



Prevention of an accident from drowsiness and driver safety using deep learning

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ABSTRACT

Asbestos poses a high risk to health, such as being carcinogenic and hazardous to the environment, it should not be used in brake pads. Natural ceramics are therefore of interest to researchers because of their excellent properties, affordability, availability, non-toxicity, etc. The mechanical and tribological properties of a non-asbestos brake pad were compared to those of an asbestos brake pad in this study. The brake pads can be replaced by natural ceramics such as marble dust powder, with additives such as aluminium oxide. Epoxy resin is utilized as a binding agent. For increased strength, marble dust powder is used. Abrasive materials are aluminium oxide. This helps to make brake pads with a high friction coefficient and less wear rate with low noise pollution. Catia v5 software the structural model of the brake pad is developed. The objective of the project is natural ceramics as an alternative to asbestos. The outcomes are what matter due to the varying filler compositions' effects on the mechanical and physical qualities. Hardness tests have been performed, and the behavior of materials with various compositions has been researched. The resulting marble slabs' properties regarding water absorption have also been evaluated.

KEYWORDS: Composite Material, Marble Dust Powder, Aluminium Oxide, Hand Layup Process

1. INTRODUCTION

Safety brings first aid to the uninjured. Never think because an accident hasn't happened to you that it can't happen. Drowsiness and unconscious or troublesome situation can happen anytime. With the adverse technology available it is not difficult to bring things to our control. In this Accident Prevention and Driver safety we make use of Convolutional Neural Networks a part of Deep Learning and Image processing techniques to prepare a dataset and classify the state of driver by giving it to the classifier model. Thus a sound

or message is generated to alert the driver and thus prevent the injury for himself as well as others [1][2].

Human life is a gift of God, it is very precious. Losing such due to unaware activities or negligence costs so much. So it is our duty to protect the precious gift. Here comes the advent of technology. India accounts to 6% of global road accidents. Six percent of this highly populated country is undoubtedly not a small number. Even the statistics show an increased growth from 2005 till date [3][4][5].

So this is definitely an issue that motivates the technocrats to handle it in order to save the human

lives. Of the portion of accidents again drowsiness stands apart. Thus this system is use to monitor the drowsiness of a driver an alerts him.

A. Image as Input:

Inorder to take image as input from the camera we make use of OpenCV. OpenCV-Python is a library of Python bindings designed to solve computer vision problems. Python is a general purpose programming language started by Guido van Rossum that became very popular very quickly, mainly because of its simplicity and code readability. In OpenCV there are various methods defaultly available. Those methods are used to take face and eyes as input and create Region Of Interest [6][7][8].

B. Predict if eyes are Open/Closed:

This is done by using Keras. There are various methods available in keras. Firstly we need to load our model that is build using Keras and Tensorflow [9][10]. This model is nothing but our convolutional neural network. Once on loading the model it will take the eyes as input and predict using the keras functions. If closed the it increments the score and displays the score using OpenCV [11][12][13]. If the score exceeds the specified value which is the number of seconds then an alarm sound rings alerting the driver to wake up and thereby preventing accidents and loss of life.

C. Building the CNN:

Inorder to build the Convolutional Neural Network we make use of Keras and Tensorflow. Neural Networks have many layers. Starting from input layer followed by 2 Convolutional layers of 32 nodes and one convolutional layer of 4 nodes and a fully connected layer of 128 nodes and finally an Output Layer. Any Neural Network Comprises of activation function. Activation functions define the output on giving the input [14][15]. They decide what must be given to the next layer in the sequence. And mainpurpose of activation function is non linear transformation of data. The activation functions used in our system are ReLu Activation function and Softmax Activation function. Relu activation function is used in all the layers except the output layer. In the output layer Softmax activation function is used [16][17][18].

Relu stands for rectified Linear Activation Function. It keeps the output as it is if positive and makes it to zero if negative. Relu is the most popular and widely used activation function. and for image data Convolutional Neural Networks gives the best results. The various layers that are built are Dense, Flatten, Batch Normalization, Conv2D and Maxpooling2D. Thus upon building all these layers, our model gets ready [19][20][21].

And on using the methods available in keras we train our model on dataset containing the various images of eyes under different lighting conditions, some with eyes open and others with eyes closed. Therefore this trained model can thus be imported and used to predict the state of eyes of a person while driving [22][23].

2. LITERATURE REVIEW

Many studies on the project rate using Convolutional neural networks have majorly based on the use of Keras for building the model.

There are even various other ways of conducting it using Support Vector Machine, Logistic regression etc. But performing it using the Convolutional Neural Networks gives more accurate results as CNN is best in performing on images.

List of References those we are referred to do this project are:

- <https://ieeexplore.ieee.org/abstract/document/8751886><http://www.ijjims.com>

From this Reference, we understood the basic idea of the project, the causes and the issues. Then we were able to figure out another method of implementation.

- github.com/VenuuMaadhav/Driver-Drowsiness-Detection

From this Reference, we came to know how the Neural Network can be implemented.

<https://www.analyticsvidhya.com/blog/2021>

From this Reference, we understood the usage of Keras and Tensorflow inorder to build the neural network.

<https://www.geeksforgeeks.org/opencv-python-tutorial/>

From this reference, we got a clear understanding about OpenCV in python

and various methods available, so as to make use of them in the right place possible.

<https://stackoverflow.com>

Making use of this reference, we were able to overcome the errors that were raised during the process of coding and execution.

3. PROPOSED METHOD

We make use of Convolutional Neural Networks for the sake of improvement in accuracy. Convolutional Neural Networks work best for image data. CNN is a class of artificial neural network, most commonly used for visual imagery. Convolutional Neural Networks take fixed size input and give fixed size output. There are various types of Neural networks. In comparison with Recurrent Neural Network, CNN is fast and more accurate. RNN takes arbitrary size inputs and outputs. It is not applicable in our case as we just determine if eyes are open or closed. And most of all, again CNN is useful for image data. Therefore we have built the model using CNN by making use of Keras and OpenCV. Keras uses Tensorflow as backend. Keras is an open source python framework that is used to build Machine Learning and Deep Learning models. tensorflow is free, open source software that enables to build neural networks. There are various methods available in OpenCV to take image as input from video and make the region of interest. Therefore, we are embedding OpenCV and CNN in order to make our task easier and accurate. OpenCV is used for the sake of Image classification. and Keras is used to build the Neural Network. We even used another module called Pygame that allows us to play sounds. Here we used this module to play the alarm buzzer. Therefore on not just relying on the conventional machine learning techniques to implement the system, we are using Image classification and Deep Learning to make it advanced and make it suitable for all kinds of image data that we encounter in real world. Not that it is the best in all senses. Any technique does have its own limitations. But the only intention is to use the one that is better among all the ways available. And hence we built it with OpenCv and Convolutional Neural Networks. All these are built in python libraries.

4. RESULT



Figure 1



Figure 2

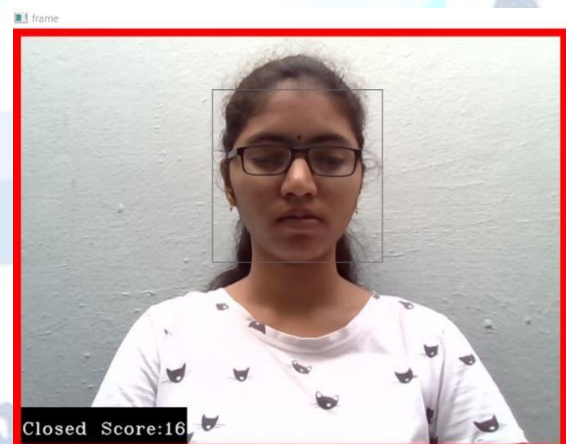


Figure 3



Figure 4

5. CONCLUSION

The world today, is witnessing large number of accidents. This system aims to reduce the number of accidents that occur mainly due to fatigue and unconsciousness. It will be of a great use while travelling for long distances especially during nights. The driver need not strain himself from controlling the fatigue. The system automatically alerts him by producing an alarm sound. Therefore this will be of a great help to the mankind. The number of deaths, injuries will eventually decrease. And thus it will be one of the ways of increasing the driver's as well the passenger's safety.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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