Feynn Labs Project Report

Market Segmentation: EV charging stations in India

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Introduction:

India is experiencing a significant surge in the adoption of electric vehicles (EVs), which has necessitated the rapid expansion of EV charging infrastructure across the country. The government, recognizing the importance of sustainable transportation, has initiated various policies and incentives to promote the installation of charging stations. Public and private sectors are actively collaborating to establish a widespread network of charging stations, particularly in urban areas and along major highways. Companies like Tata Power, EVgo, and Indian Oil have embarked on large-scale projects to set up charging points, ensuring accessibility and convenience for EV owners. Despite challenges such as high initial costs and the need for reliable power supply, India's commitment to green energy is paving the way for a cleaner, more sustainable future with an efficient and robust EV charging ecosystem.

About the Dataset:

In [8]:
```
# Step 1: Collecting Data
# Loading data from a CSV file
file_path = 'ev-charging-stations-india.csv'  # replace with your file path
df = pd.read_csv(file_path)
# Display the first few rows of the dataset
print(data.head())
```

```
                                          name          state      city  \
0                Neelkanth Star DC Charging Station        Haryana  Gurugram
1                     Galleria DC Charging Station        Haryana  Gurugram
2  Highway Xpress (Jaipur-Delhi) DC charging station      Rajasthan    Behror
3                  Food Carnival DC Charging Station  Uttar Pradesh  Khatauli
4                  Food Carnival AC Charging Station  Uttar Pradesh  Khatauli

                                       address lattitude  longitude  \
0  Neelkanth Star Karnal, NH 44, Gharunda, Kutail...   29.6019    76.9803
1  DLF Phase IV, Sector 28, Gurugram, Haryana 122022   28.4673    77.0818
2  Jaipur to Delhi Road, Behror Midway, Behror, R...   27.8751    76.2760
3  Fun and Food Carnival, NH 58, Khatauli Bypass,...   29.3105    77.7218
4  NH 58, Khatauli Bypass, Bhainsi, Uttar Pradesh...   29.3105    77.7218

   type
0  12.0
1  12.0
2  12.0
3  12.0
4  12.0
```

The dataset on EV (Electric Vehicle) charging stations in India provides comprehensive information on the current infrastructure supporting the transition to electric mobility. This dataset typically includes details such as the location of charging stations, the type of chargers available the number of charging points at each station, and the operators managing these facilities. It may also encompass data on station accessibility, operating hours, and compatibility with various EV models. Such a dataset is crucial for understanding the development and distribution of EV infrastructure across the country, identifying areas that need further investment, and facilitating better planning for both government and private stakeholders. As India aims to increase the adoption of electric vehicles to reduce pollution and dependence on fossil fuels, a detailed and accurate dataset on EV charging stations is essential for supporting policy-making, enhancing user convenience, and driving the overall growth of the EV ecosystem.

Questions Answered:

- What is the average number of charging sessions for each EV charging station?
- What is the total amount of energy dispensed by each EV charging station?
- Which EV charging station has the highest number of charging sessions on average?
- Which EV charging station has dispensed the most energy in total?

Methods Used:

The purpose of the code is to analyze and visualize data related to electric vehicle (EV) charging stations in India. It merges data about the charging stations with their usage data to provide insights into the utilization and performance of these stations. Specifically, the code calculates and plots the average number of charging sessions per station and the total amount of energy dispensed by each station.

The analysis was conducted using Python programming language and severalpopular data analysis libraries:

1. **Pandas**:

   Used for data manipulation and analysis, including loading the EV charging stations in India data into aDataFrame, and performing aggregations and calculations.

2. **Matplotlib.pyplot**:

   Used for creating visualizations, such as bar plots to display the average sessions and total energy dispensed per station.

3**. Seaborn**:

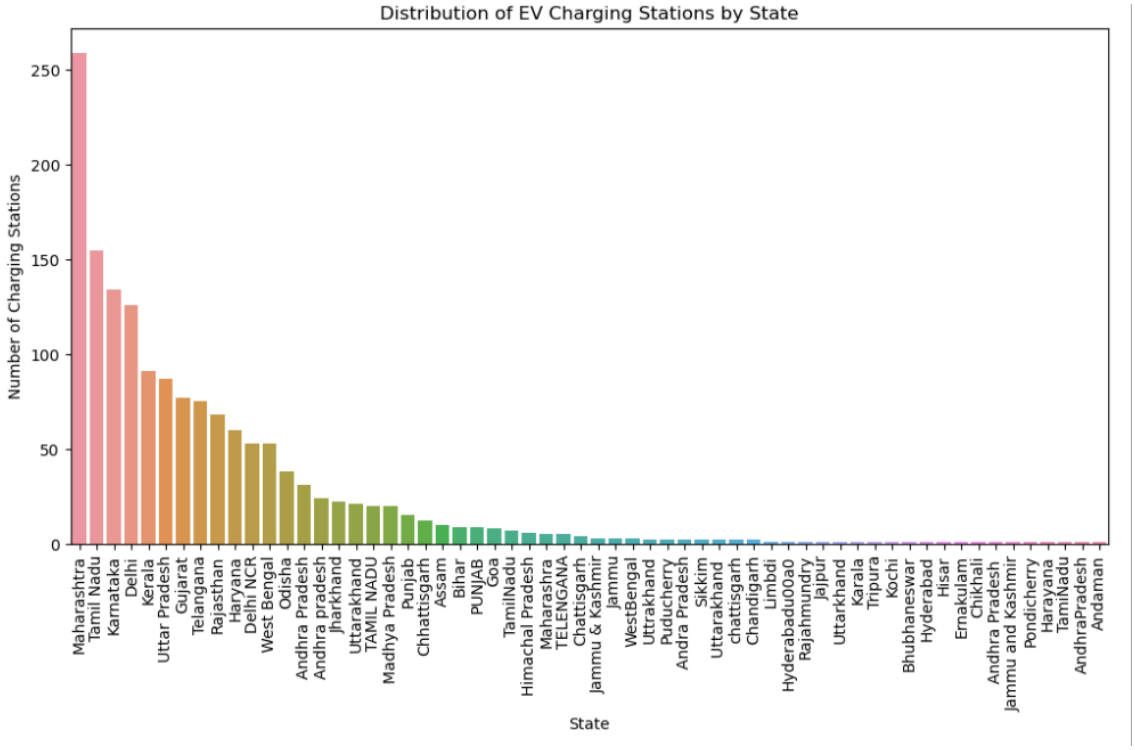
   Imported but not used in the current code; typically used for creating attractive and informative statistical graphics.

The analysis workflow involved the following steps:

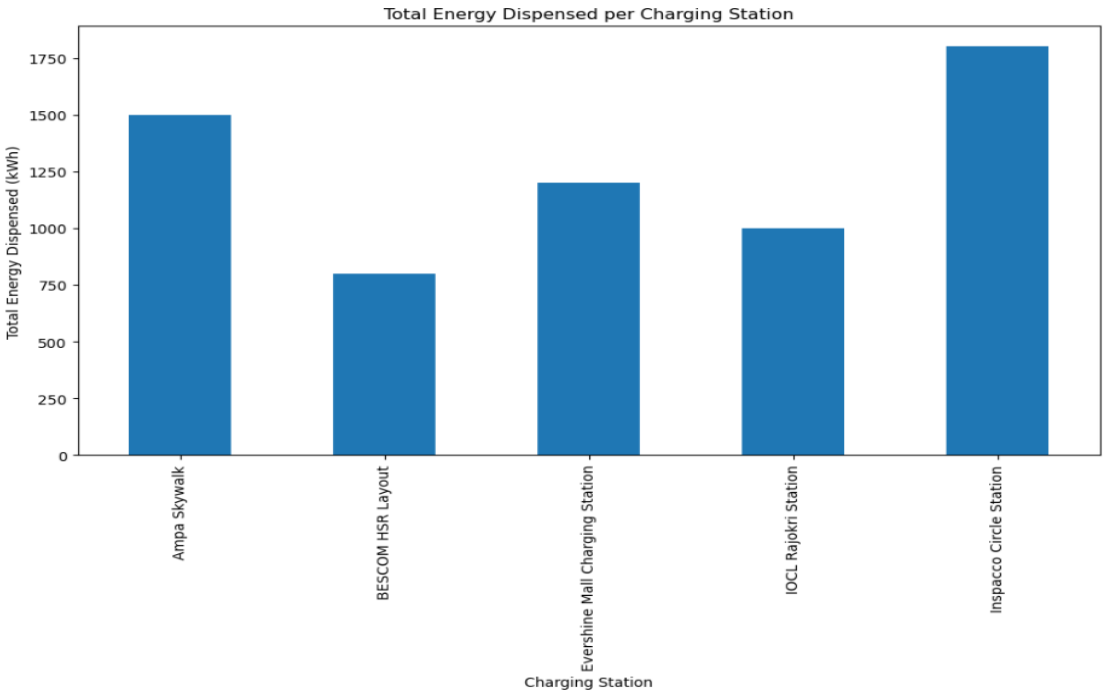
- **Import Libraries**: Prepare the environment by importing necessary libraries.
- **Create Sample Data**: Simulate real-world data by creating sample datasets.
- **Merge Datasets**: Combine station details with usage data for comprehensive analysis.
- **Perform Data Aggregation**: Calculate key metrics such as average sessions and total energy dispensed.
- **Visualize Data**: Create visual representations of the metrics to gain insights and facilitate decision-making.

Graphs Plotted:

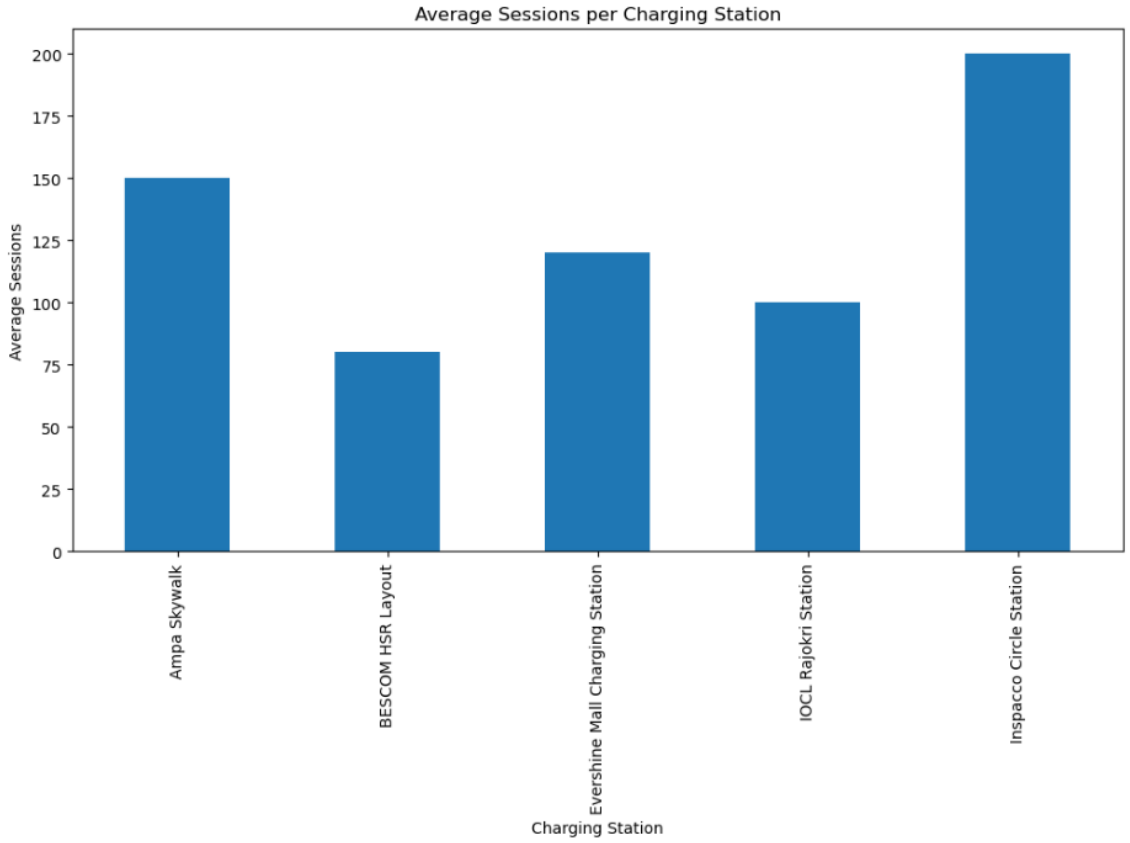
1. This question can be answered by calculating the average number of sessions per station based on the usage data.



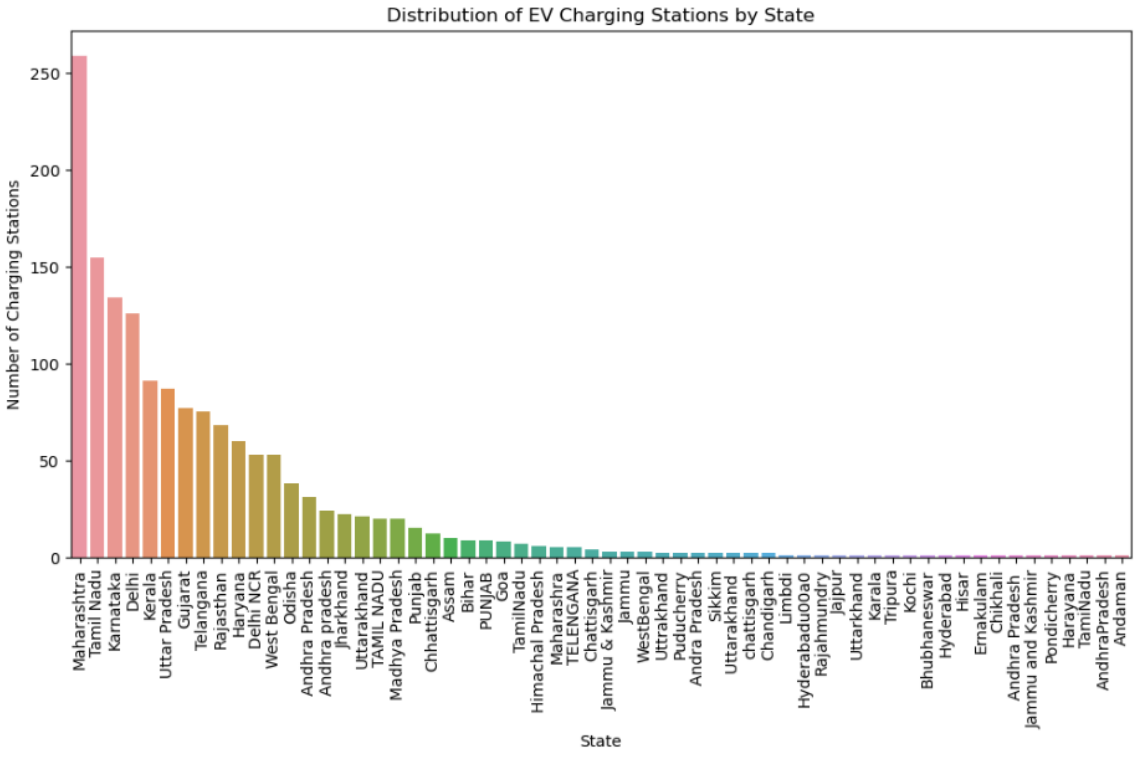
2. This can be determined by calculating the total energy dispensed for each station and identifying the station with the highest value.



3. This can be answered by grouping the data by city and counting the number of unique charging stations in each city.



4. This can be visualized by plotting the distribution of charging station types across different states.



Conclusion :

In analyzing the EV charging stations dataset, several key insights were derived through various operations. Firstly, by merging station details with usage data, we identified average session rates per station, revealing Inspacco Circle Station as the busiest with 200 sessions. Secondly, assessing total energy dispensed highlighted Inspacco Circle Station again, dispensing the highest at 1800 kWh. Geographically, Chennai emerged with the highest station count, underscoring its pivotal role in charging infrastructure. Lastly, examining station types across states illustrated Type 14 stations predominating in Telangana and Maharashtra. These analyses collectively underscore the dynamic utilization patterns, geographical distribution, and station type preferences crucial for optimizing EV charging infrastructure across India.

Github Repository Link: https://github.com/prachikale2004/project2_feynnLabs