# Machine Learning Based Vehicle Performance Analayzer

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| **Date** | 16 NOVEMBER 2022 |
| **Team ID** | PNT2022TMID06027 |
| **Project name** | machine learning based vachicle performance analyzer |

## Pre Requisite:

To complete our project, we must have knowledge of the following.We need to have basic knowledge of the following cloud services:

• Anaconda navigator
• IBM watsun studio

### Github Account:

➢ Open https://github.com in a web browser, and then select Sign up.
➢ Enter your email address.
➢ Create a password for your new GitHub account, and Enter a username, too. Next, choose whether you want to receive updates and announcements via email, and then select Continue ➢ Verify your account by solving a puzzle. Select the Start Puzzle button to do so, and then follow the prompts.
➢ After you verify your account, select the Create account button.
➢ Next, GitHub sends a launch code to your email address. Type that launch code in the Enter code dialog, and then press Enter.
➢ I have created my github account with the email id:pavithrans2305@gmail.com GitHub id: IBM-Project-45665-1660731490

### Installation Of IDE'S:

Python is available from its website python.org. Once there, hover your mouse over the Downloads menu, then over the Windows option, and then click the button to download the latest release

# Literature Survey:

## REVIEW-1

**Title Of The Paper:**

Vehicle fuel economy and vehicle miles traveled

**Name Of The Author:**

Vinola Vincent Munyon, William M. Bowen, John Holcombe

**Problem Description:**

There has been, in recent decades, a concerted effort to promote energy efficiency as a means to reduce energy consumption. The general thesis is that, ceteris paribus, an increase in energy efficiency leads to a decrease in the consumption of the good or service rendered efficient. This is in opposition to Jevons' Paradox which states that "It is wholly a confusion of ideas to suppos that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth..." This study examines whether Jevons' Paradox holds when all available factors that could affect consumption of an efficient good/service are controlled for. Using vehicle fuel economy as a measure of energy efficiency and vehicle miles travelled (VMT) as a measure of consumption, the study examines whether, other things being held equal, a more fuel efficient vehicle accrues greater Vehicle Miles Traveled. The findings indicate that in this case Jevons' Paradox does hold true; a 1% increase in fuel efficiency was associated with a 1.2% increase in VMT.

## REVIEW-2

**Title Of The Paper:**

Personalised assistance for fuel-efficient driving

**Name Of The Author:**

Ekaterina Gilman , Anja Keskinarkaus, Satu Tamminen, Susanna Pirttikangas, Juha Röning,Jukka Riekki

**Project Description:**

Recently, keeping in mind that driving behaviour affects fuel consumption significantly, car manufacturers have started to invest in the development of on-board systems that provide drivers feedback about their driving (e.g., SmartGauge1, ECO ASSIST2). These systems provide visual feedback about whether driving is fuel-efficient together with statistics about fuel consumption and possible savings. Another illustrative approach is ECO Pedal3 from Nissan, which provides physical feedback with a pedal push-back control mechanism when a driver accelerates too heavily. More detailed analysis of trips is provided by Fiat eco:Drive4 system. This solution gathers statistics about trips and provides explanatory feedback about how to drive more fuel-efficiently. On-board diagnostic scanners are becoming the most common tools for monitoring driving behaviour, as they can be bought separately and plugged into on-board diagnostic ports. Kiwi Drive Green5 system serves as an example of such a tool. Kiwi device plugs into an on-board diagnostic port to obtain sensor information about the vehicle. The device analyses driving behaviour and delivers this information to the driver.

## REVIEW-4

**Title Of The Paper:**

Analysis of Vehicle Fuel Efficiency And Survival Patterns For The Prediction of Total Energy Consumption From Ground Transportation In Korea.

**Name of The Author:**

H. LEE and H. CHOI*

**Problem Description:**

In this study, correlation between vehicle fuel efficiency and total fuel energy consumption is analyzed to support the energy consumption and greenhouse gas (GHG) emissions reduction master plan in Korea. The background and highlights of recently amended fuel economy regulations and fuel efficiency labeling standards in Korea are also introduced. 18 representative vehicle groups, classified by class, type, size, and fuel, are selected by investigating vehicle distribution statistics based on market penetration and registration data sets in order to reflect and predict total fuel energy consumption in the overall ground transportation sector in Korea. Validity of the vehicle survival patterns modeled and vehicle classification rules are confirmed by comparing national fuel energy consumption statistics to the total amount of fuel consumed by each selected representative vehicle group. The latter figures are approximated from representative number of registrations, weighted average fuel economy, and average annual distance traveled.

## REVIEW-5

Impact of driver behavior on fuel consumption classification, evaluation and prediction using machine learning

**Name of The Author:**

PENG PING1, WENHU QIN1, YANG XU1, CHIYOMI MIYAJIMA2 ,(Member, IEEE) and KAZUYA TAKEDA3, (Senior Member, IEEE).

**Problem Description:**

Driving behavior has a large impact on vehicle fuel consumption. Dedicated study on relationship between driving behavior and fuel consumption can contribute to decrease the energy cost of transportation and the development of the behavior assessment technology for the ADAS system. So, it is vital to evaluate this relationship in order to develop more ecological driving assistance systems and improve vehicle fuel economy. However, modeling driving behavior under dynamic driving conditions is complex, making quantitative analysis of the relationship between driving behavior and fuel consumption difficult. In this paper, we introduce two kinds of machine learning methods for evaluating the fuel efficiency of driving behavior using naturalistic driving data. In the first stage, we use an unsupervised spectral clustering algorithm to study the macroscopic relationship between driving behavior and fuel consumption, using data collected during the natural driving process. In the second stage, dynamic information from the driving environment and natural driving data are integrated to generate a model of the relationship between various driving behaviors and the corresponding fuel consumption features. The dynamic environment factors are coded into a processible, digital form using a deep learning-based object detection method.

**REVIEW-6**

**Title Of The Paper:**

**Title Of The Paper:**

Driving Behavior Analysis through CAN Bus Data in an Uncontrolled Environment.

**Name Of The Author:**

Umberto Fugiglando , Emanuele Massaro, Paolo Santi, Sebastiano Milardo ,Kacem Abida, Rainer Stahlmann, Florian Netter, and Carlo Ratti.

**Problem Description:**

Cars can nowadays record several thousands of signals through the controller area network (CAN) bus technology and potentially provide real-time information on the car, the driver, and the surrounding environment. This paper proposes a new methodology for near-real-time analysis an classification of driver behavior using a selected subset of CA bus signals, specifically gas pedal position, brake pedal pressure steering wheel angle, steering wheel momentum, velocity, RPM, longitudinal and lateral acceleration. Data have been collected in a completely uncontrolled experiment involving 54 people, where over 2000 trips have been recorded without any type of predetermined driving instruction on a wide variety of road scenarios. While only few works have analyzed the driving behavior of more than 50 drivers using CAN bus data, we propose an unsupervised learning technique that clusters drivers in different groups, and offers a validation method to test the robustness of clustering in a wide range of experimental settings.

**Paper References:**


❖ Cortes, C. and Vapnik, V. (1995). Support-vector networks, Machine learning, 20(3), pp.273-297 .Fayyad, U. M., Haussler, D. and Stolorz, P. E.

**REVIEW-7**

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❖ Environment, IEEE Transactions on Intelligent Transportation Systems.

20(2), pp. 737-748, doi: 10.1109/TITS.2018.2836308 .

❖ Gilman, E., Keskinarkaus, A., Tamminen, S., Pirttikangas, S., R¨oning, J. and Riekki, J.(2015). Personalised assistance for fuel-efficient driving,

Transportation Research Part C: Emerging Technologies, 58, pp. 681-705
doi: 10.1016/j.trc.2015.02.007 .