PROJECT REPORT_WINTER SEMISTER (2020_2021)

Drowsy Driver Detection System Using Cnn or Rnn

(Eye Ratio based.)

Course: CSE2009 - Soft Computing

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Slot: C+TC

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PROBLEM STATEMENT:

The drowsy driver system detects drowsiness and fatigue prior to the driver falling asleep.

The warnings can begin as the driver becomes fatigue and intensify as the system detects increasing drowsiness to avoid endanger himself and others.

Many Driver Drowsiness Detection systems have been developed using eye and face detection methods but in this we have advanced the previous systems by adding the concept of head position technique.

The head position technique is a newly introduced feature which enhances the performance of the system to a great extent.

The systems capture frame and detects the face and eyes, if the face is detected and eyes are closed then head position is monitored for next few frames, if the face is aligning down gradually and continuously then the alarm is activated.

OBJECTIVE / MOTIVATION:

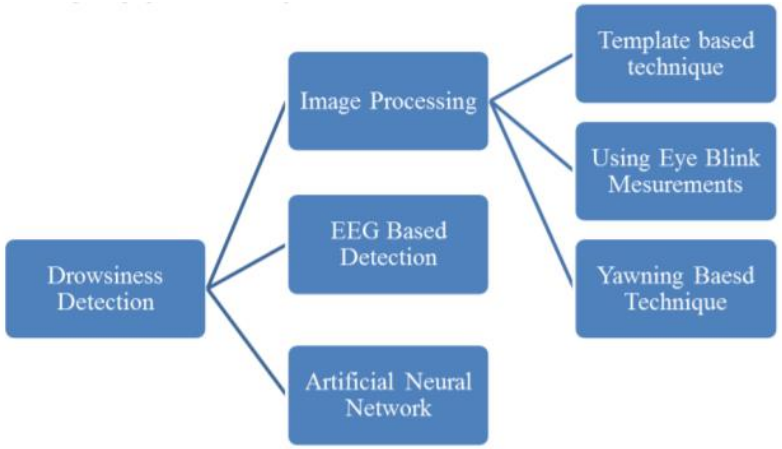
Nowadays the driver safety in the car is one of the most wanted system to avoid accidents, our objective of the project is to ensure the safety system.

For enhancing the safety, we are detecting the eye blinks of the driver and estimating the driver status and warning them by an alarm sound which keeps on increasing as the eye aspect ratio increases.

In this project we will be using openCV for gathering the images from webcam and feed them into a CNN model which will be easier to classify whether the persons eyes are ‘open’ or ‘Closed’

SURVEY ANALYSIS :(Past survey on the topic made by researchers)

Based on the survey we have found that there 3 ways to implement these project



I) Images Processing based techniques

In image processing based techniques, drivers face images are used for processing so that one can find its states. From the face image one can see that driver is awake or sleeping.

We can classify these techniques in three sub-categories

Category 1: Template Matching Technique:

In this technique, one can use the states of eye i.e. if driver closes eye/s for some particular time then system will generate the alarm.Becasue in this techniques system has both close and open eyes template of driver. This system can also be trained to get open and closed eye templates of driver.

This method is simple and easy to implement because templates of both open and closed eye states

Category 2: Eye Blinking based Technique:

In this eye blinking rate and eye closure duration is measured to detect driver's drowsiness.

Because when driver felt sleepy at that time his/her eye blinking and gaze between eyelids are different from normal situations so they easily detect drowsiness.

In this system the position of irises and eye states are monitored through time to estimate eye blinking frequency and eye clouse duration.

And in this type of syetem uses a remotly plced camrea to aquire video and computer vision methodes are then applied to sequentially localize face, eyes and eyelids positions to measure ratio of closure.

Using these eyes clouser and blinking ration one can detect drowsiness of driver.

Category3: Yawning Based Technique:

Yawn is one of the symptoms of fatigue.

The yawn is assumed to be modeled with a large vertical mouth opening.

Mouth is wide open is larger in yawning compared to speaking.

Using face tracking and then mouth tracking one can detect yawn. they detect yawning based on opening rate of mouth and the amount changes in mouth contour area

II) Artificial neural network based techniques

In this technique they use neuron to detect driver's drowsiness. Only one neuron is not much accurate and the result of that is not good compare to more than one neurons
To optimization of driver drowsiness detection using Artificial Neural Network. People in fatigue exhibit certain visual

behaviors that are easily observable from changes in facial features such as the eyes, head, and face. Visual behaviors that typically reflect a person's level of fatigue include eyelid movement, gaze, head movement, and facial expression

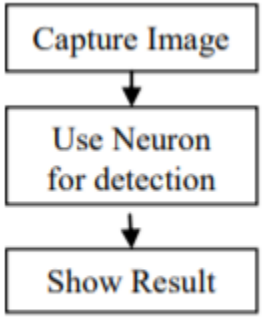


Figure5: Working of ANN

III) EEG (electroencephalograph) based techniques

In this technique it is compulsory to wear electrode helmet by drivers while driving.

This helmet have various electrode sensors which placed at correct place and get data from brain have used the characteristic of EEG signal in drowsy driving.

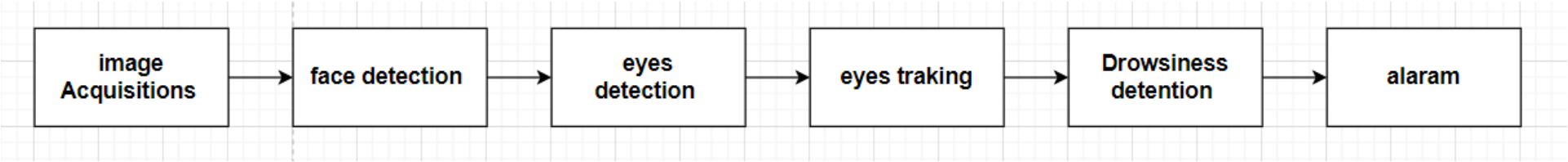
A method based on power spectrum analysis and FastICA algorithm was proposed to determining the fatigue degree.

In a driving simulation system, the EEG signals of subjects were captured by instrument NT-9200 in two states, one state was sober, and the other was drowsy. The multi-channel signals were analyzed with FastICA algorithm, to remove ocular electric, my electric and power frequency interferences.

shows how EEG based systems get data for acquisition. Experimental results show that the method presented in this paper can be used to determine the drowsiness degree of EEG signal effectually

MODEL / PLAN OF ACTION:

FLOW CHART



There are 5 steps are involves:

Step1: Take image as input from a camera

With a webcam, we will take images as input. So to access the webcam, we made an infinite loop that will capture each frame.

We use the method provided by OpenCV, cv2.VideoCapture(0) to access the camera and set the capture object (cap). cap.read() will read each frame and we store the image in a frame variable

Step2: Detect the face in the image and create a region of interest(ROI)

Here we detect the face in the image,

we need to first convert the image into grayscale as the OpenCV algorithm for object detection takes gray images in the input.

We don't need color information to detect the objects. We will be using haar cascade classifier to detect faces.

This line is used to set our classifier face = cv2.CascadeClassifier(‘ path to our haar cascade xml file’). Then we perform the detection using faces = face.detectMultiScale(gray).

It returns an array of detections with x,y coordinates, and height, the width of the boundary box of the object. Now we can iterate over the faces and draw boundary boxes for each face.

Step3: Detect the eyes from ROI and feed it to the classifier

The same procedure to detect faces is used to detect eyes.

First, we set the cascade classifier for eyes in leye and reye respectively then detect the eyes using left_eye = leye.detectMultiScale(gray).

Now we need to extract only the eyes data from the full image.

This can be achieved by extracting the boundary box of the eye and then we can pull out the eye image from the frame with this code.

l_Eye only contains the image data of the eye. This will be fed into our CNN classifier which will predict if eyes are open or closed. Similarly, we will be extracting the right eye into r_eye.

Step4: Classifier will categorized whether eyes are open or closed

We are using CNN classifier for predicting the eye status.

To feed our image into the model, we need to perform certain operations because the model needs the correct dimensions to start with.

First, we convert the color image into grayscale using

Then, we resize the image to 24*24 pixels as our model was trained on 24*24 pixel images

We normalize our data for better convergence

. Now we predict each eye with our model then, it states that eyes are closed.

Step5: Calculate score to check whether the person is drowsy

The score is basically a value we will use to determine how long the person has closed his eyes.

So if both eyes are closed, we will keep on increasing score and when eyes are open, we decrease the score. We are drawing the result on the screen which will display real time status of the person.

A threshold is defined for example if score becomes greater than 15 that means the person's eyes are closed for a long period of time. This is when we beep the alarm

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