Using EDA Technique to analyze sales of Electric Vehicles

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***Abstract*— Electric vehicles are dominating themarket with respect to other vehicles. The demand for Electric Vehicles is rapidly Increasing across different countries, so many companies are investing money to manufacture Electric vehicles. By the end of the year 2040, all vehicles across the world will be electric. The main aim of this paper by using an Exploratory Data Analysis to analyze sales data of Electric vehicles in India and the data of other countries. By using this technique to study and analyze the data and make conclusions from the data.**

Index Terms*— *Electric Vehicles, Exploratory data analysis (EDA)

I. Introduction

An electrical Vehicle is a vehicle that uses electric energy to run engines for propulsion. Electric Vehicles use batteries for storing electricity, whereas EVs (Electric Vehicles) can be on roads, in rail vehicles, and surface underwater vessels, in aircraft. EVs (Electric Vehicles) use the autonomous driving system and emerging automotive technologies for the future mobility vision[1]. Gasoline, petrol, and diesel vehicles release pollutants into the air are carbon monoxide, Hydro carbons, Nitrogen oxides, and Sulphur dioxide. Whereas EVs (Electric Vehicles) are not releasing tailpipe air pollutants.

The carbon emission-producing EVs (Electric Vehicles) are typically less produced by conventional vehicles[2]. For manufacturing an electric vehicle cost is less when compared with conventional vehicles. According to the statistics of 2021, the cost of Electric vehicles increasing depending on the locations. The high use of electric vehicles led to a decrease in the use of conventional vehicles and it leads to a decrease o in Air pollution in the atmosphere. This paper aims to analyze the trends in electric vehicle sales by using Exploratory data analysis (EDA) to explore the data it is used to make conclusions from it.

II. Data Analysis

The sales of Electric Vehicles are increasing in different countries. By using Exploratory Data Analysis (EDA) on datasets, the data is collected from different sources such as Wikipedia[3]. This data was used to analyze the trend of sales of Electric Vehicles across different countries. The dataset using the Exploratory Data Analysis technique undergoes normalization, choosing essential columns using filtering, deriving new columns, and visualizing the data in the graphical format. This paper

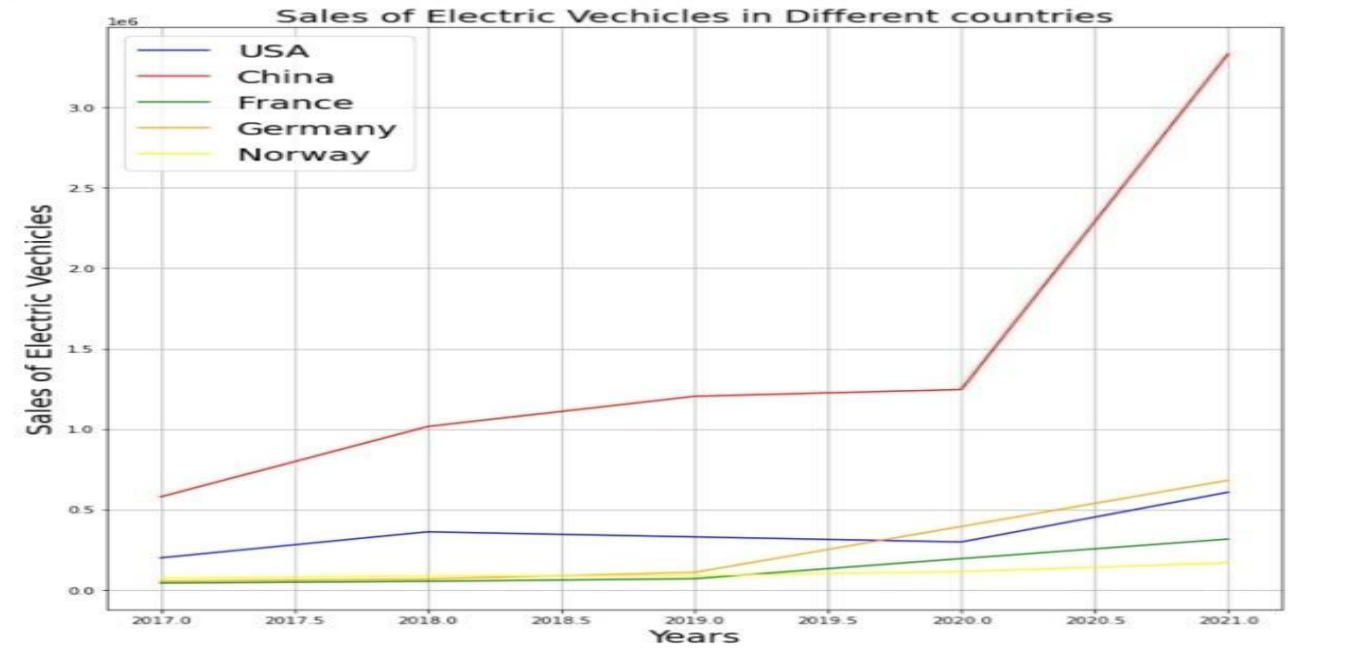

Figure 1: Sales of Electric Vehicles in Different Countries

used "Python" for "data processing" "web scraping", "and pandas" library to process and extract information from the available dataset. Appropriate graphs were created for better visualization are the results of "Matplotlib" and "Seaborn" libraries of Python.

From the figure-1, the X-axis represents the years of the Different countries and Y-axis represents the no of Electric Vehicles are sales in Different countries, in the graph, the red line indicates "China", where the blue indicates "USA" and the Green, Pink, Yellow indicates the "France", "Germany" and "Norway". Inference from Figure 1 as follows:

- China has huge sales of Electric Vehicles from 2017 to 2021, In 2017 the sales of electric vehicles in China were 579000 sales of electric vehicles by the end of 2021 China recorded 3334000 sales of electric vehicles.
- The USA has low sales of Electric Vehicles as compared with China, the USA recorded 18 by the end of 2021, and the USA recorded 607567 sales of electric vehicles.
- France, Germany, and Norway have almost the same no of sales of electric vehicles recorded, by the beginning of 2017 approximately 42779 were recorded in sales of electric vehicles, but by the end of 2021, Germany has recorded 681410 sales of electric vehicles.

III. Country-wise Analysis

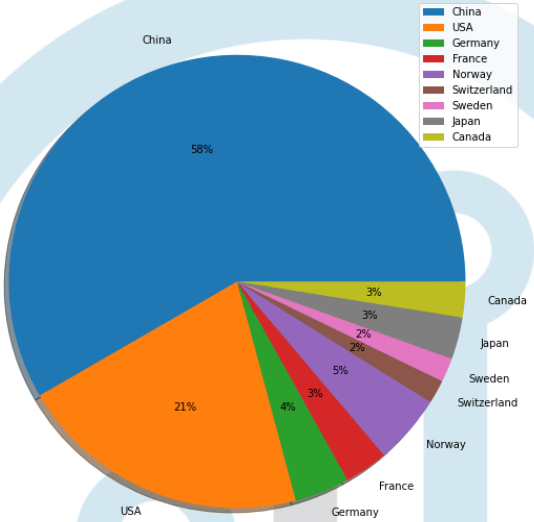

Figure 2a: Percentage criteria of sales of Electric vehicles in different countries in the year of 2017

Inference from Figure 2a is as follows:

- The pie chart analyzes the percentage criteria of different countries of electric vehicles in the year 2017.
- 'Blue' color indicates China, China has 58% off as compared with other countries.
- China has recorded a huge no of sales of electric vehicles as compared with the USA.
- 'Orange' color indicates the USA, the USA, has 21% off as compared with China, the USA is the second highest no of sales recorded in electric vehicles.
- As the 'Green' and 'Violet' indicates Germany, and Norway of these two countries has 4%, and 5% sales of electric vehicles sales in 2017.
- The remaining countries have less percentage of sales as compared with other countries.

Inference from Figure 2b is as follows:

- The pie chart analyzes the percentage criteria of different countries of sales of electric vehicles in the year 2021.
- As we compared with statistics of 2017, China has recorded 61% sales of electric vehicles, in 2017 the sales were 58%, In gradually China increased sales up to 3%.
- In where USA has decreased sales up to 10% from when we compared with 2017 to 2021 statistics.
- Where the USA recorded 11% of sales of electric vehicles in the year 2021.
- Germany increased sales up to 8% sales of electric vehicles from the year of 2017 to 2021.
- France increased sales up to 3% sales of electric vehicles from the year of 2017 to 2021.
- The remaining countries have decreased and have constant sales of electric vehicles from the year 2017 to 2021.

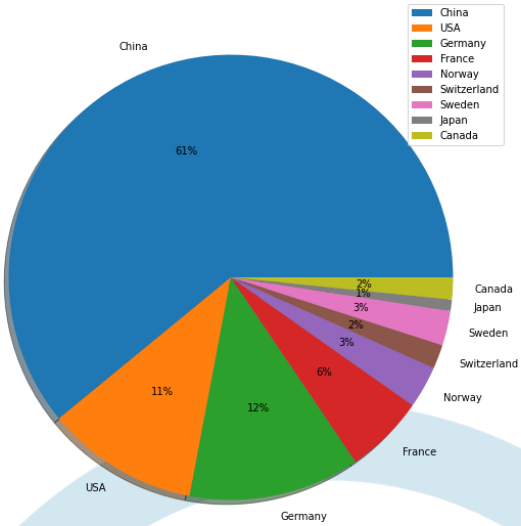

Figure 2b: Percentage criteria of sales of Electric vehicles in different countries in the year of 2021

IV. YEAR-WISE ANALYSIS

China:

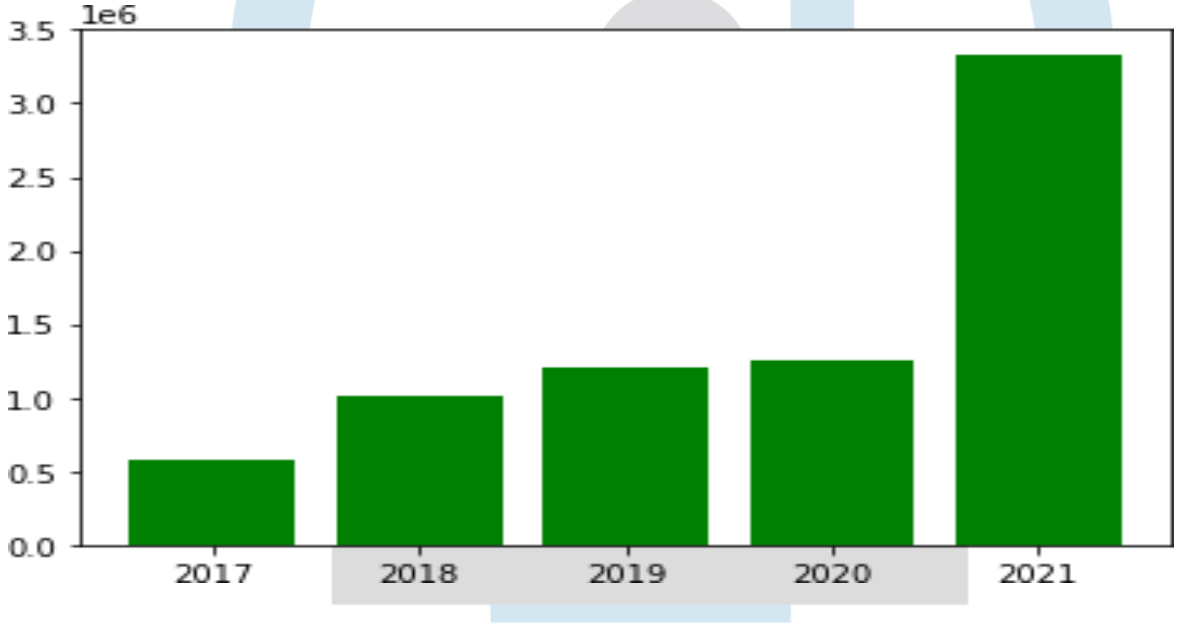

Figure 2c: Sales of Electric vehicles in China from the year of 2017-2021

Inference from the Figure 2c is follows:

- China recorded 579000 sales of electric vehicles in the Year of 2017
- By the end of 2019 the sales of electric vehicles have increased up to 5%
- In 2021 China recorded 3334000 sales of electric vehicles while compared with 2020, In 2021 the sales increased up to 11%

USA:

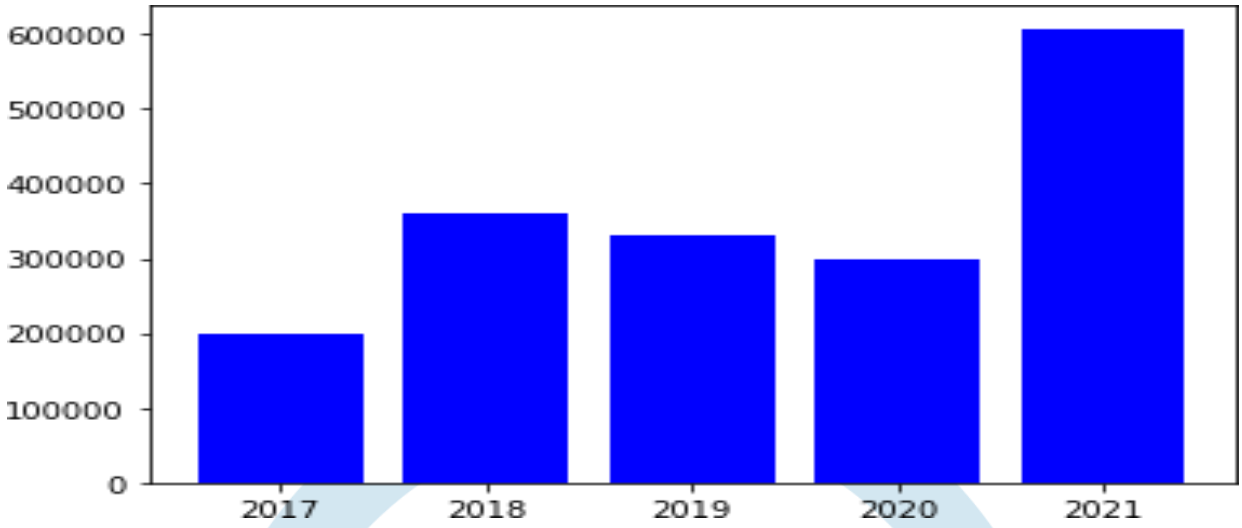

Figure 2d: Sales of Electric Vehicles in USA from 2017-2021

Inference from the Figure 2d is follow as:

- Where the sales of electric vehicles are 199818 sales is recorded in the USA in the year 2017
- In 2018 the sales of electric vehicles increased up to 36 thousand sales recorded in the USA
- By the end of 2021 the sales of electric vehicles are recorded up to 600000 In the USA

V. CONCLUSION

The main aim of this paper is to study and analyze the trends of sales of Electric vehicles in different countries, In this paper, we observe that analysis of Different country's sales of electric vehicles in the form of overall data analysis, Country-wise analysis, and Year-wise analysis, from his analysis, we can understand which countries have increased the sales of electric vehicles from past 5 years onwards and we make conclusions from this data

REFERENCES

[1] Hamid,UmarZakir Abdul (2022). "Autonomous, Connected, Electric and Shared Vehicles: Disrupting the Automotive and Mobility Sectors". Retrieved 11 November 2022.

[2] Maruan Al-Shedivat and Ankur P. Parikh. 2019. Con- sistency by agreement in zero-shot neural machine translation. *CoRR*, abs/1904.02338.

[3] https://en.wikipedia.org/wiki/Electric_car_use_by_country#cite_note-ChinaNEV2021-72