Vehicle Analytics Using IOT and ML

Ms Karthiga G [1], Bhoomika V [2], Neha Srivastava [3], Nikita Kumari [4], Jigyasa Kumari [5]

[234] *Student, Department of Computer Science and Engineering, AMCEC, Bangalore- 083, Karnataka*

[1] *Faculty, Department of Computer Science and Engineering, AMCEC, Bangalore- 083, Karnataka*

Abstract

Vehicle analytics has gained significant attention in recent years due to its potential to improve driving behavior, fuel consumption, optimal speed, and driving patterns. This paper explores the application of machine learning (ML) techniques in vehicle analytics to extract valuable insights from various data sources such as sensors, GPS, accelerometer and gyroscope. The primary focus is on analyzing driving behavior to identify patterns that can lead to safer and more fuel-efficient driving practices. ML algorithms are utilized to process large volumes of data and provide accurate predictions and recommendations for optimizing driving performance.

Keywords- Vehicle analytics, machine learning, driving behavior, fuel consumption, optimal speed, driving patterns.

I. INTRODUCTION

In recent years, vehicle analytics has emerged as a powerful tool for extracting valuable insights from various data sources within vehicles. By leveraging advanced technologies such as machine learning (ML), driving behavior, fuel consumption, optimal speed, and driving patterns can be analyzed to enhance overall driving performance, reduce fuel consumption, and improve road safety. The advent of sophisticated sensors, GPS technology, accelerometer, and gyroscope has enabled the collection of vast amounts of data related to vehicle operation and driver behavior. Traditional methods of data analysis often fall short in effectively utilizing this wealth of information. The primary focus of vehicle analytics using ML is to analyze driving behavior. By examining various parameters such as acceleration, braking, speed, and lane changes, ML algorithms can identify patterns and trends that correlate with safe and fuel-efficient driving practices. Fuel consumption is a significant concern for vehicle owners and fleet operators alike. ML techniques can help establish the relationship between driving behavior and fuel efficiency Determining the optimal speed for fuel efficiency is another critical aspect of vehicle analytics. ML algorithms can analyze historical data and identify the speed range that provides the best fuel economy for a given vehicle and road conditions. The ultimate goal is to develop a robust and efficient vehicle analytics system that can provide drivers with actionable information to optimize their driving performance and fuel efficiency while ensuring road safety.

II. IMPLEMENTATION

To implement vehicle analytics using machine learning techniques like Random Forest and Support Vector Machine (SVM), we follow a step-by-step approach. This implementation focuses on analyzing driving behavior, fuel consumption, optimal speed, and driving patterns. We gather relevant data from sensors, GPS, accelerometer, and gyroscope including parameters like acceleration, braking, speed, lane changes, and fuel consumption. After preprocessing the data by handling missing values, normalizing features, and encoding variables, we train a Random Forest classifier to analyze driving behavior and predict safe or risky instances. For fuel consumption analysis, an SVM regression model learns from historical data on driving patterns and corresponding fuel consumption, allowing it to estimate fuel efficiency for new instances based on driving behavior. Similarly, the SVM model trained on historical data for optimal speed and fuel efficiency can predict the optimal speed range considering road conditions. Once trained and validated, these models are deployed in a real- time vehicle analytics system that receives data, performs driving behavior analysis, fuel consumption estimation, and optimal speed prediction.

III. ARCHITECTUTRE

Diagram shows the stages of the project as data collection, processing and prediction. Data is collected with the help of sensors. The collected data is processed for driving behavior analysis, fuel

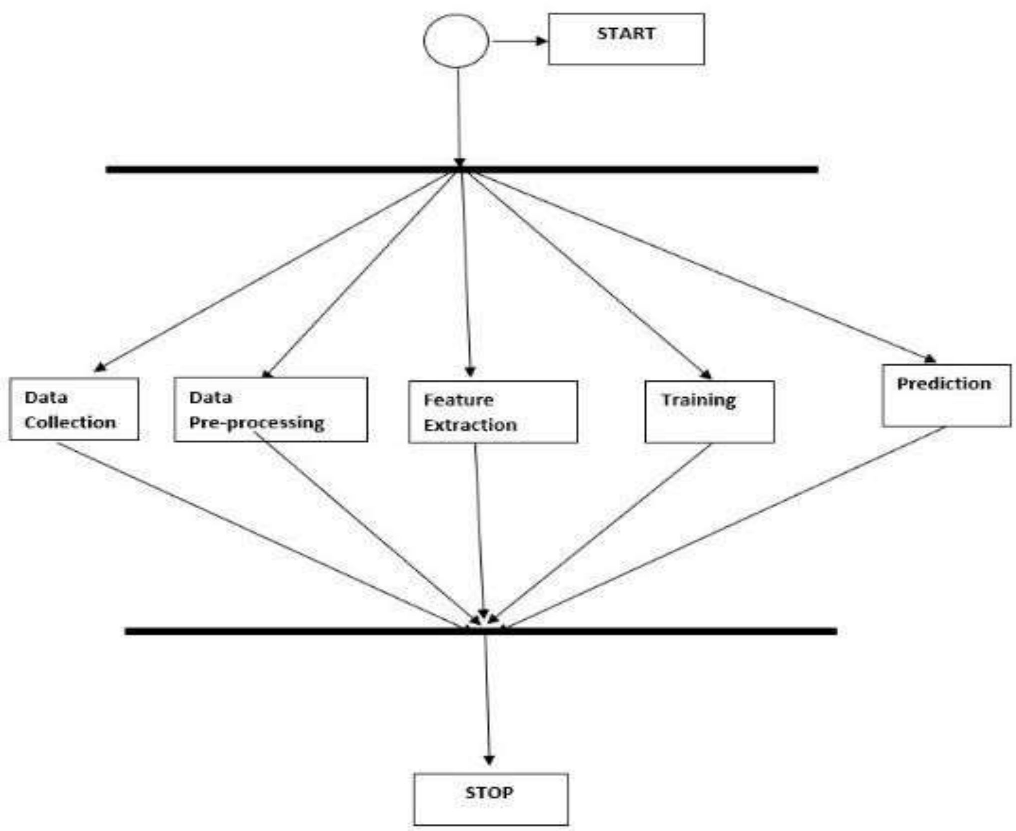

Fig. High level overview of vehicle analytics

consumption estimation, and optimal speed prediction and hence the analysis is performed to get the desired output for secure driving practices.

IV. CONCLUSION

In conclusion, the implementation of vehicle analytics using machine learning techniques such as Random Forest and Support Vector Machine (SVM) offers valuable insights into driving behavior, fuel consumption, optimal speed, and driving patterns. By analyzing and predicting these factors, it enables safer driving practices, improved fuel efficiency, and enhanced road safety. This implementation holds great potential for revolutionizing the transportation industry and promoting more efficient and secure driving practices.
Overall, our study contributes to the Driving safety field of machine learning in vehicle analytics, highlighting the

pattern of driving to provide actionable insights for improvingindividual experience of driving.

V. REFERENCES

[1] Austin, Thomas C., Francis J. DiGenova, Thomas R. Carlson, Richard W. Joy, Kathryn A. Gianolini, and John M. Lee, "Characterization of Driving Patterns and Emissions from Light-duty Vehicles in California," Report No. A932-185 (Sacramento, CA: Sierra Research, Inc., 1993).

[2] Feng and Matthew Barth, "Critical Issues in Quantifying Hybrid Electric Vehicle Emissions and Fuel Consumption," SAE981902, (Warrendale, PA: Society of Automotive Engineers, 1998).

[3] Yamada, Keiichi, Shin Yamamoto, and Takero Hongo, "What Effects Does a Speed Information Display Have on Vehicle Speed? A Study of Methods to Improve Driver Decision in Selecting Safer Speeds," SAE2006-05-0049(Warrendale, PA: Society of AutomotiveEngineers, 2006).