







Electric Vehicle Market Segmentation
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Python 3 (ipykernel)








Code

## Required Libraries

```

In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

In [2]: ev_data = pd.read_csv('data.csv')
ev_data

Out[2]:

```

	Unnamed: 0	Brand	Model	AccelSec	TopSpeed_KmH	Range_Km	Efficiency_WhKm	FastCharge_KmH	RapidCharge	PowerTrain	PlugType	Body
0	0	Tesla	Model 3 Long Range Dual Motor	4.6	233	450	161	940	Yes	AWD	Type 2 CCS	
1	1	Volkswagen	ID.3 Pure	10.0	160	270	167	250	No	RWD	Type 2 CCS	Hatchback
2	2	Polestar	2	4.7	210	400	181	620	Yes	AWD	Type 2 CCS	Liftback
3	3	BMW	iX3	6.8	180	360	206	560	Yes	RWD	Type 2 CCS	
4	4	Honda	e	9.5	145	170	168	190	Yes	RWD	Type 2 CCS	Hatchback
...	...	...	...	...	...	...	...	...	...	...	...	...
98	98	Nissan	Ariya 63kWh	7.5	160	330	191	440	Yes	FWD	Type 2 CCS	Hatchback
99	99	Audi	e-tron S Sportback 55 quattro	4.5	210	335	258	540	Yes	AWD	Type 2 CCS	
100	100	Nissan	Ariya e-4ORCE 63kWh	5.9	200	325	194	440	Yes	AWD	Type 2 CCS	Hatchback
101	101	Nissan	Ariya e-4ORCE 87kWh Performance	5.1	200	375	232	450	Yes	AWD	Type 2 CCS	Hatchback
102	102	Byton	M-Byte 95 kWh 2WD	7.5	190	400	238	480	No	AWD	Type 2 CCS	

◀ ▶

```
ev_data.tail()
```

Unnamed: 0	Brand	Model	AccelSec	TopSpeed_KmH	Range_Km	Efficiency_WhKm	FastCharge_KmH	RapidCharge	PowerTrain	PlugType	BodyStyle	
98	98	Nissan	Ariya 63kWh	7.5	160	330	191	440	Yes	FWD	Type 2 CCS	Hatchbac
99	99	Audi	e-tron S Sportback 55 quattro	4.5	210	335	258	540	Yes	AWD	Type 2 CCS	SUV
100	100	Nissan	Ariya e-4ORCE 63kWh	5.9	200	325	194	440	Yes	AWD	Type 2 CCS	Hatchbac
101	101	Nissan	Ariya e-4ORCE 87kWh Performance	5.1	200	375	232	450	Yes	AWD	Type 2 CCS	Hatchbac
102	102	Byton	M-Byte 95 kWh 2WD	7.5	190	400	238	480	No	AWD	Type 2 CCS	SUV

```
ev_data.shape
```

```
ev_data.columns
```

```
In [6]: ev data.info()
```

```
ev_data.isnull().sum()
```

```
ev data.duplicated().sum()
```

Jupyter Electric Vehicle Market Segmentation Last Checkpoint: 5 hours ago (unsaved changes) Python 3 (ipykernel) Logout

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101	101	Nissan	400CC 87kWh Performance	5.1	200	375	232	450	Yes	AWD	Type 2 CCS	Hatchback
102	102	Byton	M-Byte 95 kWh 2WD	7.5	190	400	238	480	No	AWD	Type 2 CCS	SUV

```

In [4]: # Size of the dataset
ev_data.shape

Out[4]: (103, 15)

In [5]: # columns in the data
ev_data.columns

Out[5]: Index(['Unnamed: 0', 'Brand', 'Model', 'AccelSec', 'TopSpeed_KmH', 'Range_Km',
              'Efficiency_WhKm', 'FastCharge_KmH', 'RapidCharge', 'PowerTrain',
              'PlugType', 'BodyStyle', 'Segment', 'Seats', 'PriceEuro'],
              dtype=object)

```

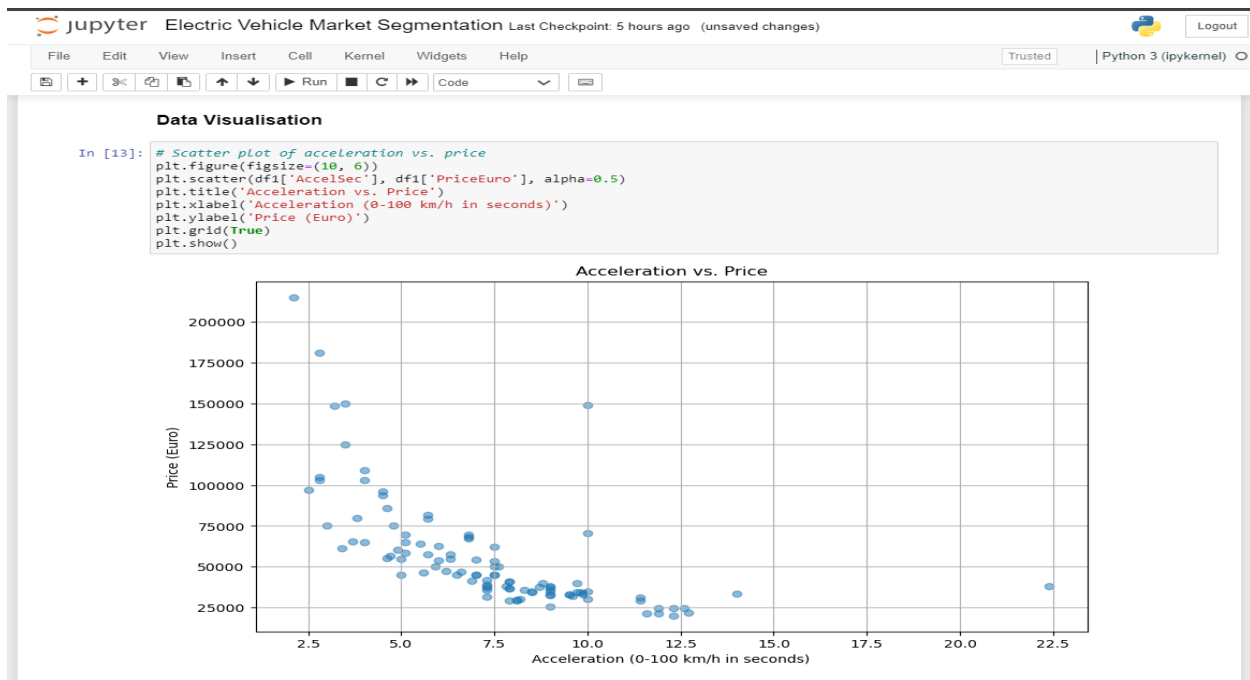
### 3. Market Segmentation Analysis

#### 3.1 By Brand

- **Top Brands:** Tesla, Volkswagen, Audi, BMW, and Nissan have a significant presence in the dataset.
- **Diversity:** Brands offer multiple models targeting different segments and price ranges.

#### 3.2 By Acceleration

- **High Performance:** Models like the Tesla Roadster (2.1 sec), Lucid Air (2.8 sec), and Porsche Taycan Turbo S (2.8 sec) cater to performance enthusiasts.
- **Economy Options:** Models with slower acceleration, such as the Skoda CITIGOe iV (12.3 sec) and Smart EQ forfour (12.7 sec), are targeted at urban commuters.

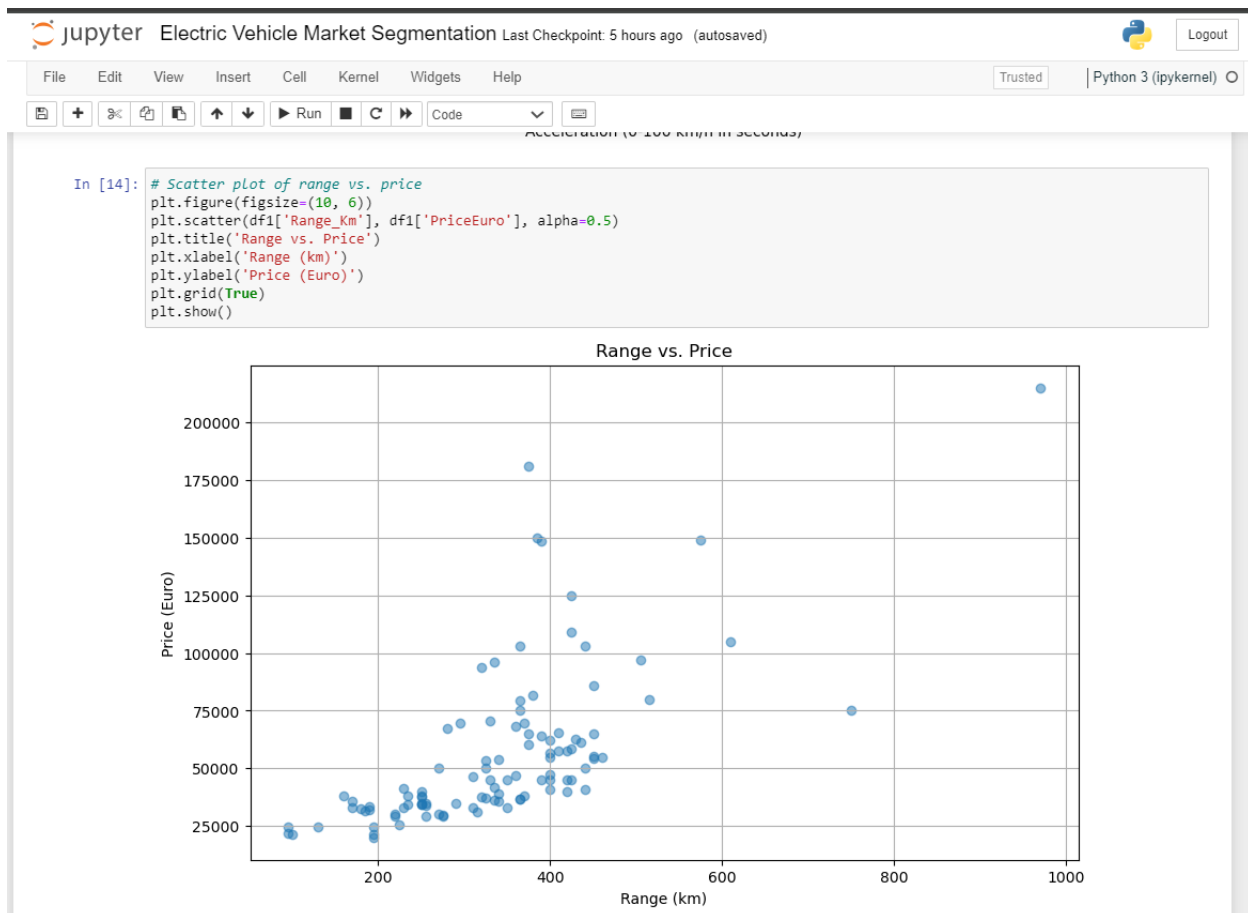


### 3.3 By Top Speed

- **High Speed:** The Tesla Roadster (410 km/h) and various Porsche models offer top speeds exceeding 250 km/h.
- **Moderate Speed:** Most economy and mid-range models have top speeds between 130-200 km/h.

### 3.4 By Range

- **Long Range:** Tesla Cybertruck Tri Motor (750 km) and Lucid Air (610 km) lead in range, appealing to long-distance travelers.
- **Mid-Range:** Many models, including those from Nissan and Hyundai, offer ranges between 250-400 km, suitable for daily commutes.
- **Short Range:** Urban-focused models like the Honda e (170 km) and Renault Twingo ZE (130 km) have shorter ranges.

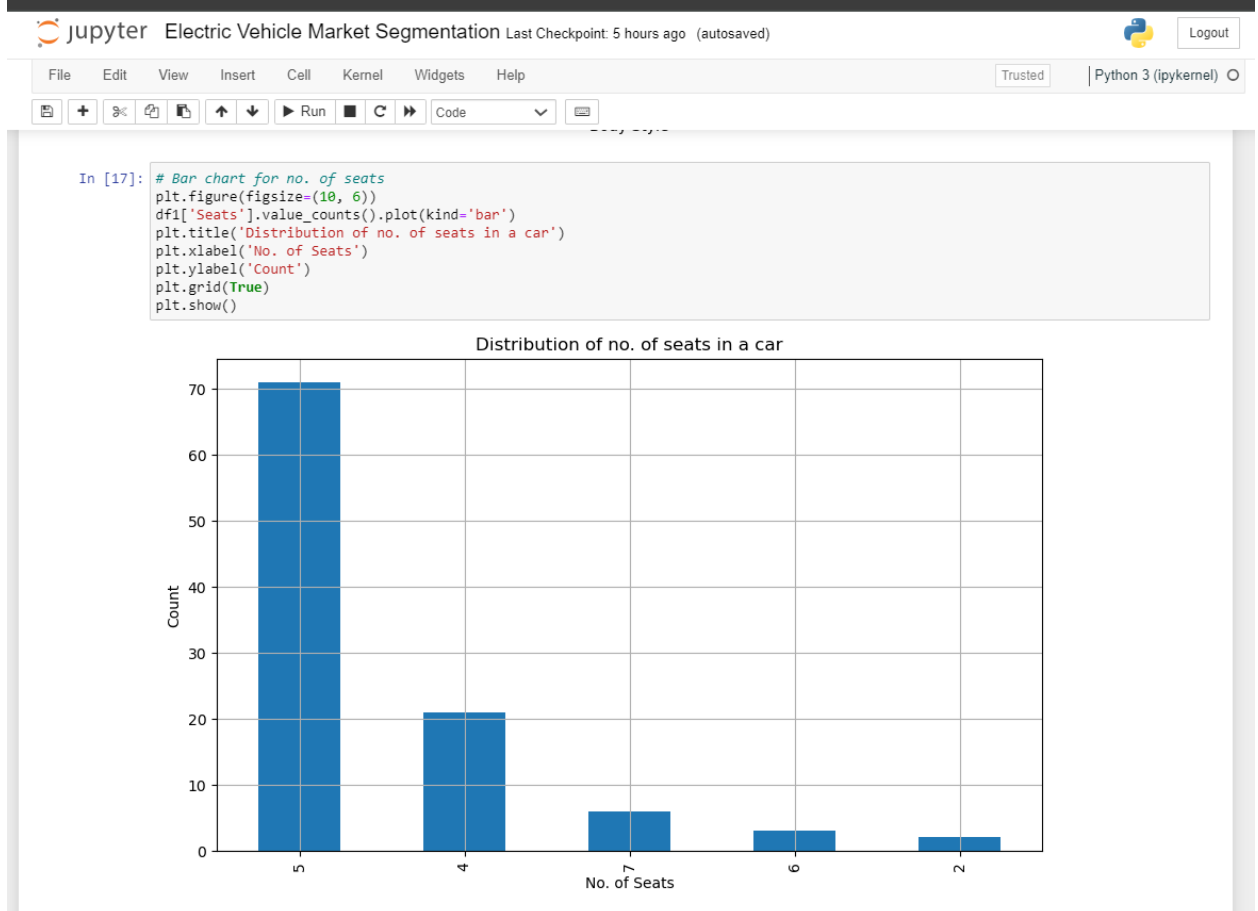
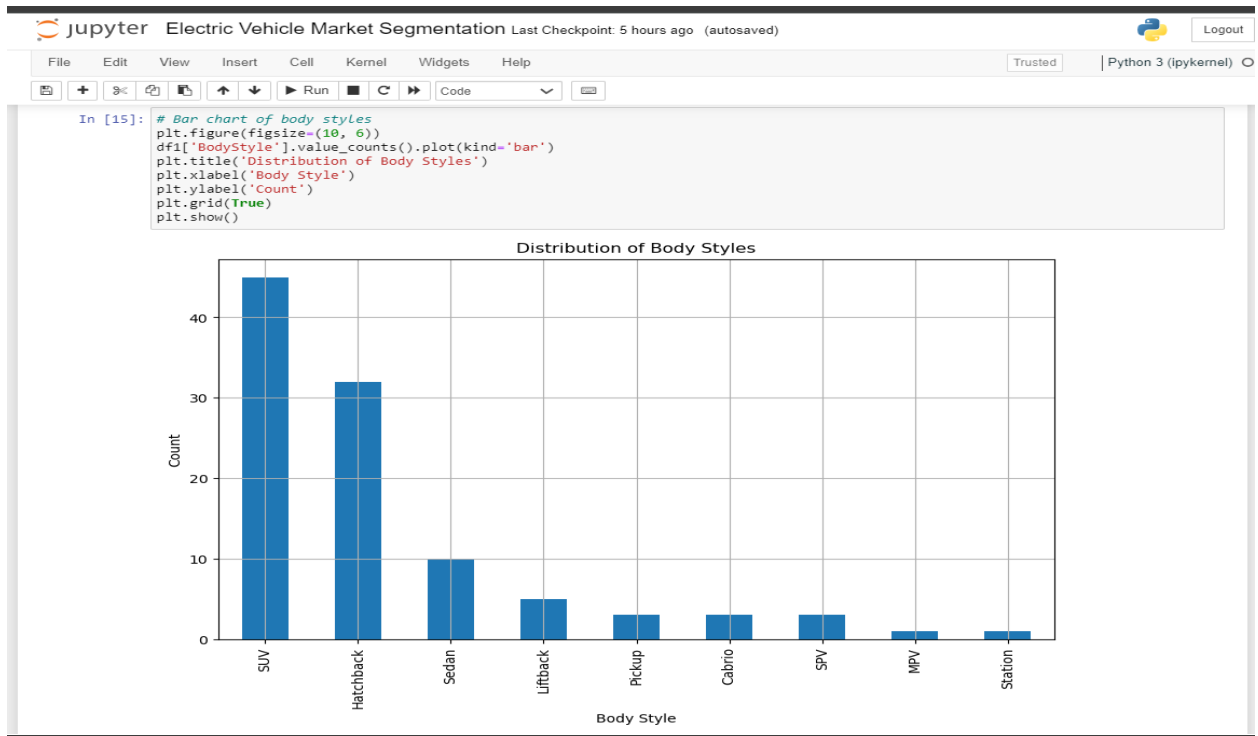


### 3.5 By Price

- **Luxury Segment:** Vehicles like the Tesla Roadster (€215,000) and Porsche Taycan Turbo S (€180,781) cater to the high-end market.
- **Mid-Range:** Models like the Tesla Model 3 (€46,380 - €65,620) and Audi e-tron (€67,358) cater to the mid-market segment.
- **Budget-Friendly:** Affordable options include the Renault Zoe (€29,234) and Volkswagen e-Up! (€21,421).

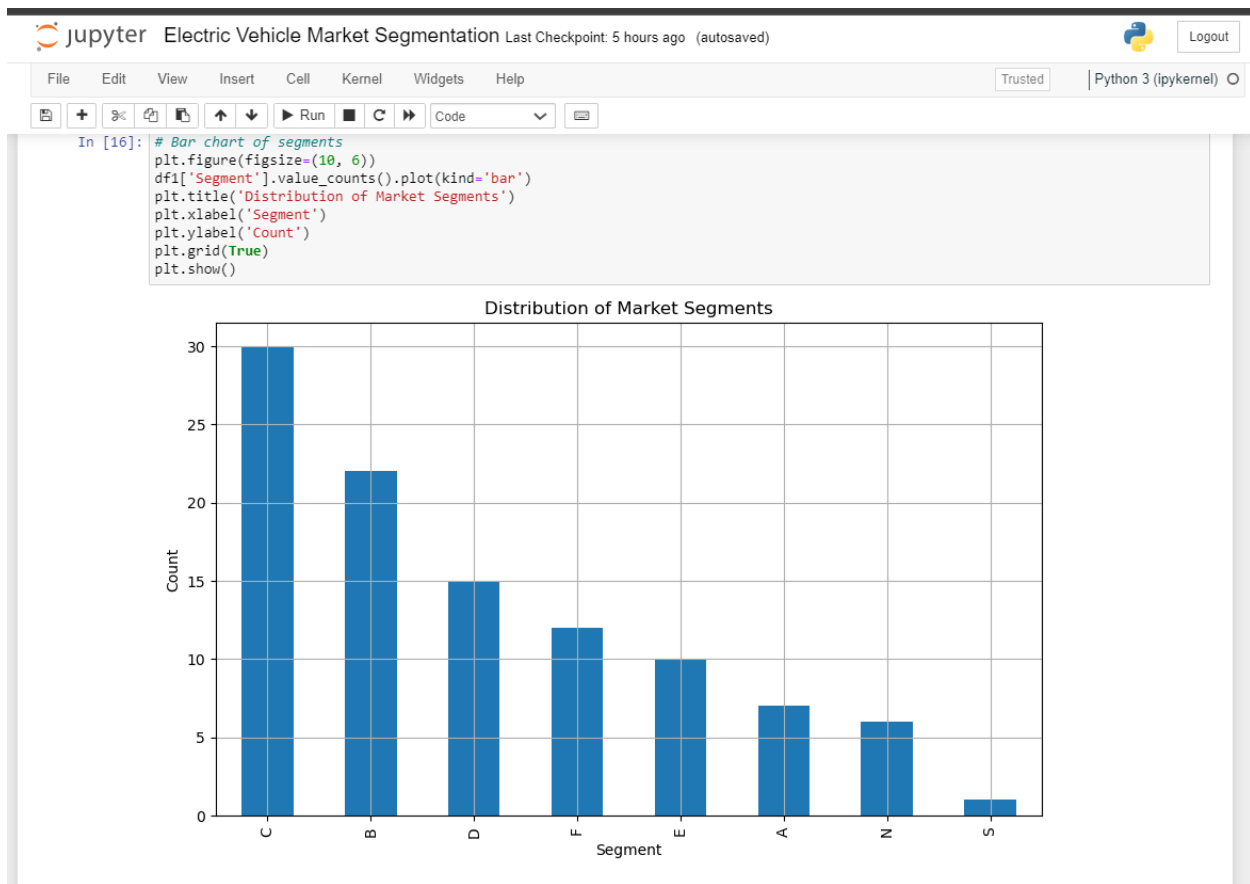
### 3.6 By Body Style

- **Sedans:** Popular for their balance of performance and practicality, with models like the Tesla Model S and Audi e-tron GT.
- **SUVs:** Highly popular for their versatility, with entries from Tesla, Audi, and Volkswagen.
- **Hatchbacks:** Suitable for city driving, with models like the Nissan Leaf and Volkswagen ID.3.
- **Other:** Includes pickups (Tesla Cybertruck), liftbacks (Polestar 2), and cabrios (Tesla Roadster).



### 3.7 By Segment

- **Luxury (F Segment):** High-end sedans and performance vehicles like the Lucid Air and Porsche Taycan.
- **Upper Medium (D Segment):** Balanced options for performance and price, such as the Tesla Model 3 and Audi Q4 e-tron.
- **Lower Medium (C Segment):** Practical vehicles like the Volkswagen ID.3 and Nissan Leaf.
- **Small (B Segment):** Compact cars like the Peugeot e-208 and Opel Corsa-e.
- **Mini (A Segment):** Urban-focused models like the Skoda CITIGOe iV and Smart EQ fortwo.



### 3.8 By Powertrain

- **AWD:** Common in high-performance and luxury models, enhancing traction and stability.
- **RWD:** Often seen in performance-oriented models and some budget options.
- **FWD:** Predominant in economy and compact models, offering simplicity and cost efficiency.

### 3.9 By Rapid Charge Capability

- **With Rapid Charge:** Most models offer rapid charge capabilities, essential for long-distance travel.
- **Without Rapid Charge:** Some budget models lack this feature, making them more suitable for short-range city driving.

## 4. Conclusion

- The EV market segmentation reveals a diverse range of vehicles catering to different consumer needs, from high-performance luxury cars to practical city commuters.

- Key trends include the prominence of **SUV body styles**, the importance of **rapid charging capabilities**, and the **wide range of prices and performance specifications**.

- Brands like Tesla and Volkswagen dominate the market with varied offerings across multiple segments.