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DRUNK AND DRIVING DETECTION USING DRIVING PATTERN AND FACIAL RECOGNITION

Prof. Jyoti Kharat
Department of Computer Engineering
Jaywant Shikshan Prasarakh Mandal Narhe Technical Campus
Pune 411041, India

Patil Archita Bhausaheb
Department of Computer Engineering
Jaywant Shikshan Prasarakh Mandal Narhe Technical Campus
Pune 411041, India

Gawali Atharva Rajesh
Department of Computer Engineering
Jaywant Shikshan Prasarakh Mandal Narhe Technical Campus
Pune 411041, India

Sadashiv Ashish Sanjay
Department of Computer Engineering
Jaywant Shikshan Prasarakh Mandal Narhe Technical Campus
Pune 411041, India

Giri Tanaya Shailesh
Department of Computer Engineering
Jaywant Shikshan Prasarakh Mandal Narhe Technical Campus
Pune 411041, India

Abstract*— According to a government survey, drunk driving constitute to 33 percent of accidents in India Drunk driving, or officially driving under the Influence (DUI) of alcohol, is a major cause of traffic accidents throughout the world. In this research, we propose a highly efficient system aimed at early detection and alert of dangerous vehicle movements typically related to drunk driving. The entire solution requires only a raspberry pi placed in vehicle and with accelerometer. Software installed on the raspberry pi computes accelerations based on sensor readings, and compares them with typical drunk driving patterns extracted from real driving tests. Once any evidence of drunk driving is present; the raspberry pi will automatically Capture the face and detect the face. If the Face expression is similar to the drunken pattern then it will automatically generate warning.

Keywords- Driving Under the Influence (DUI) Image Processing, Raspberry PI, Intrusion Detection System

I. INTRODUCTION

Drunkenness is a state where there is a decrease in alerts and conscious level of the driver. Even though there is no direct measure to detect the sleepiness level of the driver there exist several indirect methods which can be used for this purpose. Various types of methods

are present such as vehicle based movement measures, physiological measures, behavioral measures. Using those methods an intelligence system can be developed which would alert the driver in case of drunken condition and prevent accidents. The approach for the entire system is such that first we analyze the drunken driving behaviors and extract its fundamental cues based on lateral and longitudinal accelerations of vehicle, which is determined by accelerometer sensor. If a drunken driving behavior is detected then the system will prompt the camera module to take real time images. The images are divided into frames and analyzed for drunken state via image processing. If drunk condition is found, then the buzzer is triggered and the location info of the driver.

The equipment that is utilized for the whole framework is Raspberry Pi. Raspberry Pi will be set up properly for implementation. Several subjects will be taken to record the response and working of the system. The opening of eyes was indicated by circular shapes. If drunken state is detected, then circle does not appear indicating the closure of eye or drunken state of a driver. Results were shown with several photos with both eye opening and closing condition.

Motivation

- Nowadays accidents are frequently increasing at a high rate due to careless driving which results in damage to one's life or worse, cause death.
- As per the survey, many accidents are caused due to rash driving under the influence of alcohol.
- A Drunk Driver System is a system which can reduce these accidents to some extent caused due to rash driving and unconsciousness induced by alcohol.

II. RELATED WORK

Literature survey is the most important step in any kind of research. Before start developing we need to study the previous papers of our domain which we are working and on the basis of study we can predict or generate the drawback and start working with the reference of previous papers.
In this section, we briefly review the related work on drunk and driving detection using driving patterns and facial recognition

This paper shows that irregular driving alludes generally to alcoholic driving, exhaustion driving, and forceful driving practices. This places of business alcoholic driving identification, which really can be stretched out to apply to discovery of the other anomalous driving practices. The methodology finds out about the related on-board vehicle sensors for recognizing alcoholic driving practices dependent on picking up utilizing certain alcoholic driving signs. In a past work, we built up a Hidden Markov Model (HMM) technique and applied it to each time arrangement of the chose sensors estimations. The expectation exactness was most elevated for the longitudinal quickening, with a limit of 79%. Here, we expand our initial work that depended on HMMs and utilize Recurrent Neural Networks that spend significant time in time arrangement, where our testing results show exactness rates that go into the upper nineties. [1]

This paper proposed With India detailing as numerous as 1.34 lakhs fatalities in street mishaps consistently, a huge 70% of them being because of smashed driving, questions are currently being raised on whether the mushrooming development of alcohol distributes along the roadways is dependable for costing valuable lives in an unfavorable way. The framework executed by us targets diminishing the street mishaps later on because of tanked driving. The motivation behind this undertaking is to create vehicle mishap avoidance by strategy for liquor identifier in exertion to lessen car crash cases dependent on driving impaired liquor. In this proposed project another strategy is utilized by use of picture preparing framework and liquor in perspiration palm for alcoholic and driving identification. [2]

The paper aims unusual driving conduct may make genuine risk both the driver and the general population. In this work, we propose to recognize unusual driving by breaking down standardized driving conduct. Filling in as the virtual driver, a customized driver model is set up for the speed control reason by utilizing the privately planned neural organization and this present reality Vehicle Test Data. The driving conduct is standardized by utilizing the virtual driver to lead the speed following assignment as characterized by the standard driving cycle test, e.g., the FTP-72. Three common unusual driving practices are portrayed and recreated, to be specific, the weariness/inebriated, the wild and the telephone use while driving. An irregularity record is proposed dependent on the examination of standardized driving practices and is applied to quantitatively assess the abnormity. Mathematical examinations are directed to check the viability of the proposed plot. [3]

This paper proposed that smashed driving, or formally Driving Under the Influence (DUI) of liquor, is a significant reason for auto collisions all through the world. In this system, propose an exceptionally effective framework focused on early recognition and caution of risky vehicle moves ordinarily identified with alcoholic driving. The whole arrangement requires just a cell phone set in vehicle and with accelerometer and direction sensor. A program introduced on the cell phone processes increasing speeds dependent on sensor readings, and contrasts them and ordinary alcoholic driving examples separated from genuine driving tests. When any proof of alcoholic driving is available, the cell phone will consequently alarm the driver or call the police for help a long time before mishap really occurs. We actualize the recognition framework on Android G1 telephone and have it tried with various types of driving practices. The outcomes show that the framework accomplishes high exactness and energy proficiency. [4]

In this paper, wellbeing and security in vehicle voyaging are a pre-prominent worry for all. With the quick urbanization and stunning development of transport networks like bike vehicles, wellbeing on the streets and security on the bicycle has arisen as a certain need for us. It has extended the pace of mishaps, which prompts a few harms with loss of lives. Much of the time, we can't ready to identify the mishap's area. A cap is a type of ensuring gear worn to be careful the head from wounds. All the more explicitly, the cap helps the skull in securing the mind. A brilliant protective cap can identify the mishap's areas likewise save lives and makes bike driving more secure from already. This system propounds a savvy protective cap framework to dodge the mishap. The framework

separates into three sections cap circuit, auto circuit, and portable application. From the start, the head protector circuit has IR and liquor discovery sensor. The vehicle circuit has a 3-pivot accelerometer, Bluetooth module, hand-off, and load sensor. The cap circuit imparts a sign to the car circuit to begin if the protective cap is wearied and no liquor recognizes. At that point the vehicle circuit checks the status of the heap to begin. 3-pivot accelerometer detects crash or hit. In the wake of identifying a mishap versatile application sends the mishap area naturally to police and crisis contact number through the information base. [5]

In the modern day, with the increase in the number of vehicles plying on the roads, traffic accidents have grown significantly in number. One of the primary causes of traffic accidents is drunk driving or driving under influence (DUI). This is particularly an important issue for developing countries, such as India, where 53.4% of unnatural deaths in the year 2014 were due to traffic accidents, with drunk driving being the primary cause. Currently, police inspecting roads sample cars for breath tests to detect alcohol levels. However, this approach is manual and unlikely to detect most cases of driving under influence of alcohol. Alternate and more effective approaches to detect drunk driving may include automatic detection using sensors. Prevention may include reducing. [6]

This system propose a fine-grained abnormal Driving behavior Detection and identification system, D3, to perform real-time high-accurate abnormal driving behaviors monitoring using smartphone sensors. By extracting unique features from readings of smartphones' accelerometer and orientation sensor, we first identify sixteen representative features to capture the patterns of driving behaviors. Then, a machine learning method, Support Vector Machine (SVM), is employed to train the features and output a classifier model which conducts fine-grained identification. From results of extensive experiments with 20 volunteers driving for another 4 months in real driving environments, we show that D3 achieves an average total accuracy of 95:36%. [7]

The proposed approach aims to take advantage of advanced specifications of smartphones to design and develop a low-cost solution for enhanced transportation systems that is deployable in legacy vehicles. In this context, a customized Android application is developed to gather information regarding speed, gravitational force, pressure, sound, and location. The speed is a factor that is used to help improve the identification of accidents. It arises because of clear differences in environmental conditions (e.g., noise, deceleration rate) that arise in low speed collisions, versus higher speed collisions). The information acquired is further processed to detect road incidents. Furthermore, a navigation system is also developed to report the incident to the nearest hospital. The proposed approach is validated through simulations and comparison with a real data set of road accidents acquired from Road Safety Open Repository, and shows promising results in terms of accuracy. [8]

The current existing solutions that provide assistance to passengers in case of vehicle accident occurrence are mainly concerned with user interaction after the incident happened. Those mobile solutions require that the injured must launch the app and request help manually and that would not be possible if he/she is under critical or serious non-vital situation. The situation becomes even worse if passengers went under unconscious state. Accident detection device installed in a vehicles when meets with an accident will send SMS/ messages to the pre-install numbers of the drivers family members, police station, ambulance and nearest hospital. This automated tracking system can be useful for tracking and detecting the exact position of any automobile, which has met with a collision by using Global Positioning System (GPS) and sensors. [9]

In this paper, a major share of accidents happening today is categorized under drunk and drive accidents. Attempts to curb these accidents are limited to manual checking of drivers and awareness programs, which is evidently not enough or stringent. We propose a system where the driver's face is captured in thermal image spectrum and is first recognized using facial recognition, then classified as drunk or sober. The former is done using a deep learning tool that is Convolution Neural Network and the latter is done using Gaussian Mixture Model along with Fischer Linear Discriminant for dimensionality reduction. Post the facial recognition, we will be using capillary junction points on faces to determine difference in blood temperature thus allowing us to classify them as drunk or not. [10]

III. PROBLEM STATEMENT

- Drunken driving is responsible for around 33% of road accidents.
- There are various drunken driving detection tool but these tools require manual operating and accuracy is less.
- The proposed system is fully automatic and uses driving pattern of vehicle to detect the rash driving.

- The facial expressions of driver are also taken into consideration for highly accurate results

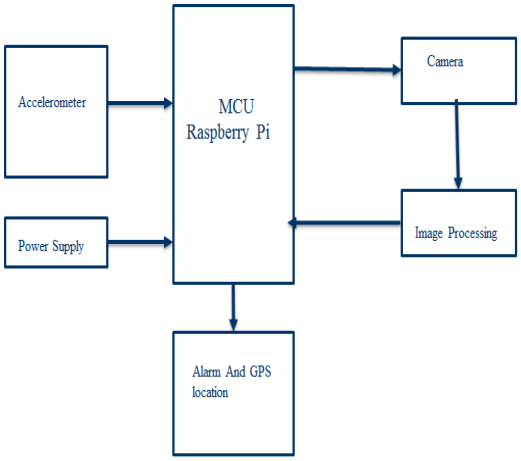

Fig.2 System Architecture

Algorithm

1. CNN

Convolutional Neural Networks (which are additionally called CNN/ConvNets) are a kind of Artificial Neural Networks that are known to be tremendously strong in the field of distinguishing proof just as picture order.

Four main operations in the Convolutional Neural Networks are shown as follows:

IV. ARCHITECTURE

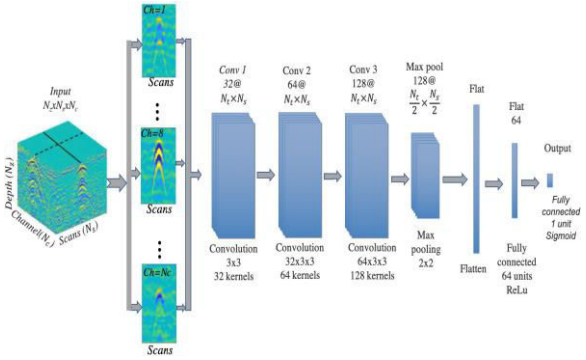

Fig.3 CNN Architecture

(i) Convolution

The principle utilization of the Convolution activity if there should be an occurrence of a CNN is to recognize fitting highlights from the picture which goes about as a contribution to the primary layer. Convolution keeps up the spatial interrelation of the pixels this is finished by fulfillment of picture highlights utilizing miniscule squares of the picture. Convolution equation. E very picture is seen as a network of pixels, each having its own worth. Pixel is the littlest unit in this picture grid. Allow us to take a 5 by 5(5*5) framework whose qualities are just in twofold (for example 0 or 1), for better agreement. It is to be noticed that pictures are by and large RGB with upsides of the pixels going from 0 - 255 i.e 256 pixels.

(ii). ReLU

ReLU follows up on a rudimentary level. All in all, it is an activity which is applied per pixel and overrides every one of the non-positive upsides of every pixel in the component map by nothing.

(iii). Pooling or sub-sampling

Spatial Pooling which is likewise called subsampling or down sampling helps in lessening the elements of each element map yet even at the same time, holds the most important data of the guide. Subsequent to pooling is done, in the long run our 3D element map is changed over to one dimensional component vector.

(iv) Fully Connected layer
The yield from the convolution and pooling activities gives noticeable highlights which are removed from the picture. These highlights are then used by Fully Connected layer for consigning the info picture into various classes predicated on the preparation dataset.

2. Haar Cascaded Algorithm

Haar Cascade is a machine learning-based approach where a lot of positive and negative images are used to train the classifier. Positive images – These images contain the images which we want our classifier to identify. Negative Images – Images of everything else, which do not contain the object we want to detect. Face detection using Haar cascades is a machine learning based approach where a cascade function is trained with a set of input data. OpenCV already contains many pre-trained classifiers for face, eyes, smiles, etc.. Today we will be using the face classifier. You can experiment with other classifiers as well. The Local Binary Pattern Histogram (LBPH) algorithm is a simple solution on face recognition problem, which can recognize both front face and side face. ... To solve this problem, a modified LBPH algorithm based on pixel neighborhood gray median (MLBPH) is proposed. Haar-like features are digital image features used in object recognition. ... A Haar-like feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums.

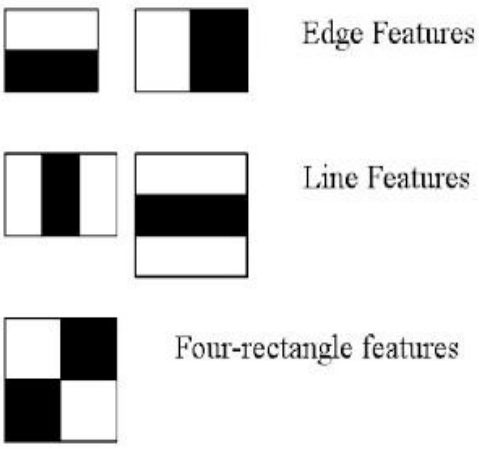

Fig.4 Feature Extraction Using LBP

V. CONCLUSION

In this paper, there are several different algorithms and methods for eye tracking, and monitoring. Most of them in some way relate to features of the eye (typically reflections from the eye) within a video Nowadays accidents are frequently increasing at a high rate due to careless driving which results in damage to one's life or worse, cause death image of the driver. As per the survey, many accidents are caused due to rash driving under the influence of alcohol. A Drunk Driver System is a system which can reduce these accidents to some extent caused due to rash driving and unconsciousness induced by alcohol. Raspberry Pi will be set up properly for implementation. Several subjects will be taken to record the response and working of the system. The opening of eyes was indicated by circular shapes. If drunken state is detected, then circle does not appear indicating the closure of eye or drunken state of a driver. Results were shown with several photos with both eye opening and closing condition.

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