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Smart System For Traffic Violation Detection

Chandula S.G
Department of Information Technology
Sri Lanka Institute of Information Technology
Malabe, Sri Lanka
chandulagayan@gmail.com

Nonis S.L.M
Department of Information Technology
Sri Lanka Institute of Information Technology
Malabe, Sri Lanka
IT19028538@my.sliit.lk

Withanage D.R.P
Department of Information Technology
Sri Lanka Institute of Information Technology
Malabe, Sri Lanka
IT19217482 @my.sliit.lk

R.M. Prasad
Department of Computer Science and Software Engineering
Sri Lanka Institute of Information Technology
Malabe, Sri Lanka
IT19022116@my.sliit.lk

Ms.Thamali Dassanayake
Department of Information Technology
Sri Lanka Institute of Information Technology
Malabe, Sri Lanka
thamali.d@sliit.lk

Ms.Wishalya Tissera
Department of Computer Science and Software Engineering
Sri Lanka Institute of Information Technology
Malabe, Sri Lanka
wishalya.t@sliit.lk

***Abstract*—Traffic accidents cause over a million deaths every year, of which a large fraction is attributed to Traffic Violations. An Automated traffic Violation and fine management system will useful in reducing the amount of accidents. In this work Using a existing data sets purposed system will detect four different types of traffic violations. Traffic light violation , Sober Detection, Accident Severity and black spot status and something are the Covered Violations by the system. In this system will use Cv2 RGB detection methods and CNN Trained models for the Violation Detection with existing data sets.Alongside we are on a fine payment and management system which will automatically connect with the above features and work as a centralized system.**

***Index Terms*—opencv-python (Cv2), Traffic Violation, convolution neural network(CNN), Sober Detection**

I. Introduction

This paper is about Driver's sobriety detection. In this pandemic like Covid-19, it's very dangerous for drivers' health to use a breathalyzer alcohol detection [1]. In the past cops had to use subjective observation and tests to determine if a driver was drunk driving or not. Cops had to observe a driver and look for signs such as the smell of alcohol, slurred speech. The first breathalyzer is developed by Rolla N.Harger in 1931.it is called the Drunkometer. The next version of the breathalyzer is developed by Professor Glen Forester in 1941. The new technics now used in the breathalyzer use is developed by Professor Robert F Borkenstein in 1954. Since then for drivers alcohol detection using a breathalyzer. In the breathalyzer, it has physical contact with the driver.

A. Past researches

There were several types of research that Detect alcohol from body sweat [2], facial thermal [3], and facial expressions [4].In my research part, I'm using Facial expressions for driver's sobriety detection. It will secure drivers' health in a pandemic like covid-19. Because we are using video footage for the system and do not have any physical contact. With the usage of a fine payment system, it will very effective to reduce bribe cases as well.

II. Literature survey

In the modern world, automatic and electronic processes have replaced practically all manual ones. To address this issue, we are creating a "Smart system for Drunk driver identification and traffic infraction management" with a mobile app for law enforcement. To increase efficiency, our new system will largely replace the manual observation and equipment utilized by the Traffic police agency.

Currently, police utilize breathalyzers to identify drunk drivers. The use of breathalyzers in a pandemic like COVID-19 poses health risks to both drivers and police officers. Both parties will be at risk for their respective health due to the existing device's physical interaction with the user (covid-19) [1].

In our system, the smartphone camera and our mobile application will be used to obtain video footage from the driver. Machine learning will then be used to evaluate the video and provide the results to the police. Additionally, the sobriety detection component in our proposed system will automatically connect with the system for managing fines, and if there is violence, it will automatically issue a ticket. Compared to a manual approach, the one we suggest will save time, effort, and facilitate the management of violence.

A. Facial Expression Detection

Facial Expressions are change on every situation in a person. Same like When people drink alcohol facial expressions of them is changing according to alcohol usage. Facial features are vary to non alcoholic person [12].In this component reason that use facial expression is no physical contact and also can get good accuracy level on detection.

III. Methodology

We proposed a Mobile application based system as proposed solution. Client application is implemented using ReactNative library and server application implemented as REST API using Python Flask framework. As a database we used MongoDb non-relational database. Client side and server side communication is done through REST API endpoints. With proposed solution, to detect the results,

1. First cops need to take a image of the suspect driver's face.
2. Image will send to the python back end via API.
3.Back end will crop the image and to face size and get the prediction via trained model.
4.model will give the prediction and add 1,0 vote for the results.
5.Based on results final output will be given to the mobile application by API.

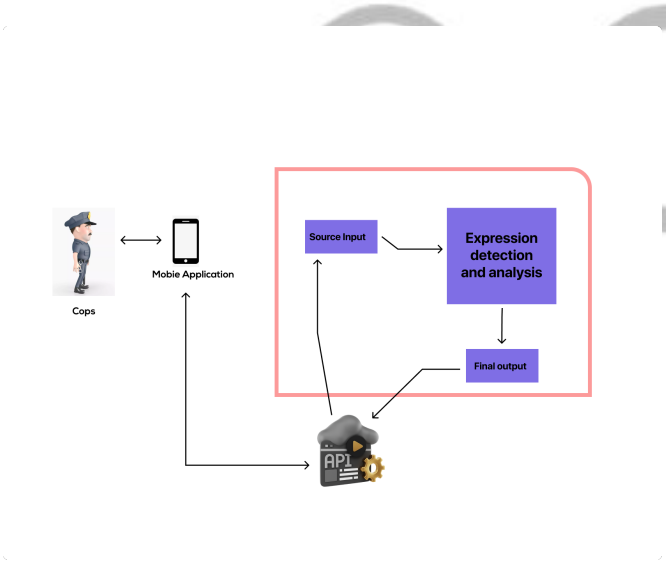

Fig. 1. System Overview Diagram

A. Data set Collection

Our work is depend on data sets. We found a photograph project done by a photographer which only one was found.Figure 2 shows some sample from the data set.

B. CNN

In this work for the system will use 3 Different types of models.A convolutional neural network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data.The

Fig. 2. Sample data

layers of a CNN consist of an input layer, an output layer and a hidden layer that includes multiple convolutional layers, pooling layers, fully connected layers and normalization layers. The removal of limitations and increase in efficiency for image processing results in a system that is far more effective, simpler to trains limited for image processing and natural language processing.

C. four layer CNN model

The four layers CNN model train with Adam optimizer.That include four conv2d and maxpool layers.Model was trained 80 epoches.Figure 3 will shows the Accuracy chart over the training time of the model.

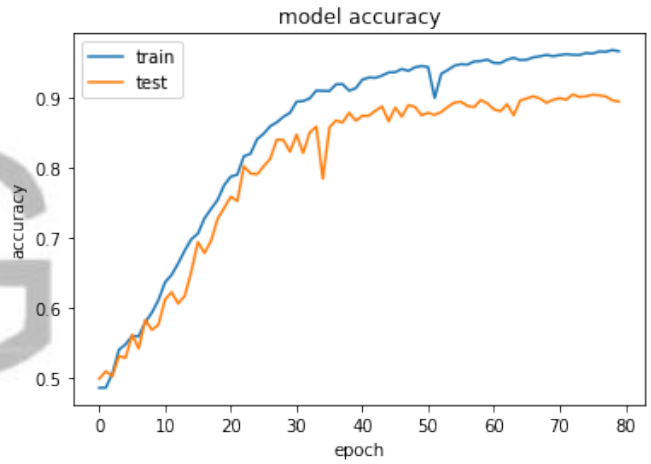

Fig. 3. Layer 4 CNN model accuracy

D. six layer CNN model

The six layers CNN model train with Adam optimizer.That include six conv2d and maxpool layers.Model was trained 50 epoches and got the best stop model weight.Figure 4 will shows the Accuracy chart over the training time of the model.

E. VGG model

The 5 layers VGG model train with Adam optimizer.One layer include two conv2d and two maxpool layers.Model was trained 50 epoches and got the best stop model weight.Figure 5 will shows the Accuracy chart over the training time of the model.

Results and Discussion

As the final results each models got above 90 percent accuracy.With the 3 model architecture that use to get the results in the system it will give us the best accuracy for system.Figure 6 shows the accuracy results of each models.

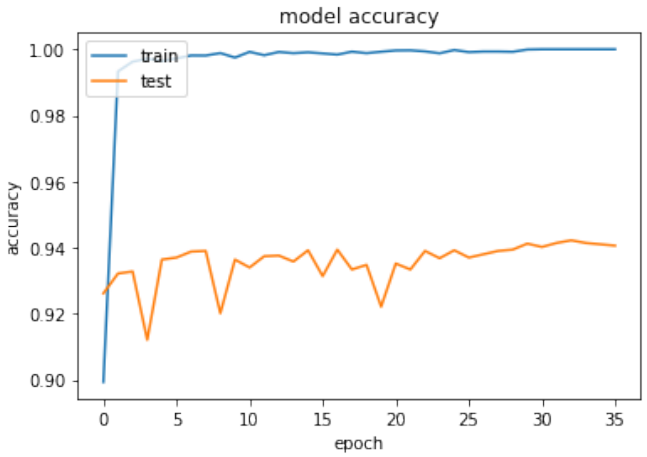

Fig. 4. Layer 6 CNN model accuracy

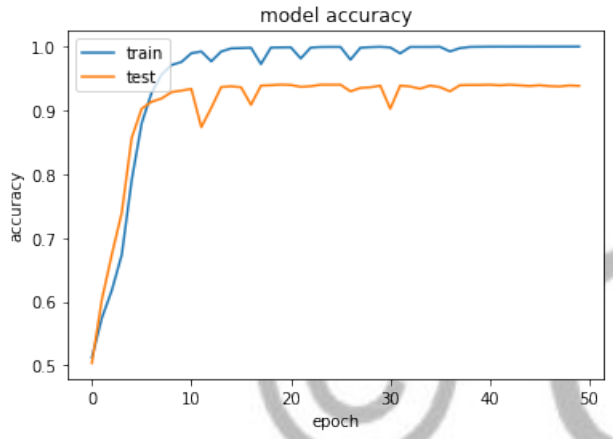

Fig. 5. Vgg model accuracy

CONCLUSION

First we found a dataset for the model training.There is only small dataset we use for the training.for future works we need to gather volunteers and create a new proper dataset for the works.Then Trained a 3 layers types of models for the system. Firstly 4 layer CNN model and 6 layers CNN model and a VGG model.

There is false positive in the System as well. We need to cover things like that in the future works with a proper new dataset.

System will take the face image from the mobile application and Send back to the backend then it will analyze image through models and give the results back to the mobile application.Cops can get necessary from the results.

Type	Accuracy
VGG	loss: 0.6699 - accuracy: 0.6112
6 layers CNN	loss: 0.1812 - accuracy: 0.9340
4 layers CNN	loss: 0.2609 - accuracy: 0.8936

Fig. 6. Model accuracy

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