Analysis of Global Electric Vehicle Adoption Trends

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GitHub Repository: https://github.com/callmeowaiso/Applied-Data-Science-1.git

Introduction:

Over the last ten years, electric vehicle adoption has increased dramatically as countries work hard to lower greenhouse gas emissions by pivoting to sustainable transport modes. The report has comprehensively looked at the trend in global EVs' adoption between 2010 and 2035 based on key parameters like the stock of EVs, sales, charging infrastructure, and market shares. This analysis will try to show trends, find relationships, and even disparities of EV adoption on a regional level, using visualizations such as line charts, bar charts, heatmaps, and box plots. Other statistical measures, including kurtosis, skewness, and correlation, provide added richness in understanding the data for the underlying dynamics which shape the EV market.

Statistical Insights:

1. **Descriptive Statistics:** From the summary statistics, there is a huge variation in the mean and standard deviation values for the stock of EVs, sales, among other parameters, across the regions. A high mean and standard deviation for the stock of EVs clearly indicates the variation in regional adoption rates.
2. **Analysis of Correlation:** It can be seen from the correlation matrix that most of the parameters involved are very highly positively correlated. That is to say, the growth in electric vehicle sales should go hand in hand with the development of charging infrastructure.
3. **Kurtosis and Skewness**: Kurtosis values record heavy-tailed distributions for several parameters, hence proving the existence of extreme values in EV sales and stock. The values of skewness confirm that the data is right-skewed, which represents low EV adoption rates for most of the regions, while just a few are experiencing extremely high growth.

Line Chart Analysis:

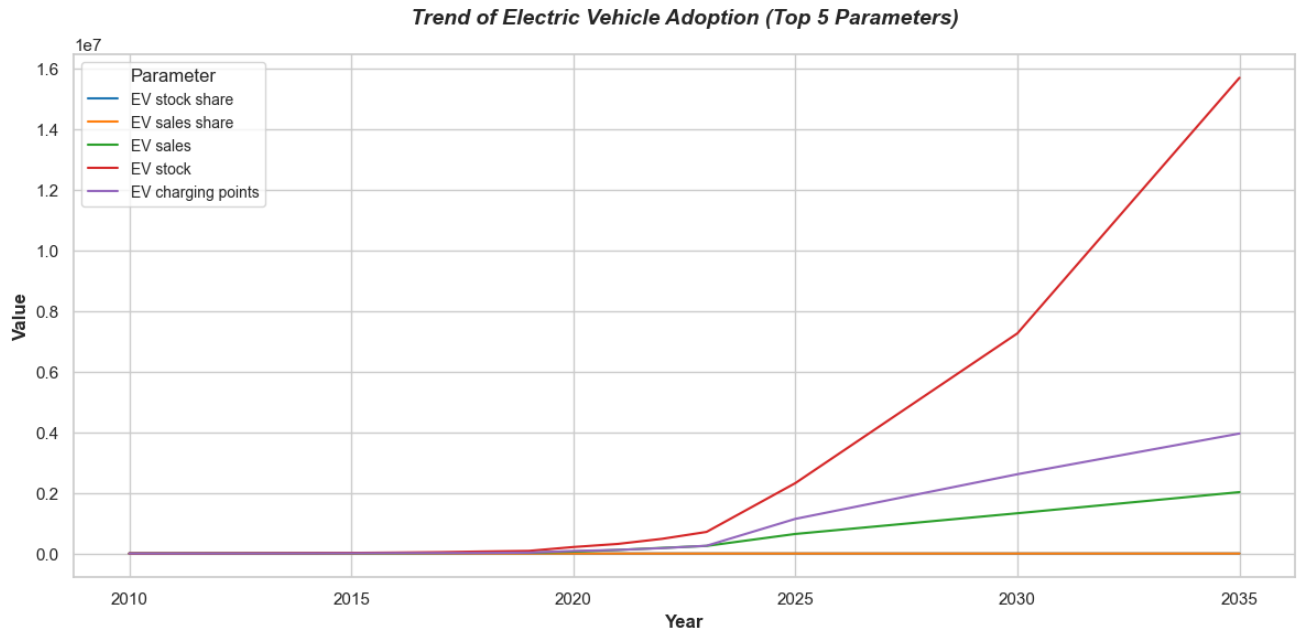

Figure 1 Trend of electric vehicles adoption

The line chart presents the trend of electric vehicle adoption over the years, focusing on the top 5 parameters. These parameters include **EV stock**, **EV sales**, **charging points**, and **EV sales/share**. The trend shows a sharp increase in the adoption of electric vehicles starting in 2025, reflecting advancements in technology and increased government support. The parameter **EV stock** exhibits the highest growth, indicating an expanding fleet of electric vehicles globally.

Bar Chart Analysis:

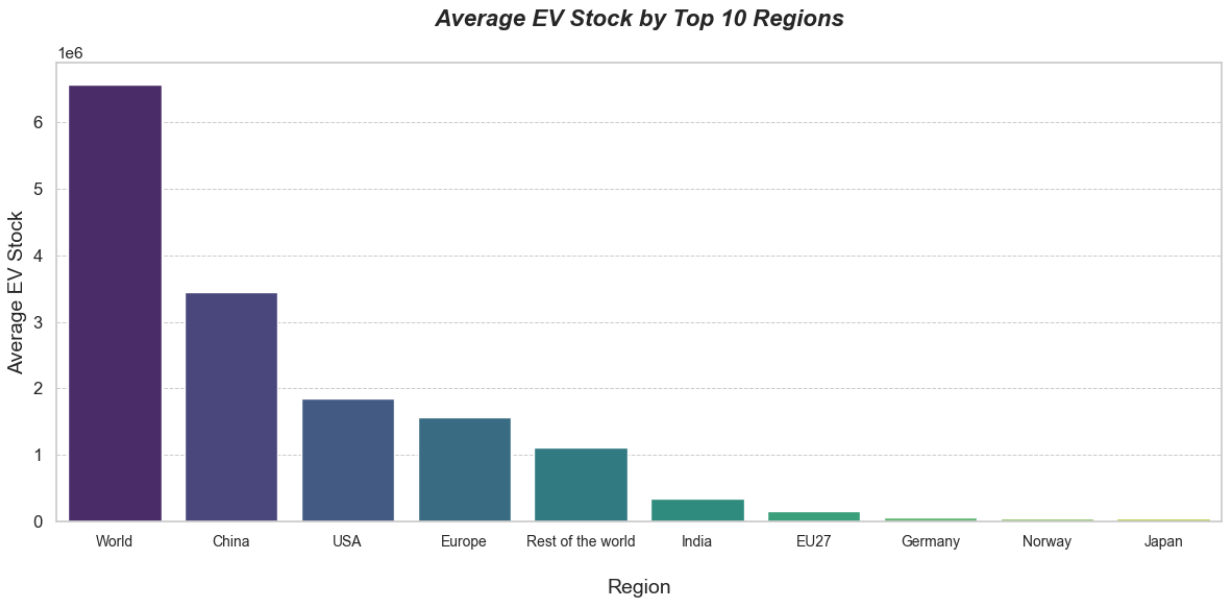

Figure 2 Top regions average stock

The bar chart illustrates the average EV stock by region for the top 10 regions. The analysis reveals that **China,** and the **USA** are leading in EV adoption, followed by **Europe**. The **World** category aggregates data from all regions, showing the global trend in electric vehicle adoption. The average EV stock is notably high in these regions due to favorable policies, subsidies, and technological infrastructure, which encourage EV usage.

Heatmap Analysis:

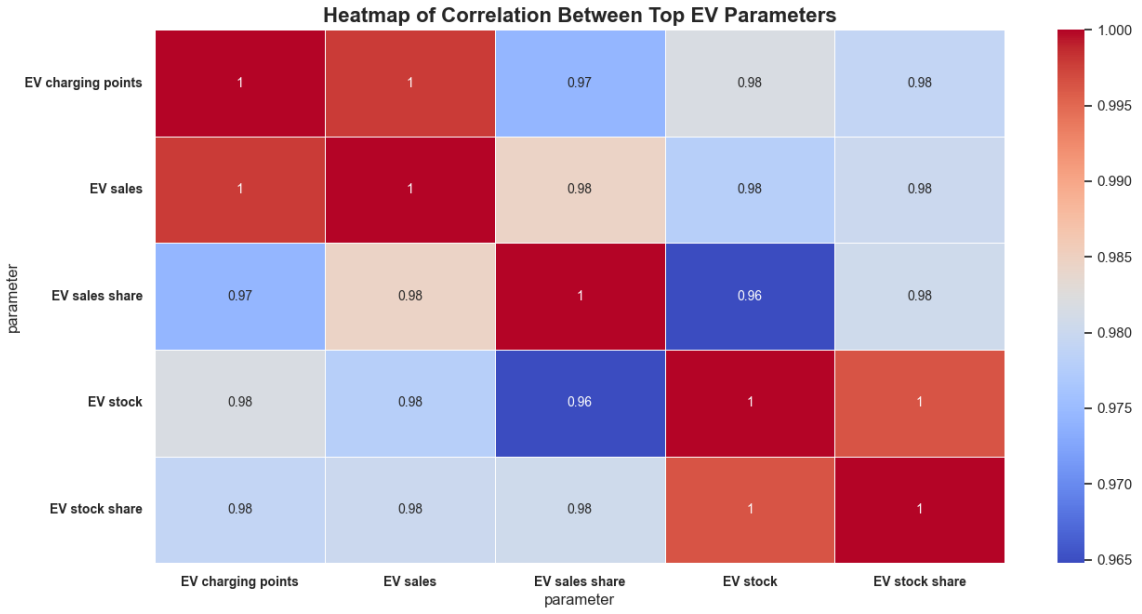

Figure 3 Correlation between top EV parameters by Heatmap

The heatmap provides insights into the correlation between different EV parameters, such as **EV charging points**, **EV sales**, **EV stock**, and **EV stock share**. The correlation analysis shows a very strong positive correlation (close to 1) between parameters like **EV sales** and **charging points**, indicating that as sales increase, infrastructure is expanded accordingly. This highlights the interdependent relationship between vehicle adoption and the need for supporting infrastructure.

Conclusion: The analysis of global EV adoption trends from 2010 to 2035 demonstrates significant growth in electric vehicle stock, sales, and supporting infrastructure, particularly in leading regions like China, the USA, and Europe. The visualizations and statistical analysis highlight the strong interdependence between vehicle adoption and charging infrastructure, as well as the uneven distribution of EV adoption across different regions. Continued investment in both electric vehicles and charging infrastructure will be critical to achieving a sustainable transportation future.