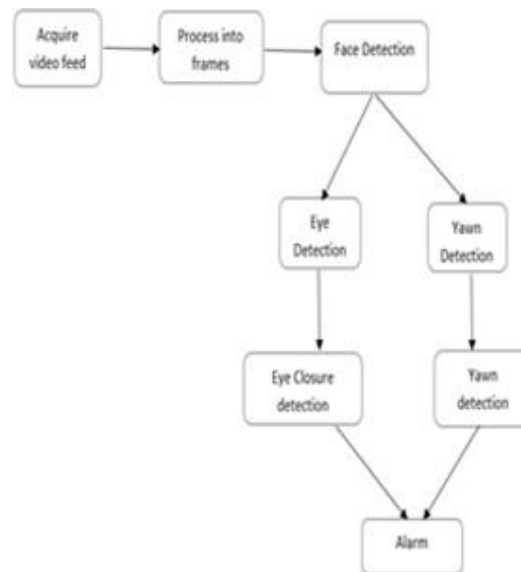


Figure.3.3architecture diagram

4. Methodology

4.1 ViolaJonesAlgorithmhas4steps:

- SelectionoftheHaarFeatureforimage.
- CreatingthespecifiedIntegrallImages.
- AdaboostTrainingfortheimagedataset.
- CascadingmethodfortheClassifier

4.2 SelectionoftheHaarFeature forImage

AHaar-

likeelementcontemplatesclosebyrectangularareasataspecificregioninanacknowledgm ent window, sums up the pixel powers in each space and finds out thequalification among these aggregates. This differentiation is then used to arrangesubsections of a photograph. It is computerized picture highlight utilized in objectprominence.It'sfar used tosort coercionsofanimage.



Figure 4.1 Haar feature

4.2 Creating the specified Integral Images

A vital picture is the place where every pixel addresses the aggregate amount of a relating input pixel with all pixels above and left of the information pixel. This calculation empowers fast computation of summations over picture sub-regions. This idea was presented by Viola and Jones and is otherwise called a summed area table.

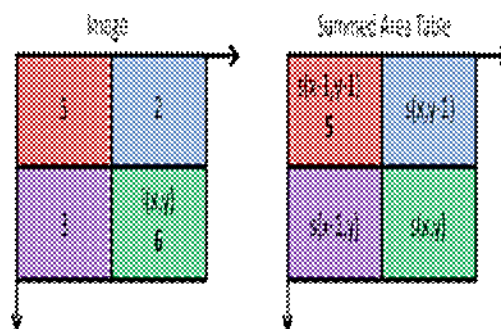


Figure 4.2 integral images

4.4 AdaBoost Training for the image dataset

AdaBoost is a forceful dominating arrangement of rules which creates a strong classifier by choosing visual abilities surrounded by family members of simple classifiers and joining them straightly. Versatile Boosting is a supporting strategy utilized as a gathering method in machine dominating. It's miles known as Adaptive Boosting on the grounds that the loads are re-relegated to each model, with better loads allotted to inaccurately named occasion.

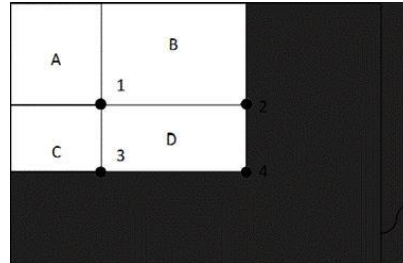


Figure 4.2 AdaBoost training

4.5 Cascading method for the classifier

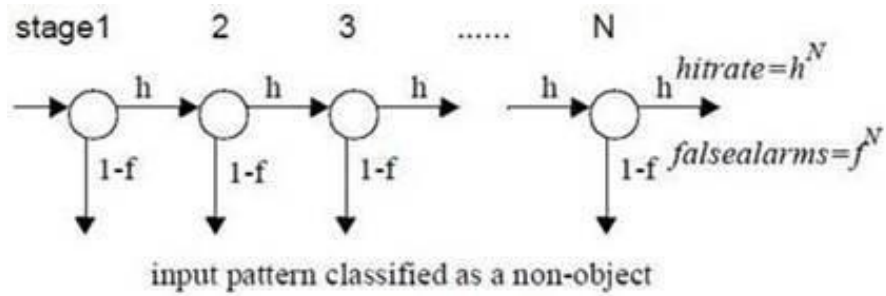
Cascading classifiers are prepared with a few hundred "positive" example perspectives on a specific item and erratic "negative" pictures of a similar size. After the classifier is prepared, it very well may be applied to a locale of a picture and identify the article being referred to.

The course engineering has intriguing ramifications for the presentation of the singular classifiers. Since the initiation of every classifier relies altogether upon the conduct of its ancestor, the bogus positive rate for a whole course is:

$$F = \prod_{i=1}^K f_i.$$

Additionally, the identification rate is:

$$D = \prod_{i=1}^K d_i.$$



Course with N stages of classifiers. Each stage of classifier is prepared to accomplish a hit probability h and a deception rate f .

5. Results and Discussion

The primary goal of the proposed work is to plan and foster the driver help model or driver sleepiness ready framework by utilizing the edge location, viola-jones calculation to caution the driver if there should be an occurrence of any uncommon movement on the face is taken note. The admonition messages should assist the driver with refocusing and have a protected excursion to him and furthermore to different people groups. Up to 5 gadgets can be bought into the Web Push Notifications with the goal that the driver as well as his well wishers can likewise be informed. Web Push Notifications are stage free and henceforth can be sent on any web empowered gadget. In the event that the driver is languid, the driver cautioned with an alert audio.

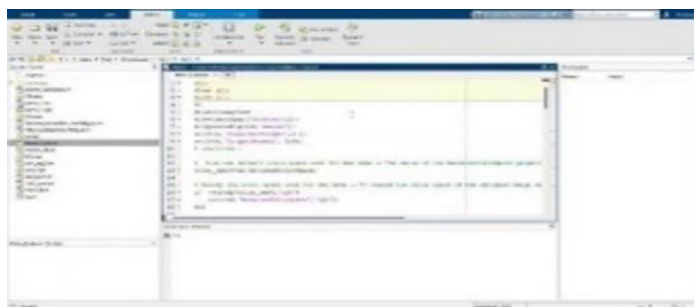


Figure.1 Application Snapshot

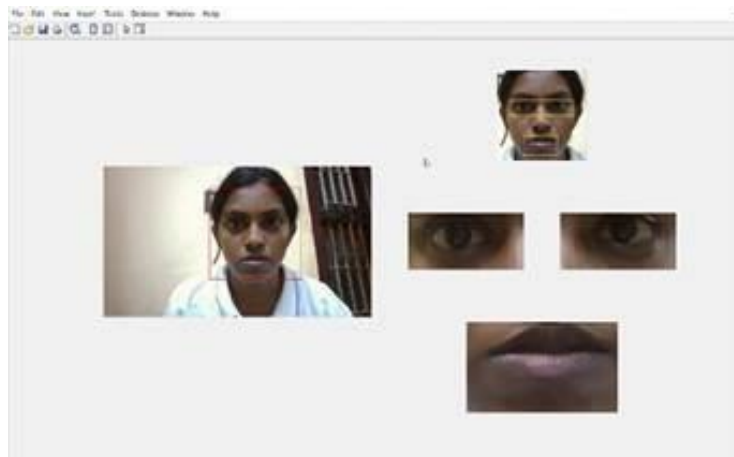


Figure.2Output

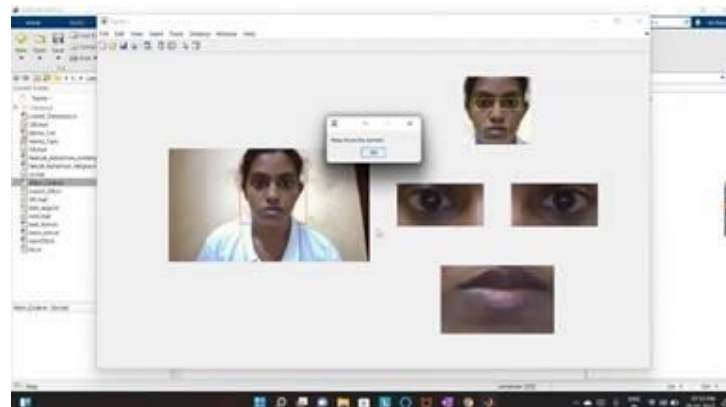


Figure.3 Output

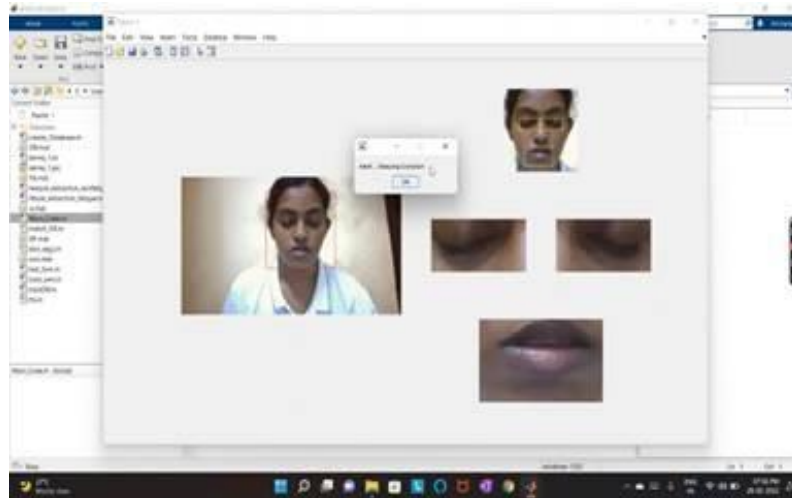


Figure.4Output



Figure.5Alertnotifications

6. Conclusion

Viola Jones set of rules has been carried out by means of the use of Matlab and DItchnology. We've got correctly established the machine for detecting the motive force Dr owsiness. The drivers who are not cautious will purposed the injuries at the highway. It's going to price many lives. For this reason the usage of the proposed device will alert the driver and will help in saving the lives of them and others. The 15fps video

frames are processed in the k-manner and Sobel aspect detector to teach the eye, mouth hobby to determine the driver's situation

The real-time framework for observing an individual's face turned out to be productively made, thus, eye points, lips of somebody to test that the driver squints or yawns to advantage data around his phase of readiness. A caution that has been carried out is a web message pop-up programming project to alarm the thought process force. So as to stagger on exhaustion on genuine streets, head pose is moreover an exceptionally better for face work

We acquire ninety-nine. One percentage exactness in the laziness location, it truly is a strong result. There's a compromise between brain local area's feedback length and the memory and time expected with the guide of utilizing brain organization. Dark scaling and resizing the consideration place pictures to 12×18 gives us the gamble to involve a truckload significantly less neurons in brain local area. Histogram evening out will build the general exhibition of eye country discovery since it diminishes horrible impact emerging from enlightenment varieties. Blending the result of appropriate and left brain organizations, in exceptional expressions, discarding outlines for right and left brain network truly done ever again concur, will develop the consideration US of America identification exactness of our procedure.

7. References

- [1] B.Mohana, C.M.Sheela Rani, "DrowsinessDetection Based on Eye Closure andYawning Detection", in International Research Journal of Engineering andTechnology(IRJET),2019.
- [2] Chris Schwarz, John Gaspar, Thomas Miller&Reza Yousefian, "The detection of drowsiness using a driver monitoring system" , in Journal of Traffic InjuryPrevention(TaylorandFrancis Online),2019.
- [3] Mahek Jain, "Real time driver drowsiness detection using computer vision", IEEE4thInternationalConferenceonInternetofThings,IEEE,Ghaziabad,India,2021
- 2.JasperS.Wijnands,JasonThompson,KerryA.Nice,GideonD.
- [4] Jasper S. Wijnands, Jason Thompson, Kerry A.Nice, Gideon D. P, Aschwanden& Mark Stevenson, "Real-time monitoring of driver drowsiness on mobileplatformsusing3Dneuralnetworks",NeuralComputingandApplications,2019.
- [5] M. Dehnavi, N. Attarzadeh and M. Eshghi, "Real time eye state recognition",2011 19th Iranian Conference on Electrical Engineering, pp. 1-1, 2011.Show inContext View Article Full Text: PDF (120KB) Google Scholar 6.A. Rahman, M.Sirshar and A. Khan, "Real time drowsiness detection using eye blinkmonitoring", 2015 National Software Engineering Conference (NSEC), pp. 1-7,2015.
- [6] P.ViolaandM.Jones,"Rapidobjectdetectionusingaboostedcascadeofsimplefeature s",ConferenceonComputerVisionandPatternRecognition,2001.
- [7] Soukupová Tereza and Jan Cech, Real-Time Eye Blink Detection using FacialLandmarks,2016.
- [8] Graf, H. P. (1995). Locating faces and facial parts. In Proc. InternationalWorkshoponAutomaticFace-andGesture-Recognition (pp.41-46)
- [9] Sigari MH. Driver hypo-vigilance detection based on eyelid behavior. In2009seventh international conference on advances in pattern recognition 2009 Feb 4(pp.426-429.IEEE.
- [10] Rahman,M.SirsharandA.Khan,"Realtimedrowsinessdetectionusingeyebblink monitoring", 2015 National Software Engineering Conference (NSEC), pp.1-

7,2015.

PLAGIARISM PAPER REPORT

ORIGINALITY REPORT

5%	2%	4%	1%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Jithina Jose, J S Vimali, P Ajitha, S Gowri, A Sivasangari, Bevish Jinila. "Drowsiness Detection System for Drivers Using Image Processing Technique", 2021 5th International Conference on Trends in Electronics and Informatics (ICOEI), 2021 Publication	3%
2	ipindexing.com Internet Source	1%
3	link.springer.com Internet Source	1%
4	dspace.uiu.ac.bd Internet Source	<1%

Exclude quotes On
Exclude bibliography On

Exclude matches < 3 words

THANKYOU