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# Trip Based Modelling Of Fuel Consumption In Modern Fleet Vehicles Using Machine

**Learning**

**INTRODUCTION**

1.0

The Ability to model and predict the fuel consumption is vital in enhancing fuel economy of vehicles and preventing fraudulent activities in ﬂeet management. Fuel consumption of a vehicle depends on several internal and external factors. However, not all these factors may be measured or available for the fuel consumption analysis. The main aim of the project is to build a Machine Learning algorithm to predict the fuel consumption of ﬂeet vehicles based on the gas type. A web application is built and is integrated with the ML model.

**PROJECT OVERVIEW**

1.1

Heavy-duty trucks contribute approximately 20 percent of fuel consumption in the United States of America (USA). The fuel economy of heavy-duty vehicles (HDV) is affected by several real- world parameters like road parameters, driver behaviour, weather conditions, and vehicle parameters, etc. Although modern vehicles comply with emissions regulations, potential malfunction of the engine, regular wear and tear, or other factors could affect vehicle performance. Predicting fuel consumption per trip based on dynamic on-road data can help the automotive industry to reduce the cost and time for on-road testing. Data modelling can easily help to diagnose the reason behind fuel consumption with a knowledge of input parameters.

**PURPOSE**

1.2

To classify if it is a regression or a classiﬁcation type of problem. To pre-process/clean the data using different data pre-processing techniques. To Apply different algorithms according to the dataset .

To know how to ﬁnd the accuracy of the model.

To build web applications using the Flask framework This project has three major parts :

1.model.ipynb - This contains code for our Machine Learning model to predict the fuel consumption level for modern ﬂeet vehicles based on training data in 'measurement.csv' ﬁle. 2.app.py - This contains Flask APIs that receive vehicles parameter through GUI or API calls, computes the pre cited value based on our model and returns it

. 3.template - This folder contains the HTML template (index.html) to allow user to enter employee detail and displays the predicted employee salary. static - This folder contains the css folder with style.css ﬁle which has the styling required for out index.html ﬁle.

**2.0 LITERATURE SURVEY EXISTING PROBLEM :**

2.1

Driver Shortages

The driver shortage has been among the top concerns for ﬂeet managers in the past decade. As the demands for freight transport increase and the number of new driver applicants continues to stagnate, experts predict the shortage of delivery drivers may approach 250,000 by 2022.

Recruiting inexperienced drivers can also lead to safety issues and the need for driver monitoring tactics. Technology can help monitor driver responses and safety protocols. While such systems are beneﬁcial, they add one more complexity to maintaining the ﬂeet.

Digitalization of Vehicles

The adoption of digital applications can enable managers to track vehicle routes, access data on service history down to the component and part level, maintain compliance records, and receive notiﬁcations when preventive maintenance is due. Increased sophistication of telemetry and internet of things (IoT) technology are making it possible for managers to track all of these processes and more.

Fuel Costs

Some plants must budget for high fuel costs, depending on the type of ﬂeet vehicles deployed. Even modest ﬂuctuations in diesel cost can have a major inﬂuence on the company’s ﬁnancial

bottom line. Maintenance teams must stay on top of reports of ﬂuctuating fuel usage, alert for issues which can be resolved or downtime which can be prevented.

Environmental Controls

Extreme climatic events have sparked greater awareness around climate change and led to new clean air standards being passed around the world. The tightening of environmental legislation means ﬂeet managers face a variety of mandates to be met and pressure to phase out the use of internal combustion engines. Fleet managers and the service technicians who support them need to be aware of the issues and formulate their own strategies.

Rising Popularity of Electric Vehicles

Based on current estimates, electric vehicles (EVs) will reach an inﬂection point somewhere between 2035 and 2040, where half of all vehicles sold will be plug-ins. Their proliferation into the world of trucks and vans, as used in manufacturing plants, is also continually increasing. Advanced analytics can help to determine charging costs, savings and the impact on .

Route Optimization

Software built especially for dispatching service technicians can track ﬂeet vehicle location, identify the optimal vehicle to dispatch for an urgent call and calculate the best route. For the ﬂeet manager and the maintenance team, this GPS-centric data can be valuable in monitoring vehicles and pinpointing environmental factors that lead to unusual maintenance requirements

Driver Behaviour

There is a strong correlation between driver behaviour and maintenance needs. Reports that highlight aggressive driving behaviour, excessive idling, improper shifting or deactivating safety controls can all be used to improve training and encourage improvement. Data changes the dialogue from being anecdotal and speculative to being fact-driven, allowing for better results.

Autonomous Vehicles

Factories and plants provide an ideal closed-loop environment for innovative proof-of-concept projects with autonomous vehicles. While public opinion is still divided about usage on public highways, growing evidence suggests autonomous vehicles will represent a safer and more eﬃcient transport model in the future. Without drivers to report on malfunctions or troublesome symptoms, software and sensors will be vital to managing these ﬂeets, allowing the dispatch manager to control assets in real time actively.

Security

As ﬂeets become autonomous and digitally powered, maintenance teams will be part of the critical line of defence to ensure transportation and the use of vehicles in plants are safe. Not only will technicians need to inspect and ensure that backup systems and safeguards are in place, but they also must monitor the technologies involved in ﬂeet operation, from dispatch to sensors monitoring the levels of brake ﬂuid.

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2.3 **PROBLEM STATEMENT DEFENITION**

Problem Statement

when a fleet manager wants to predict the fuel consumption of fleet vehicles and wants to prevent fraudulent activities in fleet management which require appropriate external and internal