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DRIVER DROWSINESS DETECTION SYSTEM

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Abstract - Drivers who do not take regular breaks when driving long distances run a high risk of becoming drowsy a state which they often fail to recognize early enough according to the experts. Studies show that around one quarter of all serious motorway accidents are attributable to sleepy drivers in need of a rest, meaning that drowsiness causes more road accidents than drink-driving.

So, our system is used to reduce the number of accidents due to drivers fatigue and hence increase the transportation safety; this system deals with capturing of live images of eyes through the webcam. If driver falls asleep while driving or even closes eyes for 5 seconds this could result in a major accident. Hence our system automatically starts the buzzer to wake up driver.

Key Words: *OpenCV, TensorFlow, CNN, Dataset, cascade*

1.Introduction

Many times, we hear about a news of car, bus or truck accidents at night, and many of them are happened at night. Sometimes driver drives his vehicle at late night, sometimes he drives for 12 to 16 hours in a day restlessly. Due to this we get tired and driver need to get sleep. If he won't stop to rest on time this could cause drowsiness. Even a nap of 5 seconds could cause a serious fatal accident, but many drivers ignore this.

To solve this problem, we have developed a system which could identify drowsiness. If system detects drowsiness, then it will ring alarm to wake driver so driver could park vehicle aside and get some rest. This system can be seen as a safety system.

We have a dataset which contains 80,000+ images of open and closed eyes.

We train a TensorFlow CNN (Convolutional Neural Network) model with these images. Every time we start the system the model is loaded into main memory for prediction.

The OpenCV library is used for image processing and eye detection. For better performance are converting RGB (color) image into grayscale image for performance improvement. The OpenCV 'HaarCascadeEyeTree.xml' is used to detect eyes and these eye images are cropped and converted into 28x28 low resolution images for prediction.

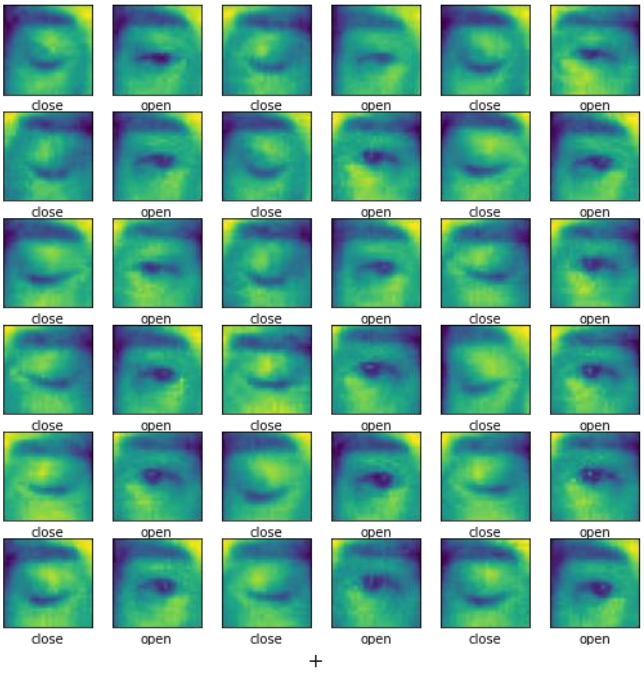

Fig-1. Eye open close dataset

We have used a counter veritable whose value is incremented when both eyes are closed. This variable indirectly defines tiredness or sleepiness of person. If this variable exceeds the predefined threshold the system will alert alarm to awake driver.

2. Body of Paper

This is a software program which is installed on a laptop. We can use an external webcam mounted on car dashboard or built-in camera to capture images of drivers face.

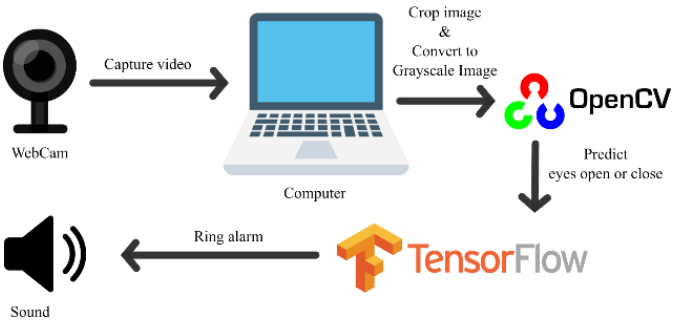

Fig-2. System architecture

By default, we use laptops built-in speakers for ringing alarm. But we can connect car stereo systems can be connected with this system which will be more effective

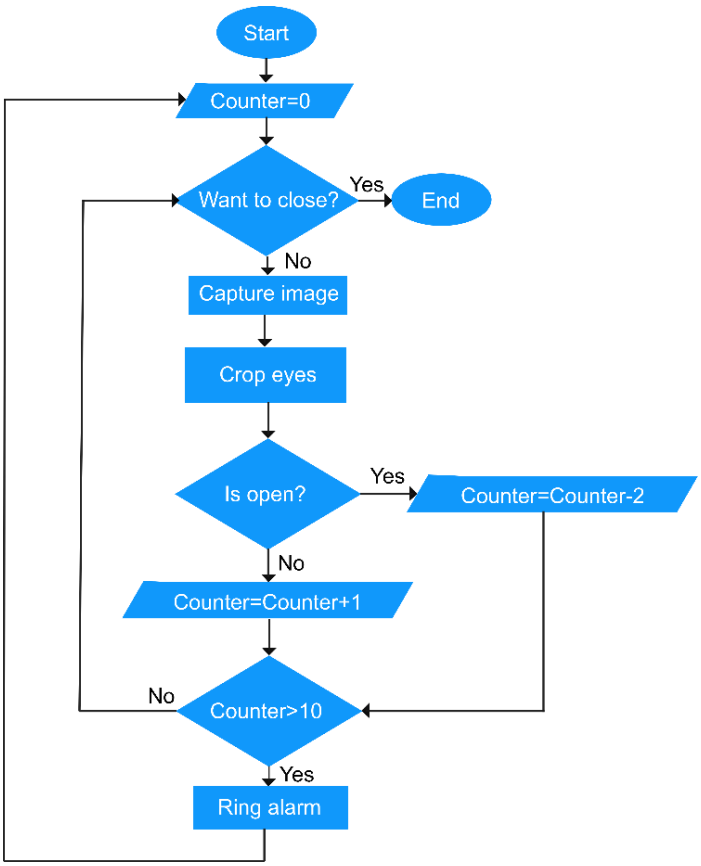

Fig-3. System flowchart

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The counter-based method gives better performance than time-based method. But in this method, we have to finetune maximum threshold with respect to system speed.

3. RESULT

The system has good performance which can be improved with GPU or TPU. The OpenCV library accurately detects and crops eye images. At night we will need a infrared light due to darkness which will help to capture images.

Epoch	Loss	Accuracy	Validation loss	Validation accuracy
1	0.2451	0.9002	0.4144	0.8400
2	0.1741	0.9333	0.5810	0.7804
3	0.1492	0.9433	0.5436	0.7963
4	0.1268	0.9512	0.5524	0.7882
5	0.1268	0.9588	0.5301	0.8066

Table-1. CNN model accuracy

We have trained our CNN model with 5 epochs. The CNN model has 80.66% accuracy.

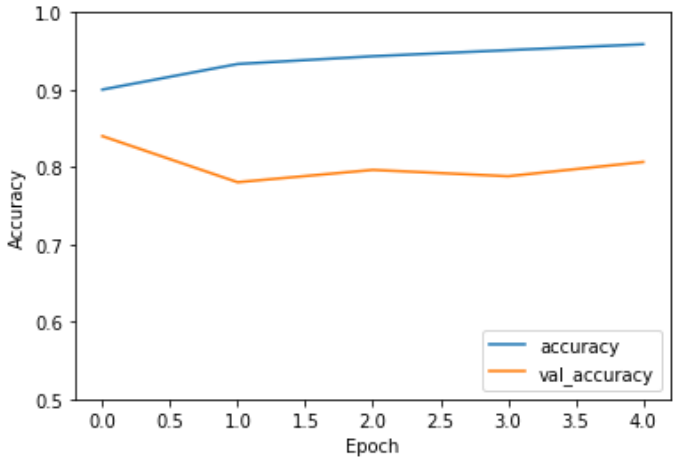

Fig-4. CNN model accuracy chart

4. CONCLUSIONS

We have successfully implemented this “Driver Drowsiness detection system” for drivers and passenger’s safety. At night drivers will feel safer with this system.
And to decrease accident level. The system is very accurate in detecting drowsiness and its performance is very good.
a good GPU or TPU could give us better performance.

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