

# **ELECTRIC CAR PERFORMANCE MONITORING DASHBOARD**

A mini project submitted in partial fulfilment of the requirements for the degree of

**MASTER OF SCIENCE**

**IN**

**DATA SCIENCE**

**Periyar University, Salem-11**

**by**

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**DEPARTMENT OF COMPUTER SCIENCE**

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**PERIYAR UNIVERSITY**

**(NAAC “A++” Grade-State University-NIRF Rank 73-ARIIA Rank 10)**

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## **CERTIFICATE**

This is to certify that the report of the Mini Project entitled “**ELECTRIC CAR PERFORMANCE MONITORING DASHBOARD**” submitted in partial fulfilment of the requirement for the degree of Master of Science in Data Science to the Periyar University, Salem is a record of bonafide work carried out by **SRIRAM R (Reg. No: U22PG507DTS023)** under my supervision and guidance.

**Signature of the Guide**

**Signature of the HOD**

Submitted of the Viva-Voce Examination held on\_\_\_\_\_.

**Internal Examiner**

**External Examiner**

## DECLARATION

I hereby declare that the project work entitled “**ELECTRIC CAR PERFORMANCE MONITORING DASHBOARD**” submitted to Periyar University, Salem-11 in partial fulfilment of the requirement for the award of the Degree of **Master of Science in Data Science** is the record work carried out by me, under the supervision **Dr. R. RATHIPRIYA, Assistant Professor, Department of Computer Science, Periyar University, Salem -11.**

To the best of my knowledge, the work reported here is not a part of any other work on the basis of which a degree or award was conferred on an earlier to one or any other candidate.

## ACKNOWLEDGEMENT

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# 1. ABSTRACT

This is an electric car dataset consisting of 33 brands with 103 models. It also has the

1. Acceleration of the car in (km/h),
2. Top Speed in (km/h),
3. Range of the car in (km),
4. The efficiency of a car in (Wh/km),
5. Fast charge in (km/h),
6. Rapid charge possibility,
7. Power Train model of car,
8. plug type,
9. Body Style of the car,
10. The market segment that belongs in,
11. Seats available in the car,
12. Prices in Euro and Price in Dollars.

Monitoring an individual brand car's performance is an existing solution. But monitoring various brands of electric cars in a single interface is never done before. I took this mini-project opportunity to build an interactive report with a dashboard to monitor different brands of electric cars' performance in a single interface.

Building the interactive report to monitor specific brands' car models based on their key features helps to understand the key difference between model cars.

Getting insights based on the car feature help to understand and make data-driven decisions to improve the car in various aspects and it also helps to understand the pros and cons of the features and its performance.

Monitoring this electric car's performance based on the features helps to build literal eco-friendly EVs and helps to ensure a sustainable future for humanity.

## **2. INTRODUCTION**

Data science is the study of data to extract meaningful insights for business. It is a multidisciplinary approach that combines principles and practices from the fields of mathematics, statistics, artificial intelligence, and computer engineering to analyze large amounts of data. This analysis helps data scientists to ask and answer questions like what happened, why it happened, what will happen, and what can be done with the results.

The visualization part is most important to analysing the data I use the visualizations to easily understand the data. In general, from the data, first, the data is to be pre-processed and in this pre-processing method, we have to do data cleaning, data integration and data transformation. The overall analysis is done by pre-processing and visualizations. The visualization is represented by charts and graphs.

### **3. PROBLEM STATEMENT**

This is an electric car dataset consisting of 33 brands with 103 models. It also has the

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Monitoring an individual brand car's performance is an existing solution. But monitoring various brands of electric cars in a single interface is never done before. Building an interactive report with a dashboard to monitor different brands of electric cars' performance in a single interface is my problem objective.

Building the interactive report to monitor specific brands' car models based on their key features helps to understand the key difference between model cars.



## 4. SYSTEM REQUIREMENTS

- **Windows:** 10
- **MAC:** OS X v10.7 or higher
- **Linux:** Ubuntu/CentOS

### Hardware Requirements

Processor: Minimum 1 GHz; Recommended 2GHz or more

- Ethernet connection (LAN) OR a wireless adapter (Wi-Fi)
- Hard Drive: Minimum 32 GB; Recommended 64 GB or more
- Memory (RAM): Minimum 4 GB; Recommended 8 GB or above

Processor	Intel Core i5-6300U CPU @ 2.40GHz 2.50 GHz
SDD	512 GB
RAM	<b>16GB</b>

## 5. SOFTWARE SPECIFICATIONS

Operating System	Windows XP/10/11.
Coding Language	Python Language
Software Tool	<b>Excel Workbook,</b> <b>Power BI desktop</b>

## **6. DATA CLEANSING AND TRANSFORMATION**

### **Steps Involved in Data Pre-processing:**

#### **Data Cleaning:**

The data can have many irrelevant and missing parts. To handle this part, data cleaning is done. It involves handling missing data, noisy data etc.

#### **i) Missing Data:**

This situation arises when some data is missing in the data. It can be handled in various ways.

**Some of them are:**

##### **(a) Ignore the tuples:**

1. This approach is suitable only when the dataset we have is quite large and multiple values are missing within a tuple.

##### **(b) Fill in the Missing values:**

1. There are various ways to do this task. You can choose to fill the missing values manually, by attribute mean or the most probable value.

#### **ii) Noisy Data:**

Noisy data is meaningless data that can't be interpreted by machines. It can be generated due to faulty data collection, data entry errors etc.

**Data Transformation:**

Data transformation is the process of converting data from one format to another, typically from the format of a source system into the required format of a destination system. Data transformation is a component of most data integration and data management tasks, such as data wrangling and data warehousing.

**Data Analysis:**

Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. According to Shammo and Resnik (2003) various analytic procedures “provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data”.

**Data visualization: -**

Data visualization is a graphical representation of quantitative information and data by using visual elements like graphs, charts, and maps.

Data visualization converts large and small data sets into visuals, which are easy to understand and process for humans.

Data visualization tools provide accessible ways to understand outliers, patterns, and trends in the data. In the world of Big Data, data visualization tools and technologies are required to analyze vast amounts of information.

Data visualizations are common in your everyday life, but they always appear in the form of graphs and charts. The combination of multiple visualizations and bits of information is still referred to as Infographics.

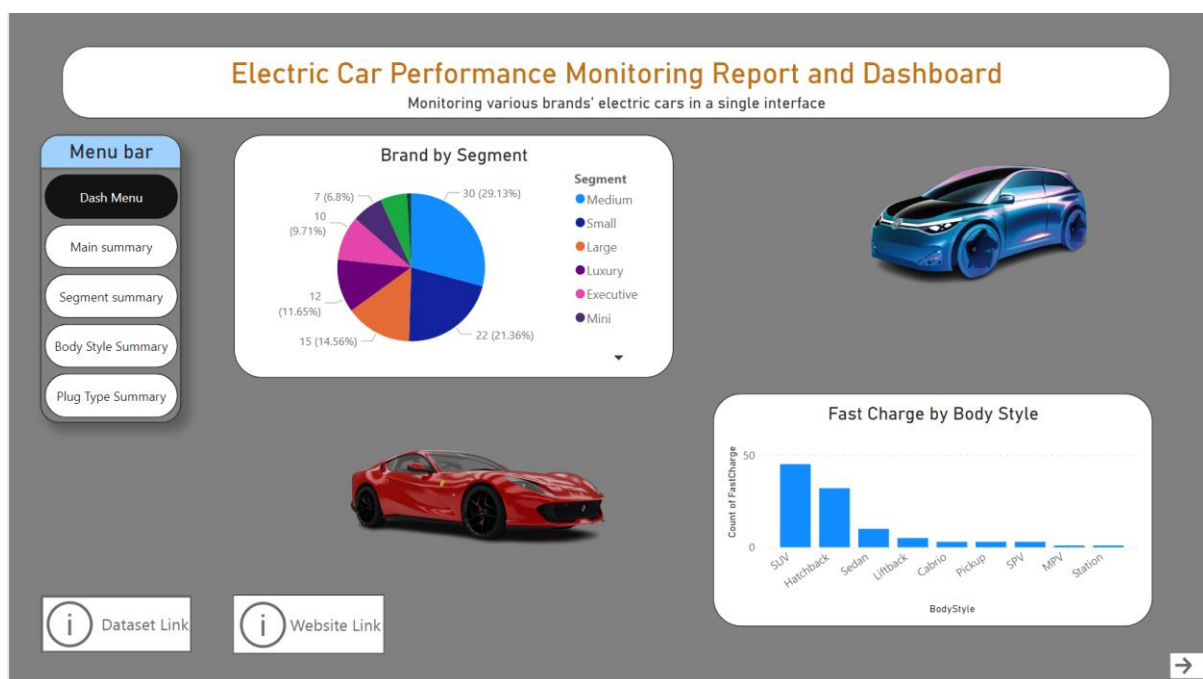
Data visualizations are used to discover unknown facts and trends. You can see visualizations in the form of line charts to display change over time. Bar and column charts are useful for observing relationships and making comparisons. A pie chart is a great way to show parts of a whole. And maps are the best way to share geographical data visually.

Today's data visualization tools go beyond the charts and graphs used in the Microsoft Excel spreadsheet, which displays the data in more sophisticated ways such as dials and gauges, geographic maps, heat maps, pie chart, and fever chart.

## 7. MODULE BUILDING

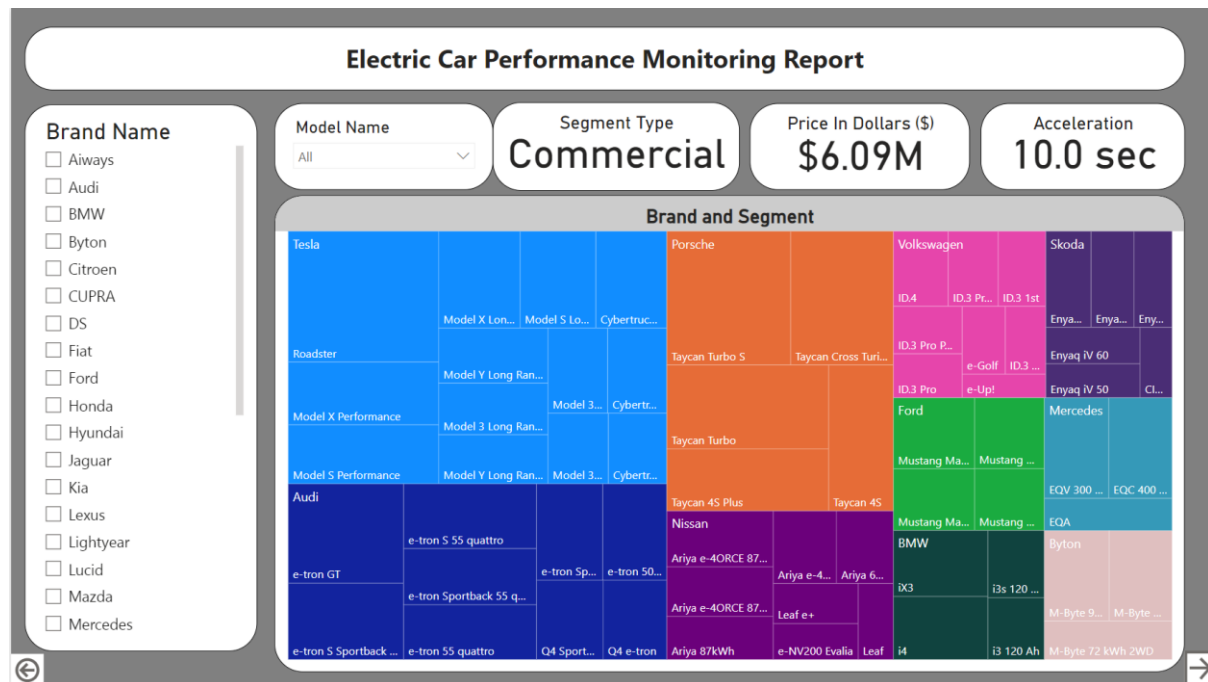
Building visuals and analysis in the Power BI tool is the main module. Data visualization brings data to life, making you the master storyteller of the insights hidden within your numbers. Through live data dashboards, interactive reports, charts, graphs, and other visual representations, data visualization helps users develop powerful business insights quickly and effectively. Building the report and dashboard based on the cars' features are separately done here.

### Dash menu:



Dash menu consists of the title, menu bar, sample visuals from like pie chart for market segments and bar chart for cars' body style. Also, the dataset and website link has given for reference. The menu bar is used to navigate the pages for the entire report from the starting page. The menu buttons are the dash menu, main summary, segment summary, body style summary, and plug type summary. All key features are analyzed in this report.

## Main summary:



The main summary page is built with the title of the report, Brand name in a vertical list at the top left corner, model name in a drop-down, market segment type, Price in dollars, and car acceleration in a card. Then there is a tree map to show the key features of the selected car. This treemap is an important feature for comparing the features of another brand's car. Knowing the car's performance based on the key features presented in the tree map helps to understand the importance of the feature.

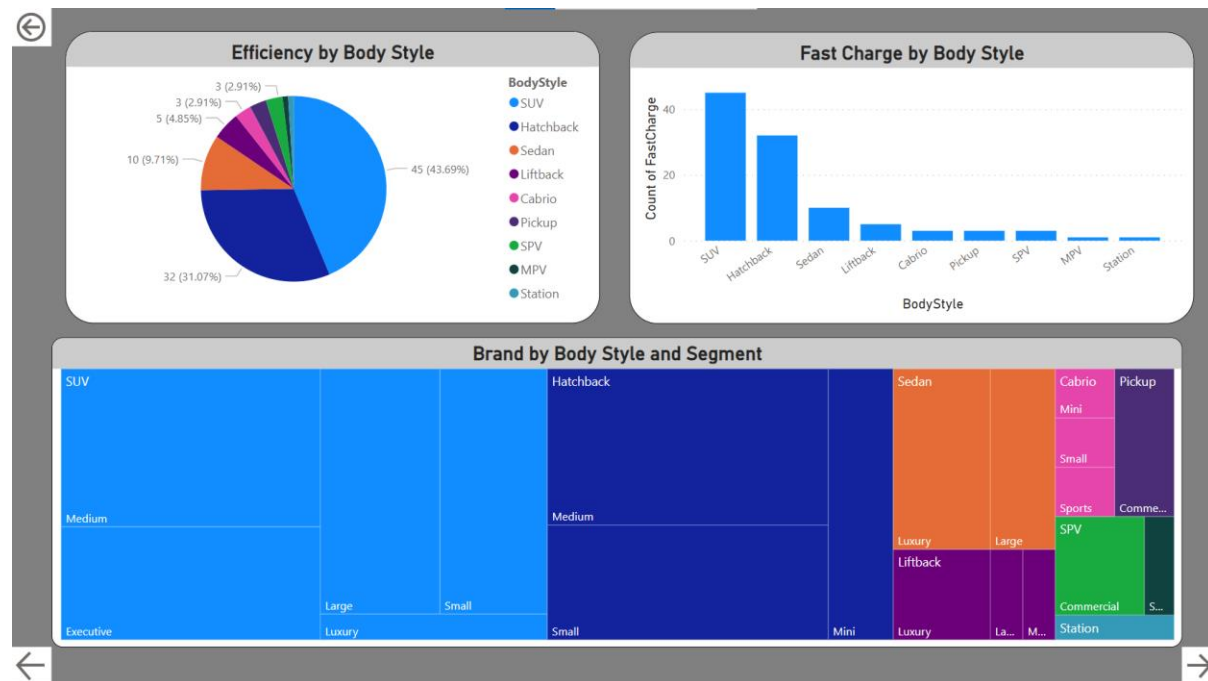
## Market Segment Summary:



The market segment page is built with the brand by segment, efficiency by segment, brand by segment and power train by segment. These features are presented in the pie chart, bar chart, clustered bar chart and area chart respectively. The clustered bar chart and area chart show the brand and power train based on the brand and the market segment type.

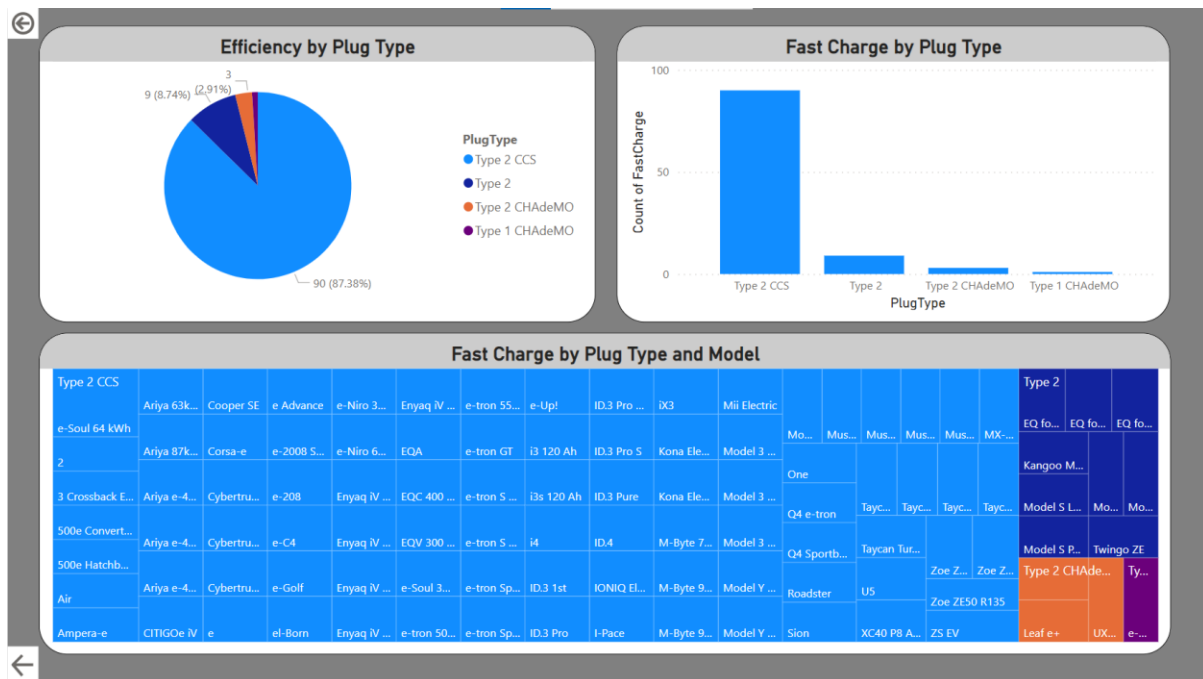


## Body Style Summary:



The body style summary consists of efficiency, fast charge by body style and, brand by body style and market segment type. The pie chart, bar chart and tree map for the respective features. Legend in the pie chart explains all body styles of the different cars and their market availability in percentage (%). The count of the body style is shown in the bar chart with respective categories based on the fast charge feature.

## Plug Type Summary:



Plug-type summary page built with a pie chart, bar chart and a tree map with categories of efficiency, fast charge and model based on plug type. The legend in the pie chart shows the major type plug port cars. The count of major plug types showed in the bar chart. Based on plug type, the models of specific brands are shown in the treemap in detail.

## **8. CONCLUSION**

We have created a detailed interactive report for all existing features with all interactive visuals like bar charts, pie charts, clustered column charts, area charts, slicers, cards, and tree maps. This detailed report shows the detailed performance of key features in the dataset. These 33 Brands and their 103 models of cars have been analyzed in this detailed report.

## 9. REFERENCES

1. Data set link: [https://www.kaggle.com/datasets/geoffnel/evs-one-electric-vehicle-dataset?select=ElectricCarData\\_Norm.csv](https://www.kaggle.com/datasets/geoffnel/evs-one-electric-vehicle-dataset?select=ElectricCarData_Norm.csv)
2. Website link: [URL](#) 
3. Power BI Documentation: [link](#) 