BVRIT HYDERABAD College of Engineering for Women

Department of Information Technology

Driver Face Detection

Under the Guidance of

Dr.T.Subetha

Assistant Professor

Team- 7

N.Akshitha Reddy 18wh1a1234

Ch.Srivalli 18wh1a1238

T.Mahalakshmi 18wh1a1244

VISHNU
UNIVERSAL LEARNING

Contents

VISHNU
UNIVERSAL LEARNING

Abstract

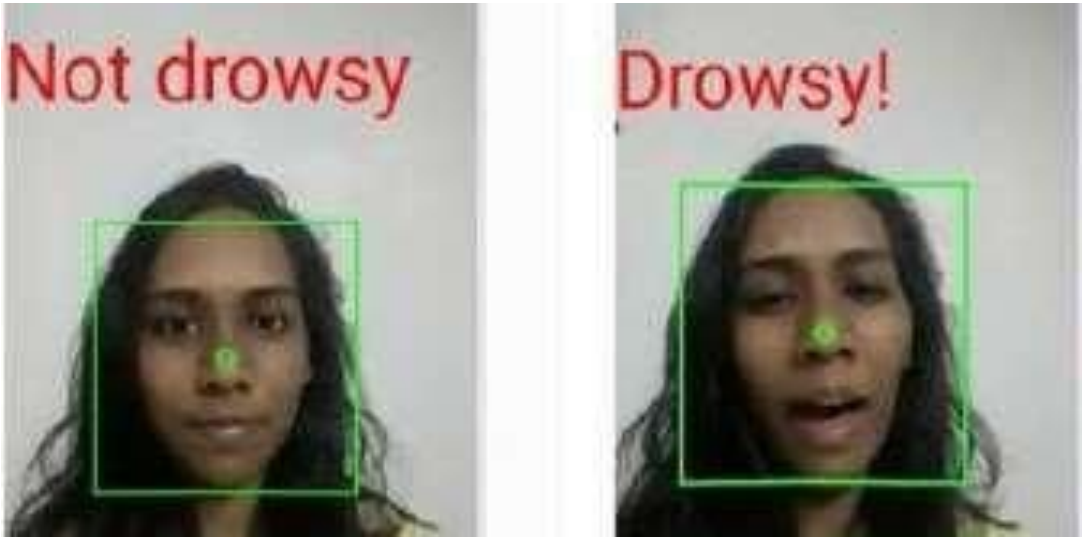
- Currently, transport systems are an essential part of human activities. We all can be victims of drowsiness while driving, simply after too short a night's sleep. Drowsiness and Fatigue of drivers are amongst the significant causes of road accidents. A module for Advanced Driver Assistance System (ADAS) is presented to reduce the number of accidents due to drivers fatigue and hence increase the transportation safety, this system deals with automatic driver drowsiness detection based on visual information using Machine Learning.

Introduction

- It’s an important problem with serious consequences that needs to be addressed. 1 in 4 vehicle accidents are caused by drowsy driving and 1 in 25 adult drivers report that they have fallen asleep at the wheel in the past 30 days. So, we believe it is important to develop a solution for drowsiness detection, especially in the early stages to prevent accidents .

Problem Statement

- To avoid fatigue related accidents



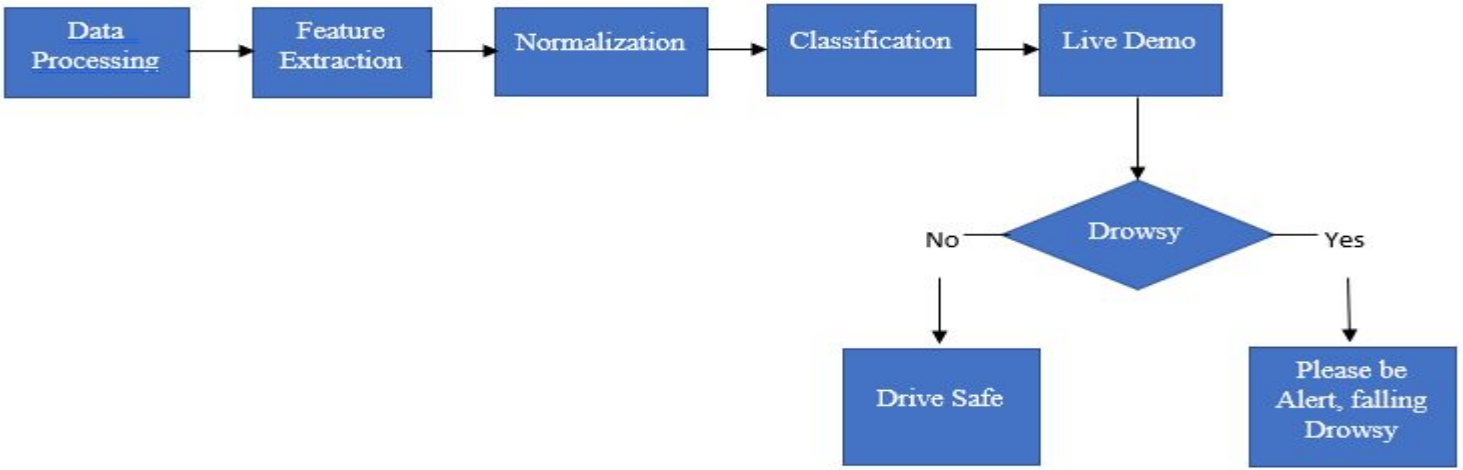
VISHNU
UNIVERSAL LEARNING

Literature Survey

Year	Author	Journal	Outcome
2019	Wanghua Deng and Ruoxue Wu	Real Time Driver Drowsiness Detection System Using Facial Features	It propose a novel system for evaluating the driver's level of fatigue based on face tracking and facial keypoint detection. It design a new algorithm and propose the MC KCF algorithm to track the driver's face using CNN.
2018	Ashish Kumar and Rusha Patra	Driver drowsiness monitoring system using visual behaviour and machine learning.	It proposed a real time driver drowsiness monitoring system with low cost. Here, visual behaviour features like eye aspect, mouth opening and nose length ratios are computed from the streaming video, captured by a webcam.
2013	Xiao qing Luo, Rong Hu and Tian e Fan	The driver fatigue monitoring system based on face recognition technology.	It proposed a driver fatigue warning, which got a strong robustness classifier based on the training of AdaBoost algorithm to locate the eyes, and to judge the state of the eyes. While, in the night mode, using the method of infrared frame difference can locate the eyes accurately.

Proposed System

- We propose an algorithm to analyse both the driver face eye aspects, mouth opening aspects, a scientifically supported measure of drowsiness associated with slow eye closure and mouth enlargement(yawn).



Project Modules

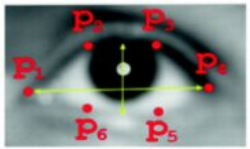
- Face Detection
  - To detect the faces we are using CNN.
  - A Convolutional Neural Network (CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

VISHNU
UNIVERSAL LEARNING

- Detect Eye aspect, Mouth opening and Pupil Circularity
  - KNN gives the best sample accuracy for the given dataset.
  - The length of the eyes is calculated by averaging over two distinct vertical lines across the eyes.
  - The Mouth opening, measures the ratio of the length of the mouth to the width of the mouth. Our hypothesis was that as an individual becomes drowsy, they are likely to yawn and lose control over their mouth. PUC is a measure complementary to EAR, but it places a greater emphasis on the pupil instead of the entire eye.

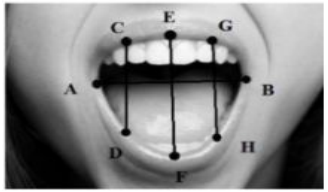
Performance Measures

- Accuracy of our model - 71%
- Eye Aspect Ratio(EAR)



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

- Mouth Aspect Ratio(MAR)



$$MAR = \frac{|EF|}{|AB|}$$

- Pupil Circularity

$$Circularity = \frac{4 * \pi * Area}{perimeter^2} \qquad Area = \left(\frac{\text{Distance(p2, p5)}}{2}\right)^2 * \pi$$

$$Perimeter = Distance(p1,p2) + Distance(p2,p3) + Distance(p3,p4) + Distance(p4,p5) + Distance(p5,p6) + Distance(p6,p1)$$

VISHNU
UNIVERSAL LEARNING

Comparison Results

KNN	CNN	Logistic Regression	Naive Bayes	Decision Tree
Accuracy - 69%	Accuracy - 71.2%	Accuracy - 64.33%	Accuracy - 57.75%	Accuracy- 70.4%

Applications

- Heavy Vehicles
- Student Face Detection
- Worker Face Detection in Heavy Industries

VISHNU
UNIVERSAL LEARNING

Conclusion

- The video monitoring system in the field of public security mainly focuses on the pre warning analysis.
- Driver face recognition technology is used in the field of public security video monitoring, which will reduce the probability of accidents.

VISHNU
UNIVERSAL LEARNING

References

1. X. Luo, R. Hu and T. Fan, "The driver fatigue monitoring system based on face recognition technology," 2013 Fourth International Conference on Intelligent Control and Information Processing (ICICIP), 2013, pp. 384 388, doi: 10.1109/ICICIP.2013.6568102.
2. A. Kumar and R. Patra, "Driver drowsiness monitoring system using visual behaviour and machine learning," 2018 IEEE Symposium on Computer Applications & Industrial Electronics (ISCAIE), 2018, pp. 339 344, doi: 10.1109/ISCAIE.2018.8405495.
3. W. Deng and R. Wu, "Real Time Driver Drowsiness Detection System Using Facial Features," in IEEE Access, vol. 7, pp. 118727 118738, 2019, doi: 10.1109/ACCESS.2019.2936663.


THANK
YOU !