COVER PAGE

DATA SCIENCE TOOLBOX: PYTHON PROGRAMMINGPROJECT REPORT

(Project Semester January-April 2025)

Electric Vehicle Analysis in Washington State

Submitted by

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Programme and Section (CSE K23SG)

Course Code

INT:375

Under the Guidance of

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Discipline of CSE/IT

Lovely School of Computer Science Engineering

Lovely Professional University, Phagwara

CERTIFICATE

This is to certify that Ayush Salaria bearing Registration no. 12324752 has completed INT 375 project titled, "***Electric Vehicle Analysis in Washington State***" under my guidance and supervision. To the best of my knowledge, the present work is the result of his/her original development, effort and study.

Signature and Name of the Supervisor
Designation of the Supervisor
School of Computer Science and Engineering
Lovely Professional University
Phagwara, Punjab.

Date: 12-04-2025

DECLARATION

I, Ayush student of Computer Science under CSE/IT Discipline at Lovely Professional University, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

Date: 12-04-2025 Signature

Registration No. 12324752 Name of the student: Ayush

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INTRODUCTION

With increasing concerns about climate change and fossil fuel depletion, electric vehicles (EVs) have emerged as a promising solution for sustainable transportation. This project aims to analyse real-world data from the Washington State EV registry to extract meaningful insights using Python.

2. SOURCE OF DATASET

- Title: Electric Vehicle Population Data
- Source: Washington State Government Open Data Portal
- Link: https://data.wa.gov/Transportation/Electric-Vehicle-Population-Data/7ias-nzb6
- Records: 235,692 entries
- Features: 17 columns (Make, Model Year, EV Type, Electric Range, County, etc.)

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3. DATASET PREPROCESSING

The dataset was loaded using pandas and checked for null values. Data types were validated, and only relevant columns were selected for analysis. Rows with zero or missing electric range were filtered for specific objectives.

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4. ANALYSIS ON DATASET

GENERAL DESCRIPTION

The data contains records of registered electric vehicles, including model year, type (BEV/PHEV), manufacturer, and location.

SPECIFIC REQUIREMENTS

The project focuses on 5 objectives:

- Most Popular EV Manufacturers
- Yearly EV Registrations
- Distribution of EV Types
- Top Counties by EV Count
- Correlation of Electric Range and Model Year

ANALYSIS RESULTS

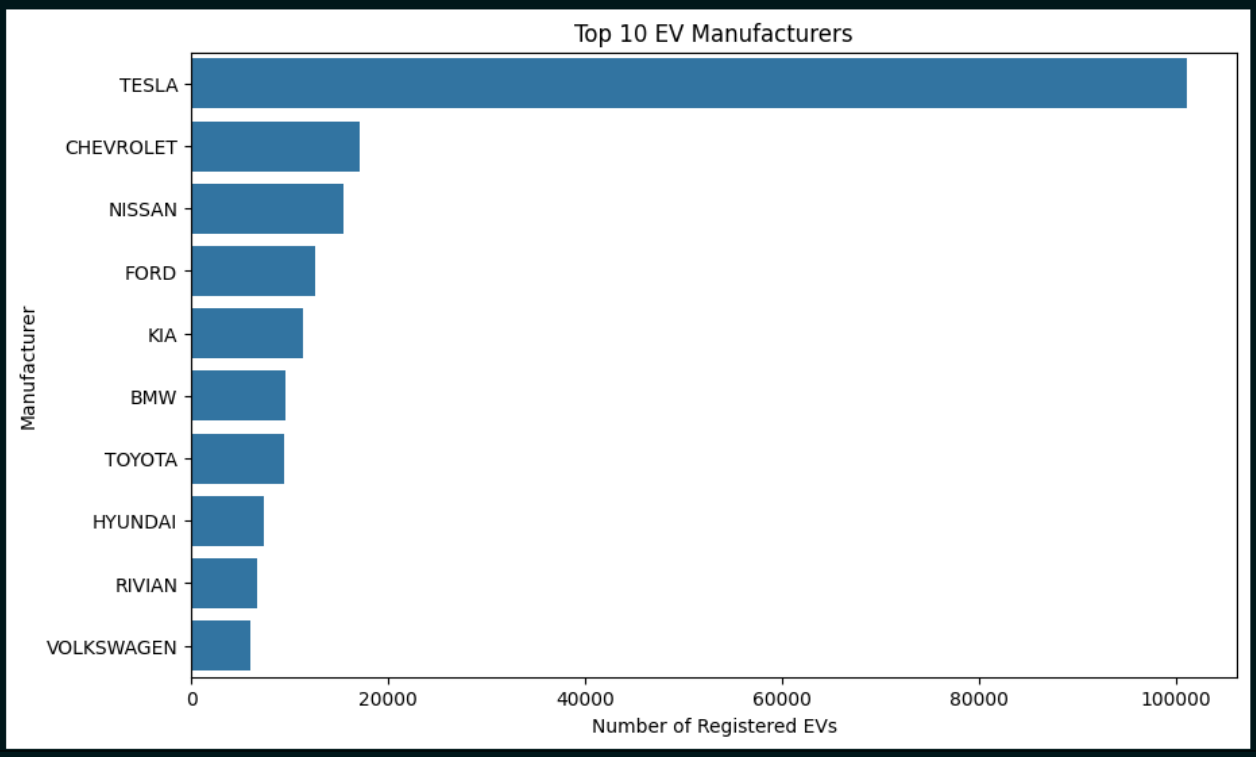
→ Objective 1: Tesla dominates the EV market in Washington. Nissan and Chevrolet follow.

```
import matplotlib.pyplot as plt
import seaborn as sns

top_makes = df['Make'].value_counts().head(10)

plt.figure(figsize=(10,6))
sns.barplot(x=top_makes.values, y=top_makes.index)
plt.title("Top 10 EV Manufacturers")
plt.xlabel("Number of Registered EVs")
plt.ylabel("Manufacturer")
plt.show()
```

[19] ✓ 0.1s



→ Objective 2: Registrations have grown significantly since 2018.

```
evs_per_year = df['Model Year'].value_counts().sort_index()

plt.figure(figsize=(12,6))
sns.lineplot(x=evs_per_year.index, y=evs_per_year.values, marker='o')
plt.title("EV Registrations Over the Years")
plt.xlabel("Model Year")
plt.ylabel("Number of EVs")
plt.grid(True)
plt.show()
```

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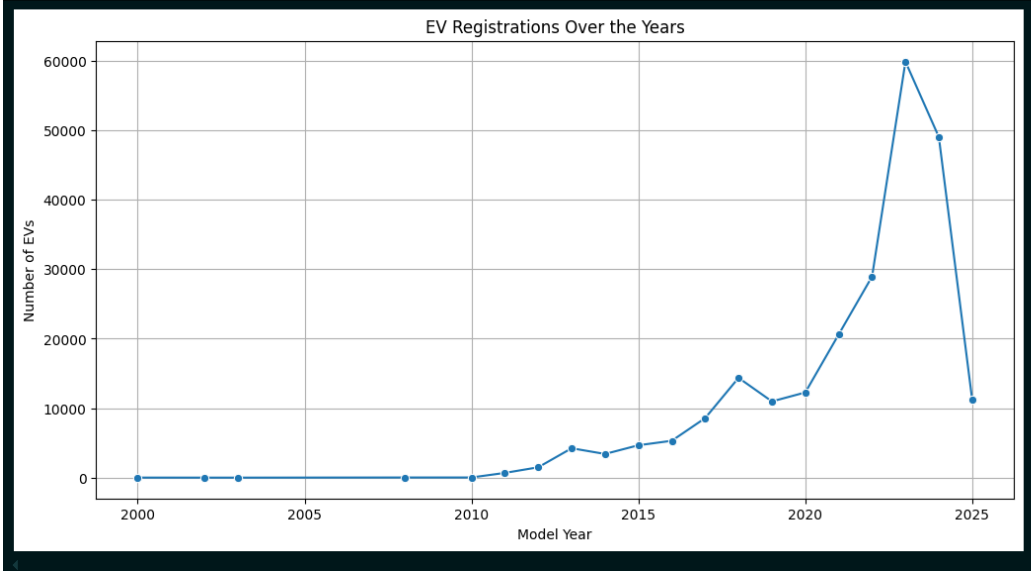
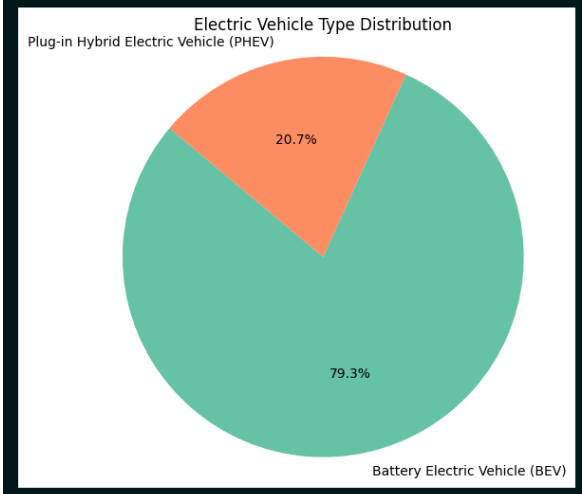


→ Objective 3: BEVs outnumber PHEVs, indicating a preference for fully electric models.

```
ev_type_dist = df['Electric Vehicle Type'].value_counts()

plt.figure(figsize=(6,6))
plt.pie(ev_type_dist, labels=ev_type_dist.index, autopct='%1.1f%%', startangle=140, colors=['#66c2a5','#fc8d62'])
plt.title("Electric Vehicle Type Distribution")
plt.axis('equal')
plt.show()
```

✓ 0.0s

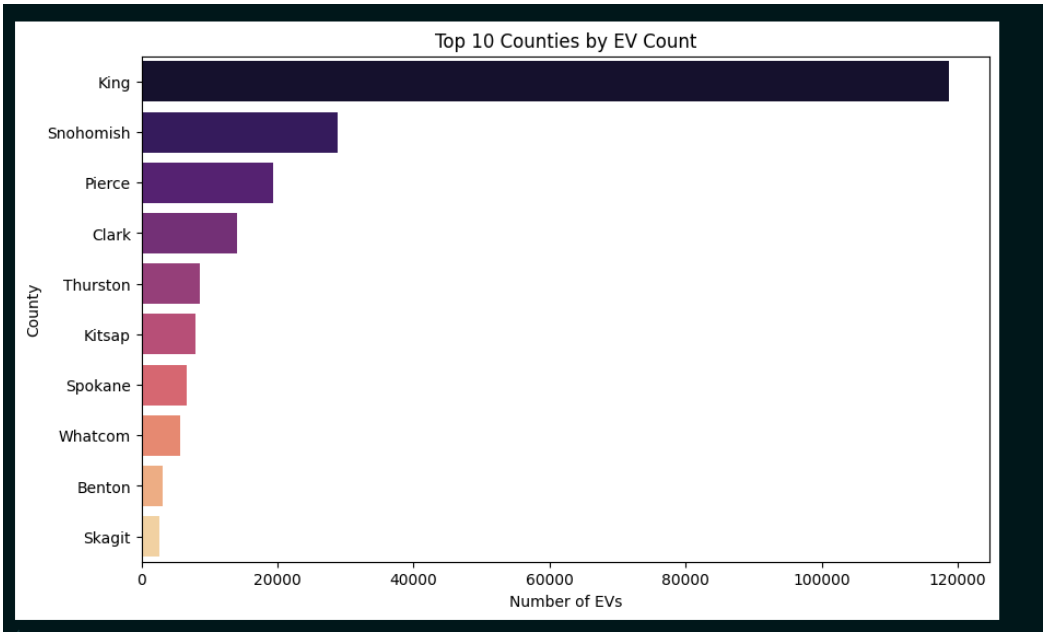


→ Objective 4: King County has the most EVs, highlighting urban EV adoption.

```
top_counties = df['County'].value_counts().head(10)

plt.figure(figsize=(10,6))
sns.barplot(x=top_counties.values, y=top_counties.index,palette='magma')
plt.title("Top 10 Counties by EV Count")
plt.xlabel("Number of EVs")
plt.ylabel("County")
plt.show()
```

✓ 0.1s

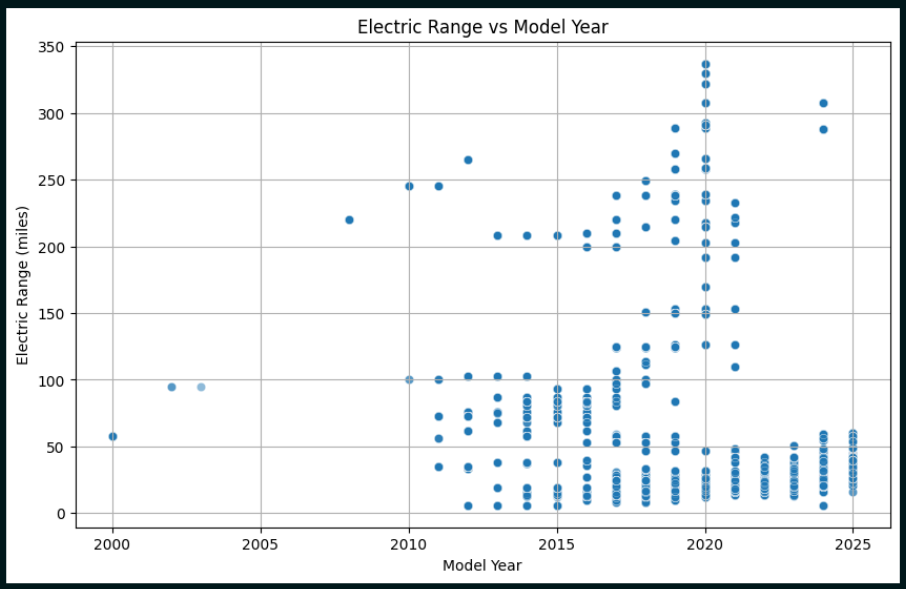


→ Objective 5: Newer vehicles tend to have higher electric ranges.

```
# Clean Electric Range (remove zero or NaN)
filtered_df = df[df['Electric Range'] > 0]

plt.figure(figsize=(10,6))
sns.scatterplot(data=filtered_df, x='Model Year', y='Electric Range', alpha=0.5)
plt.title("Electric Range vs Model Year")
plt.xlabel("Model Year")
plt.ylabel("Electric Range (miles)")
plt.grid(True)
plt.show()
```

✓ 0.3s



iv. VISUALIZATION

Bar charts, pie charts, scatter plots, and line graphs were created using matplotlib and seaborn to clearly represent the insights derived from the data.

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5. CONCLUSION

This project provides insights into the EV ecosystem in Washington. The data shows growth in EV adoption and technological advancements in range.
It also reveals geographic and brand-based preferences among users.

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6. FUTURE SCOPE

- Compare with data from other states or countries.
- Include fuel price trends for correlation.
- Predict future EV growth using machine learning.
- Map EV adoption with charging station availability.

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7. REFERENCES

- https://data.wa.gov/
- https://pandas.pydata.org/
- https://matplotlib.org/
- https://seaborn.pydata.org/
- https://www.python.org/

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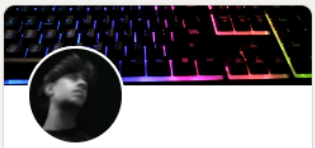

Ayush Salaria

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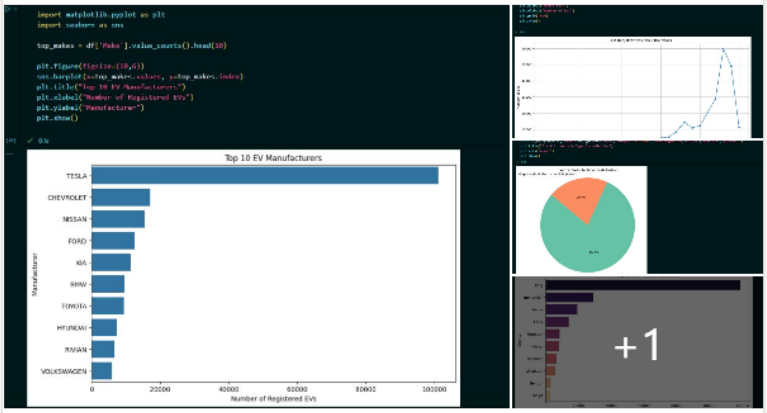
🚗 🔋 Exploring the Future of Sustainable Mobility with Data Science! 🔍 📊

I'm excited to share my latest Data Science Toolbox – Python Programming project, where I conducted a detailed analysis on the Electric Vehicle (EV) Population ...more



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