"Driving Pattern Analysis System using Dataset"

Pooja Jagdish Pathane
Student
Department of Computer Science And Engineering
Nagpur Institute of Technology

Jagdish Pimple
Assistant Professor
Department of Computer Science And Engineering
Nagpur Institute of Technology

Abstract

In today's life, every human is in hurry to reach their destination like home, office, college, shopping mall, restaurant, etc as quickly as possible. To reach their destination quickly people use vehicles on road use and drive them in faster mode which results in road accidents. And it is a common belief that if a person behavior is being monitored, it would be relatively safer. Driver behavior is a major cause for the road accidents. To address this problem, drive behavior analysis and prediction models need to be developed.
Keywords: Driving Pattern, Dataset, Latitude, Longitude, Genetic Algorithm

I. INTRODUCTION

Currently, in tune with economic growth in every county, the numbers of the vehicles increase every year. At the same time, the number of non-expert drivers also increases rapidly. Since most novice drivers are unskilled, unfamiliar with the vehicle conditions and no awareness of traffic rules and regulations, drivers' personal factors have become the main reasons of traffic accidents. Previously a lot of work is done in this field but researchers mainly focused on monitoring either driver behavior or road conditions using specialized hardware deployed inside the car [1] [2] [3] [4] [5] [6] or roadside which is expensive and also requires maintenance.

In this proposed system, we going to determine the speed of the vehicle using dataset. Dataset mainly contains the user id, latitude, longitude of the vehicle. Depending on the latitude and longitude the system will calculate the distance. proposed system generate a driving pattern depend on the distance covered by the vehicle and the different location. This will help to derive the driving pattern of the driver.

The system uses a dataset and generate the output depending on it.

II. LITERATURE SURVEY

A. Using Mobile Phone Sensors to Detect Driving Behavior. In: Proceedings of The 3rd ACM Symposium On Computing for Development

(P. Singh ., Juneja, N., Kapoor, S. ACM (2013)) This application collects data from accelerometers, GPS and also record sounds with the help of microphone, and then data is combined and analyzed to detect rash driving patterns. The various pattern such as speed breaker, lane-change left/right, left/right turn, sudden breaking, sudden acceleration was analyzed and verified using 'Ground Truth'. Correlation of audio and accelerometer data is done to find new patterns. For Example: if a lane change is not accompanied with indicator sound, then this mean rash driving event. The limitation of this work is that machine learning techniques are not used to classify driving patterns.

B. Safe Driving Using Mobile Phones

(Fazeen, M., Gozick, B., Dantu, R., Bhukhiya, M., Gonzalez, IEEE Transactions on Intelligent Transportation Systems (2012)). Fazen have proposed an innovative application using a mobile smartphone that are integrated inside an automobile to evaluate driver style. They have used the three-axis accelerometer of an Android-based smartphone to record and analyze various driver behaviors and external road conditions that could potentially be hazardous to the health of the driver. They have utilized x-axis and y-axis accelerometer data to measure the driver's direct control of the vehicle as they steer, accelerate, and apply the brakes. Safe acceleration or deceleration never reach a g force of more than±0.3 g, and sudden acceleration or deceleration approach ±0.5 g. With this comparison, it is easy to quantify the difference between safe and sudden acceleration or deceleration. Safe right/left lane produce an average g-force of less than ±0.1 g and unsafe or sudden right/left lane produce a g force well over±0.5 g. It was observed that the average time to complete a safe lane change was 75% longer than a sudden lane change. Phone placement locations in a vehicle was also observed and the loc. 1, the center console, gave the best relative data with low engine feedback. The drawback of this work is that the best results of prediction driving behavior were found, when phone was placed on a center dashboard, but in car the phone placement is not necessarily at center dashboard, it's location can be anywhere, so there should be mechanism for virtually re-orienting the accelerometer.

C. Driving Style Recognition using a Smartphone as a Sensor Platform

(Johnson, D.A., Trivedi, IEEE 14th International Conference on Intelligent Transportation system, October (2011)) proposed an approach for predicting driving style. They categorized driving style into normal, aggressive and very aggressive. They collect

data from various sensors (accelerometer, gyroscope, magnetometer, GPS, video) and fused related data into a single classifier based on Dynamic Time Warping (DTW)

D. Integrated Computing System for measuring Driver Safety Index

(Chigurupa, S., Polavarap, S., Kancherla,Y., Nikhath International Journal of Emerging Technology and Advanced Engineering,ISSN 2250-2459, Volume 2 (2012)) In this proposed system developed a android application which uses data from accelerometer sensor, GPS sensor and video recording is done with the help of camera to give rating to the driver. The feedback can be used to aware the driver and improve performance. The range of acceleration or deceleration values are given for the safe driving. Whenever the accelerometer values exceed the safe limits it would be considered as an event. X-axis, direction-front and rear, driving pattern-Accelerating / Braking, Safe g value =-3 to +3. Y axis, direction-Left/right, driving pattern-Turning / Swerves / Lane Change, Safe g value =-3 to +3. Z-axis, direction-Up/down, driving pattern-Bumps / Road Anomalies, Safe g value =-8 to-11. The limitation of this work is that entire system is not fully automatic, so there is the need of administrator to analyze the videos.

E. Driver behavior analysis and route recognition by hidden Markov models.

(Sathyanarayana, A., Boyraz, P., Hansen, J.H.L Vehicular Electronics and Safety, ICVES, IEEE International Conference on IEEE (2008)) says that, Driver Behavior Analysis and Route Recognition by Hidden Markov Models in two different approaches. The first (bottom-to-top) approach takes isolated maneuver recognition with model concatenation to construct a generic route, whereas the second (top-to-bottom). approach models the entire route as a 'phrase' and refines the HMM to discover maneuvers. Only left turn (LT), right turn (RT) and lane change maneuvers are considered.

F. Analyzing Driver Behavior using Smartphone Sensors: A Survey

(Nidhi Kalra and Divya Bansal International Journal of Electronic and Electrical Engineering. ISSN 0974-2174 Volume 7, Number 7 (2014)) In this proposed system a Driver Behavior monitoring has evolved tremendously in recent years. Driver safety can be enhanced by monitoring driver behavior, recording their aggressive driving events and giving feedback of recorded events. Monitoring driver behavior using inbuilt sensors of smartphone has been evolving as a new trend because of less cost and considering the fact that many people already own it. This paper surveys various methods of detecting driver behavior. It also presents the challenges faced by researchers in detecting and predicting driver behavior.

III. COMPARATIVE STUDY OF LITERATURE SURVEY

Table - 1

Sr.no	*Title of Paper*	*Author Name*	*Method /Algorithm used*	*Drawbacks*
1.	*Using mobile phone sensors to detect driving behavior. In: Proceedings of the 3rd ACM Symposium on Computing for Development*	*P. Singh ., Juneja, N., Kapoor, S. ACM (2013)*	*collects data from accelerometers, GPS and also record sounds with the help of microphone, and then data is combined and analyzed to detect rash driving patterns.*	*machine learning techniques are not used to classify driving patterns*
2.	*Safe Driving Using Mobile Phones*	*Fazeen, M., Gozick, B., Dantu, R., Bhukhiya, M., Gonzalez, IEEE Transactions on Intelligent Transportation Systems (2012)*	*Evaluate driver style by using a mobile smartphone that are integrated inside an automobile*	*best results of prediction driving behavior were found, when phone was placed on a center dashboard, but in car the phone placement is not necessarily at center dashboard*
3.	*Driving Style Recognition using a smartphone as a sensor platform*	*Johnson, D.A., Trivedi, IEEE 14th International Conference on Intelligent Transportation system, October(2011)*	*The system can provide audible feedback if a driver's style becomes aggressive as well as the information leading up to an aggressive event*	*only aggressive events are detected, standard lane changes (non-aggressive) are not currently being detected*
4.	*:Integrated Computing System for measuring Driver Safety Index*	*Chigurupa, S., Polavarap, S., Kancherla,Y., Nikhath International Journal of Emerging Technology and Advanced Engineering,ISSN 2250-2459, Volume 2 (2012)*	*It awares the driver and improve performance*	*Entire system is not fully automatic, so there is the need of administrator to analyze the videos.*
5.	*Driver behavior analysis and route recognition by hidden Markov models.*	*Sathyanarayana, A., Boyraz, P., Hansen, J.H.L Vehicular Electronics and Safety, ICVES,IEEE International Conference on IEEE (2008)*	*Driver Behavior Analysis and Route Recognition by Hidden Markov Models in two different approaches.*	*Only left turn (LT), right turn (RT) and lane change maneuvers are considered*

6.	*Analyzing Driver Behavior using Smartphone Sensors: A Survey*	*Nidhi Kalra and Divya Bansal International Journal of Electronic and Electrical Engineering. ISSN 0974-2174 Volume 7, Number 7 (2014)*	*Monitoring driver behavior using inbuilt sensors of smartphone*	*As the phone can be at any location inside the car, so there must be some mechanism to virtually reorient the device to align the device axis along with vehicle axis.*

IV. PROBLEM STATEMENT

In the existing system, there is no optimum pattern analysis done for the driving patterns, as all the analysis is done based on the rules decided by the researchers. But, this approach does not give an accurate analysis of the driving patterns of the user, as all possible combinations of patterns is not considered. This will make the pattern analysis faulty, and the actions taken on the basis of this analysis will not be correct too, so we need to propose a solution which will improve the accuracy of the driving pattern analysis based on the input dataset.

V. PROPOSED APPROACH

In this approach we will improve the accuracy of the driving pattern analysis based on the input dataset as in the existing system, there is no optimum pattern analysis done for the driving patterns, as all the analysis is done based on the rules decided by the researchers. But, this approach does not give an accurate analysis of the driving patterns of the user, as all possible combinations of patterns is not considered. This will make the pattern analysis faulty, and the actions taken on the basis of this analysis will not be correct too The proposed system evaluates driving patterns of the drivers. In this approach we apply Genetic Algorithm on the dataset to find the patterns of driving. In this approach Genetic algorithm collect the informations from the dataset of the vehicle and generate the solution for the driving patterns. It will trace location. speed as well as the driver's ID. Driver safety can be enhanced by monitoring driver behavior

VI. MODULES USED IN THE PROJECT

1) Collect the input dataset for the driving patterns.
2) Remove any outlier from the dataset.
3) Apply Genetic Algorithm on the dataset to find the patterns of driving.
4) Result analysis and comparison with previous method.

A. Collect The Input Dataset for the Driving Patterns

In this module we collect the information from the dataset of vehicle, it gives information about the speed. Acceleration and diver's ID etc. this information are used to derives the pattern of driving.

B. Remove Any Outlier from the Dataset

In this module, an outlier will get removed from dataset. An outlier may be due to variability in the measurement or it may indicate experimental error; the latter are sometimes excluded from the data set

C. Apply Genetic Algorithm on the Dataset to Find the Patterns of Driving

In this module, we apply the genetic algorithm on dataset to find the pattern of driving and generate the solution for the driving pattern. Also find the fitness of each solution.

D. Result Analysis and Comparison with Previous Method

Here we analyse and compare the result with the previous method.

VII. METHODOLOGY

In proposed system, we find out the driving pattern and behavior of the driver by applying the genetic algorithm on the dataset. The genetic algorithm Generate N solutions for the given driving patterns. This algorithm finds the fitness of each of the solutions. If the fitness is less than the mean fitness, discard and replace with the with new solutions. And if the solution is more than mean fitness, pass to the next iteration select the solution which has the max fitness and use it as the driver pattern. It provides Automatic generation, collection, storage and retrieval and analysis of data and information and thus eliminating the human related errors involved in collecting of such data.

In the proposed system, generate solution which will improve the accuracy of the driving pattern analysis based on the input dataset.

VIII. EXPECTED OUTCOME

Optimized driver pattern analysis with accurate outputs for the driver, and will give details about the users driving styles and patterns. it will provide the improved driving pattern analysis.

REFERENCES

[1] Singh, P., Juneja, N., Kapoor, S.: Using mobile phone sensors to detect driving behavior. In: Proceedings of the 3rd ACM Symposium on Computing for Development, ACM (2013)
[2] Fazeen, M., Gozick, B., Dantu, R., Bhukhiya, M., Gonzalez, M.C.: Safe Driving Using Mobile Phones. In: IEEE Transactions on Intelligent Transportation Systems (2012)
[3] Johnson, D.A., Trivedi, M.M.:Driving Style Recognition using a smartphone as a sensor platform. In: IEEE 14th International Conference on Intelligent Transportation system, October(2011)
[4] Chigurupa, S., Polavarap, S., Kancherla,Y., Nikhath, K.A.:Integrated Computing System for measuring Driver Safety Index. In: International Journal of Emerging Technology and Advanced Engineering, ISSN 2250-2459, Volume 2 (2012)
[5] Sathyanarayana, A., Boyraz, P., Hansen, J.H.L.:Driver behavior analysis and route recognition by hidden Markov models. In: Vehicular Electronics and Safety, ICVES,IEEE International Conference on IEEE (2008)
[6] Nidhi Kalra and Divya Bansal, Analyzing Driver Behavior using Smartphone Sensors: A Survey. In: International Journal of Electronic and Electrical Engineering. ISSN 0974-2174 Volume 7, Number 7 (2014)
[7] Hickman, J.S., Geller, E.S.:Self-management to increase safe driving among shorthaul truck drivers. In: Journal of Organizational Behavior Management (2005)
[8] https://en.wikipedia.org/wiki/Genetic_algorithm
[9] Driving Conditions in India, http://www.indiandrivingschools.com/index.php
[10] http://www.ripublication.com/irph/ijeee_spl/ijeeev7n7_07.pdf