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# ELECTRIC VEHICLES

## A COMPREHENSIVE ANALYSIS

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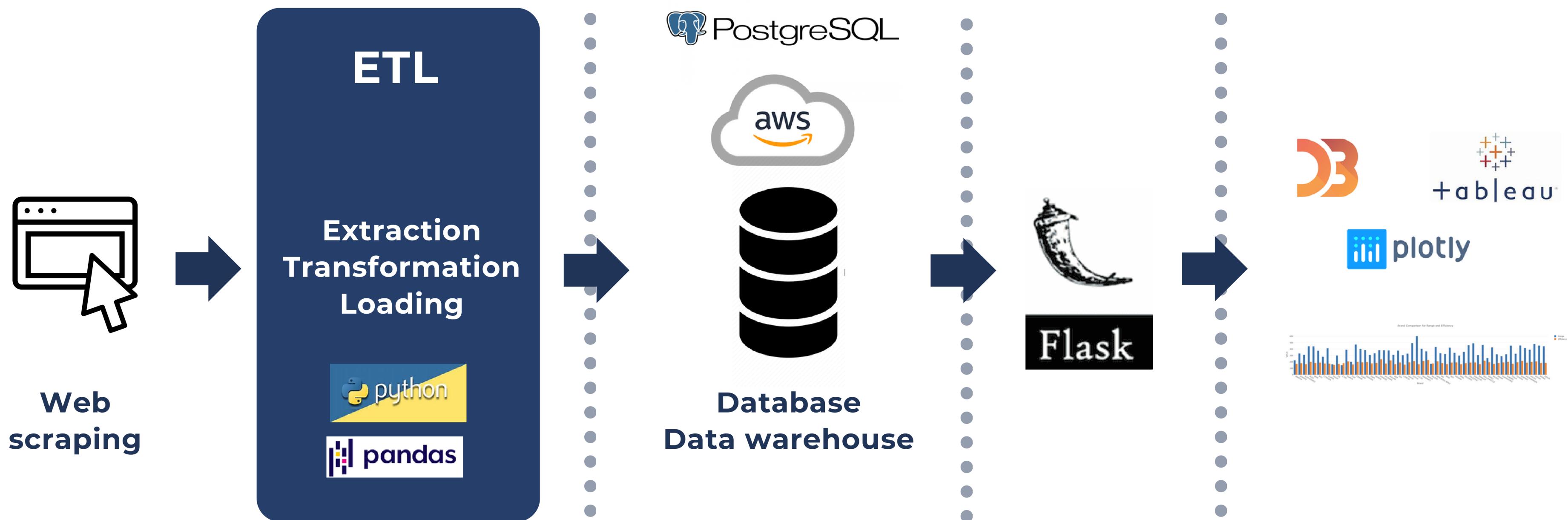
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# DATA VISUALIZATION STREAM

DATA COLLECTION

DATA CONSOLIDATION

DATA VISUALIZATION



# EXPLORING ELECTRIC VEHICLE DATA:



## EVs - One Electric Vehicle Dataset - Smaller

Compare and analyze today's electric cars!

[kaggle.com](#)



## Electric Vehicle Population by Country (2024)

The full monthly count of electric vehicles by country

[kaggle.com](#)



## Electric Vehicle Charging Stations 2024

A comprehensive dataset of EV Stations

[kaggle.com](#)



## Full Electric Vehicle Dataset 2024

A comprehensive dataset of Battery and Plug-in Hybrid and Electric Vehicles

[kaggle.com](#)

catalog.data.gov/dataset/electric-vehicle-population-data

An official website of the United States government [Here's how you know](#)

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**Electric Vehicle Population Data**

Metadata Updated: April 19, 2024

This dataset shows the Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) that are currently registered through Washington State Department of Licensing (DOL).

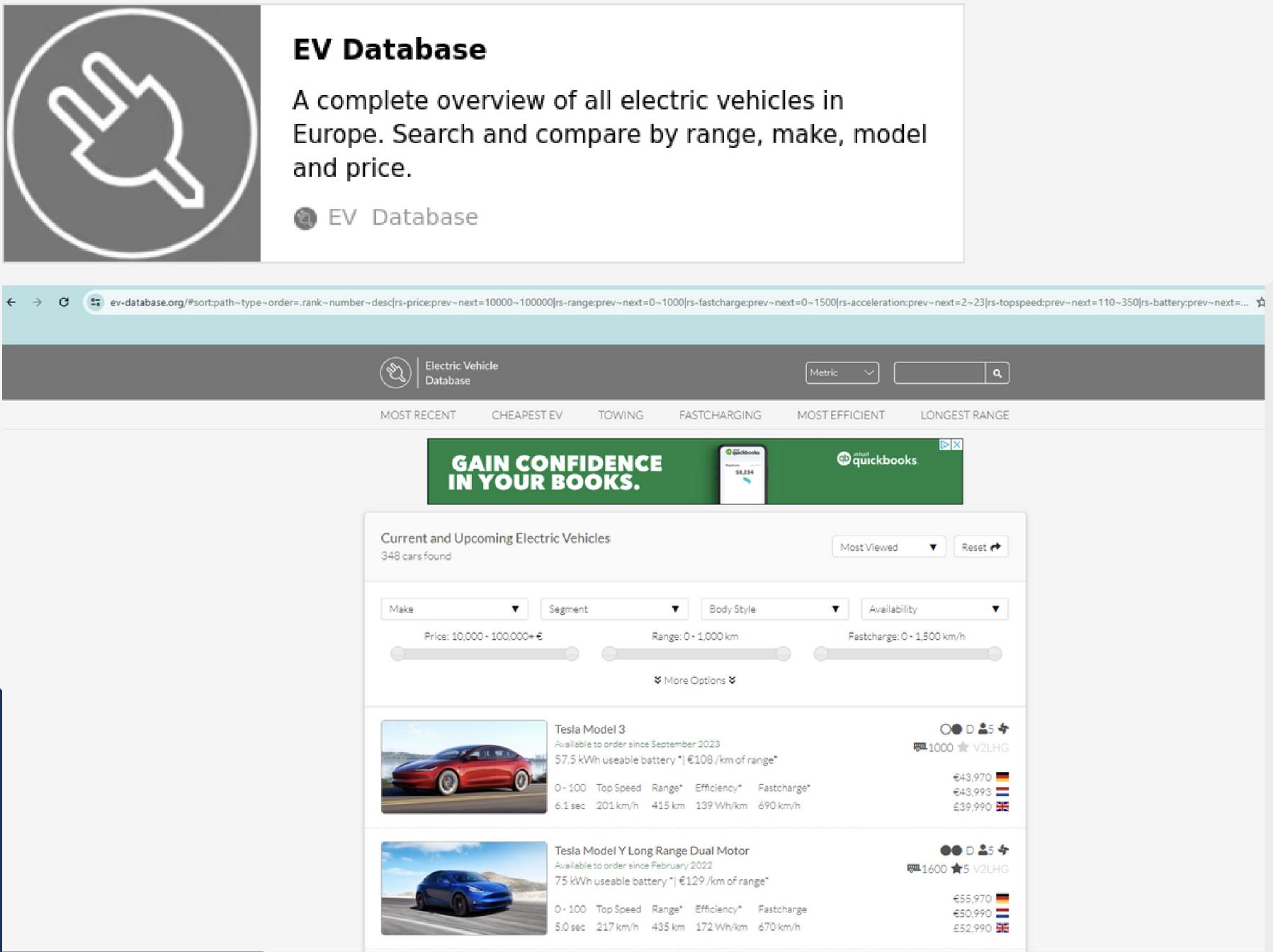
**Access & Use Information**

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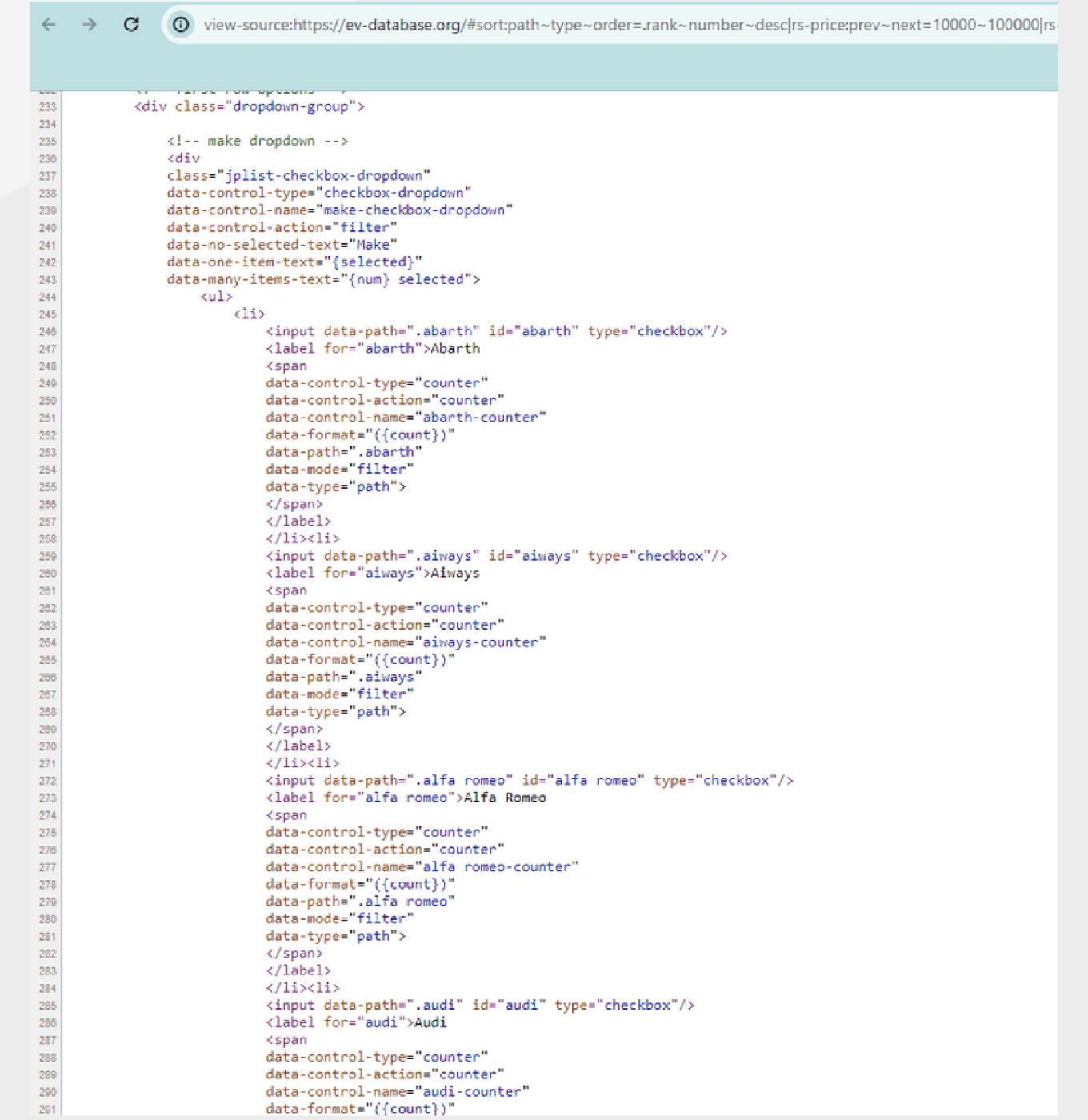
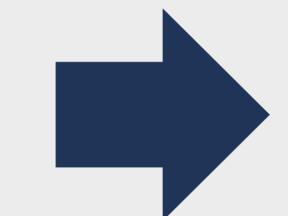
**Downloads & Resources**

Comma Separated Values File 1028 views [Download](#)  
 RDF File 72 views [Download](#)  
 JSON File 236 views [Download](#)

# DATASET



The screenshot shows the homepage of the EV Database. It features a large circular icon on the left containing a white plug symbol. The main title "EV Database" is at the top, followed by a subtitle: "A complete overview of all electric vehicles in Europe. Search and compare by range, make, model and price." Below this is a search bar with the placeholder "EV Database". The URL in the address bar is: <https://ev-database.org/#sort:path~type~order=.rank~number~desc|rs:price;prev~next=10000~100000|rs:range;prev~next=0~1000|rs:fastcharge;prev~next=0~1500|rs:acceleration;prev~next=2~23|rs:topspeed;prev~next=110~350|rs:battery;prev~next=...>. The main content area displays a grid of electric vehicle cards. One card for the Tesla Model 3 is visible, showing details like "Available to order since September 2023", "57.5 kWh useable battery", "€108/km of range", "0-100 Top Speed", "Range\*", "Efficiency\*", "Fastcharge", "6.1 sec", "201 km/h", "415 km", "139 Wh/km", and "690 km/h". Another card for the Tesla Model Y Long Range Dual Motor is partially visible below it.



The screenshot shows a browser's developer tools with the "view-source" tab selected. The URL in the address bar is: <https://ev-database.org/#sort:path~type~order=.rank~number~desc|rs:price;prev~next=10000~100000|rs:range;prev~next=0~1000|rs:fastcharge;prev~next=0~1500|rs:acceleration;prev~next=2~23|rs:topspeed;prev~next=110~350|rs:battery;prev~next=...>. The main content area displays the raw HTML code for a dropdown menu. The code includes several `<li>` elements, each containing an `<input type="checkbox">` and a label for a car brand: "abarth", "aiways", "alfa romeo", "audi", "bmw", "byd", "chevrolet", "chery", "dacia", "dodge", "econ", "fisker", "ford", "geely", "hyundai", "jeep", "kia", "lada", "lexus", "lincoln", "mazda", "mercedes", "nissan", "opel", "peugeot", "renault", "subaru", "toyota", "volkswagen", and "volvo". The code uses various CSS classes and attributes to style the dropdown and its options.

# DATASET

evdatabase\_tocsv.ipynb > ...

+ Code + Markdown | ▶ Run All ⚡ Restart ⌂ Clear All Outputs ✎ Go To | 📈 Variables 📃 Outline ...

```

+ import requests
from bs4 import BeautifulSoup
import pandas as pd
[1] ✓ 0.6s

# Function to extract car brands from the dropdown menu
def extract_car_brands(html_content):
    # Parse the HTML content
    soup = BeautifulSoup(html_content, 'html.parser')

    # Find the <div> element containing the make dropdown menu
    make_dropdown = soup.find('div', class_='jplist-checkbox-dropdown')

    # Extract the list of car brands from the dropdown menu options
    brands_list = []
    if make_dropdown:
        # Find all <input> elements inside the dropdown
        input_elements = make_dropdown.find_all('input', {'data-path': True})
        for input_element in input_elements:
            # Extract the brand name from the 'id' attribute of the <input> element
            brand_name = input_element['id']
            brands_list.append(brand_name)

    return brands_list
[2] ✓ 0.0s

def extract_car_info(html_content, brands_list):
    # Parse the HTML content
    soup = BeautifulSoup(html_content, 'html.parser')

    # Extract car information
    cars_data = []

```



Brand	Model	Battery	Pound_per_Km	0 - 100	Top_Speed	Range	Efficiency	Fastcharge	Price_in_Germany	Price_in_The_Netherlands	Price_in_the_UK	Approx_in_USD	Drive_Configuration
TESLA	Model 3	57.5	108	6.1	201	415	139	690	43970	43993	39990	49827	Rear Wheel Drive
TESLA	Model Y Long Range	75	129	5	217	435	172	670	55970	50990	52990	66025	All Wheel Drive
TESLA	Model 3 Long Range	75	108	4.4	201	500	150	770	52970	51993	49990	62287	All Wheel Drive
BYD	ATTO 3	60.5	121	7.3	160	330	183	370	37990	38990	37195	46344	Front Wheel Drive
TESLA	Model Y	57.5	135	6.9	217	350	164	580	45970	43990	44990	56057	Rear Wheel Drive
MG	MG4 Electric 64	61.7	102	7.9	160	360	171	630	39990	35785	29495	36750	Rear Wheel Drive
BYD	SEAL 82.5 kWh AWD	82.5	107	3.8	180	490	168	540	50990	50990	48695	60673	All Wheel Drive
CITROEN	e-C3	44	90	11	135	265	166	340	23300	24290	21000	26166	Front Wheel Drive
BMW	i4 eDrive40	80.7	122	5.7	190	515	157	800	59200	62992	57890	72130	Rear Wheel Drive
BYD	DOLPHIN 60.4 kWh	60.5	101	7	160	340	178	340	32990	35490	30195	37622	Front Wheel Drive
TESLA	Model Y Performance	75	150	3.7	250	415	181	640	60790	56990	59990	74747	All Wheel Drive
TESLA	Model Y Long Range	75	109	5.9	217	460	163	710	49970			52968	Rear Wheel Drive
VOLKSWAGEN	ID.4 Pro	77	114	6.7	180	435	177	650	46335	49990	46035	57359	Rear Wheel Drive
TESLA	Model S Plaid	95	201	2.3	282	560	170	780	110970	110993	100000	124600	All Wheel Drive
HYUNDAI	Kona Electric 65	65.4	116	7.8	170	390	168	400	47190	43995	38595	48089	Front Wheel Drive
VOLVO	EX30 Single Motor	64	117	5.3	180	365	175	610	41790	41495	38545	48027	Rear Wheel Drive
BMW	iX xDrive40	71	225	6.1	200	360	197	480	77300	84998	69905	87101	All Wheel Drive
BYD	HAN	85.4	146	3.9	180	475	180	450	69020	69990		39100	All Wheel Drive
TESLA	Model S Dual Motor	95	168	3.2	250	575	165	800	95970	95993	85000	105910	All Wheel Drive
KIA	Niro EV	64.8	111	7.8	167	385	168	390	45690	39995	37295	46469	Front Wheel Drive
BYD	SEAL 82.5 kWh FWD	82.5	96	5.9	180	500	165	550	44990	45990	45695	56935	Rear Wheel Drive
DACIA	Spring Electric 4x4	25	137	19.1	125	165	152	180	22550			23903	Front Wheel Drive
ROLLS-ROYCE	Spectre	102	828	4.5	250	465	219	540	379015	396275	330000	411180	All Wheel Drive
BYD	TANG	86.4	199	4.6	180	355	243	420	71400	69990		39100	All Wheel Drive
HONDA	e-Ny1	61.9	147	7.6	160	335	185	300	47590	48750	44995	56063	Front Wheel Drive
BMW	iX3	74	184	6.8	180	385	192	520	67300	71462	64165	79949	Rear Wheel Drive
RENAULT	Scenic E-Tech EV	87	98	7.9	170	490	178	510	48900	47970	40995	51079	Front Wheel Drive
BMW	iX1 xDrive30	64.7	147	5.6	180	380	170	510	55000	57850	47465	59141	All Wheel Drive
RENAULT	Megane E-Tech	60	113	7.4	160	380	158	530	46600	39370	36995	46095	Front Wheel Drive
BYD	SEAL U 71.8 kWh	71.8	126	9.3	175	340	211	320		42990		24016	Front Wheel Drive
KIA	EV6 Long Range	74	126	7.3	185	410	180	1070	51990	50995	45245	56375	Rear Wheel Drive
HONGQI	E-HS9 99 kWh	90	216	4.9	200	370	243	430		79995		44690	All Wheel Drive
MG	ZS EV Long Range	68.3	105	8.4	175	370	185	420	37990	40185	32995	41111	Front Wheel Drive
AUDI	Q6 e-tron quattro	94.9	170	5.9	210	460	206	920	74700	80000	68975	85942	All Wheel Drive
TOYOTA	bZ4X FWD	64	144	7.5	160	340	188	510	47490	45995	46110	57453	Front Wheel Drive
TESLA	Model Y	57.5	135	6.9	217	350	164	810	45970	43990	44990	56057	Rear Wheel Drive

# DATABASE DIAGRAM

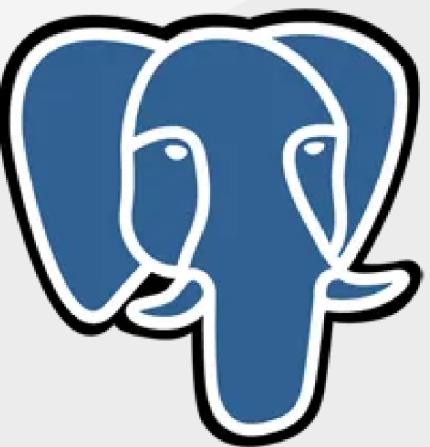
[www.quickdatabasediagrams.com](http://www.quickdatabasediagrams.com)

## **cars\_data**

Brand	VARCHAR
Model	VARCHAR
Battery	float
pound_per_km_of_range	VARCHAR
0-100	float
Top_Speed	int
Range	int
Efficiency	int
Fastcharge	int
Price_in_Germany_before_incentives	float
Price_in_The_Netherlands_before_incentives	float
Price_in_the_United_Kingdom_after_incentives	float
Approx_in_USD_based_on_source	float
Drive_Configuration	VARCHAR

# **DATABASE**

- PostgreSQL
- AWS



PostgreSQL



# VISUALIZATION

1. Model ranges for models based on brands
2. Brand Comparison for Range and Efficiency
3. Top 10 EVs with maximum usable battery capacity



# VISUALIZATION TOOL & LIBRARIES

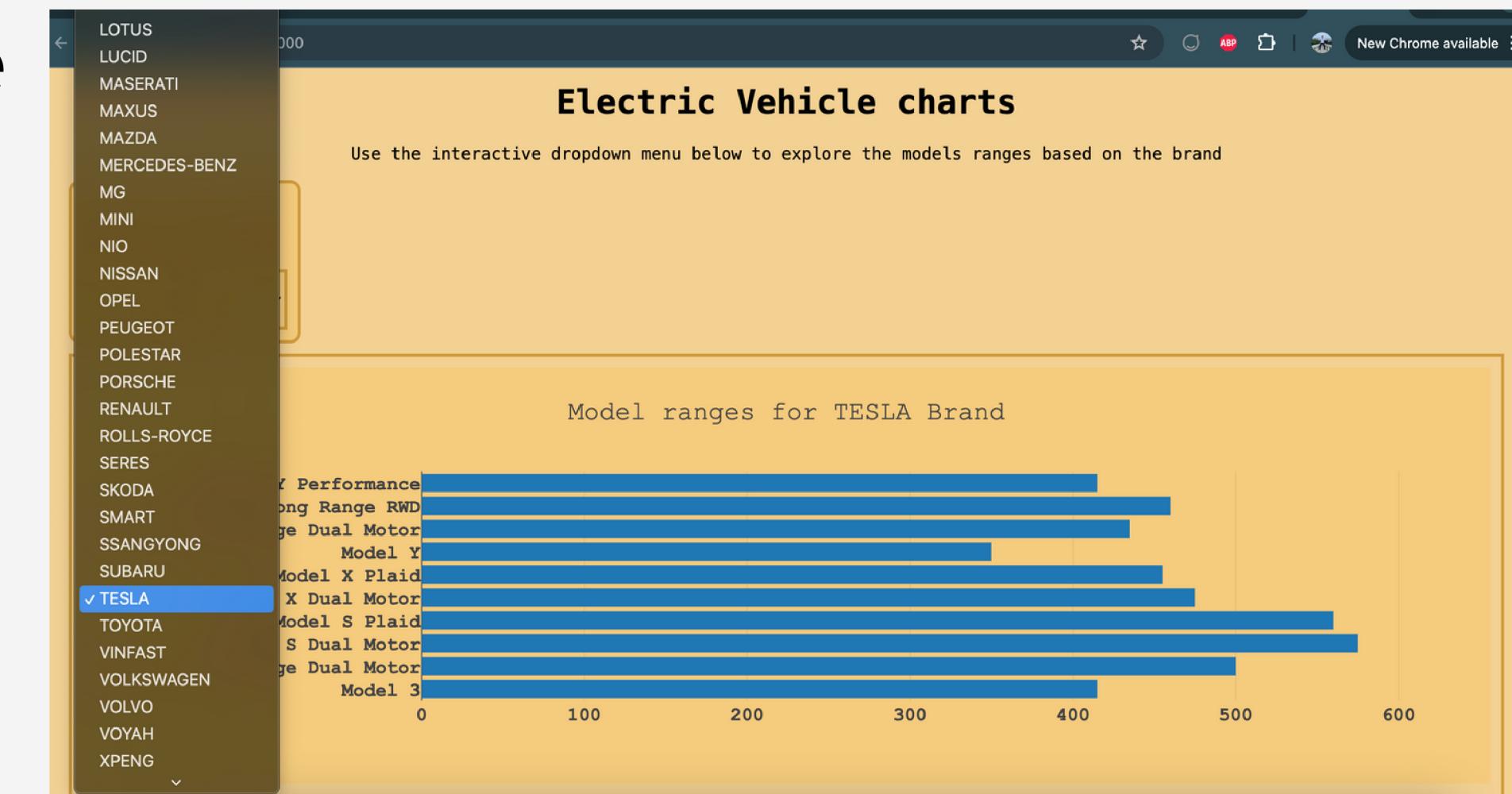
1. JavaScript

2. Plotly

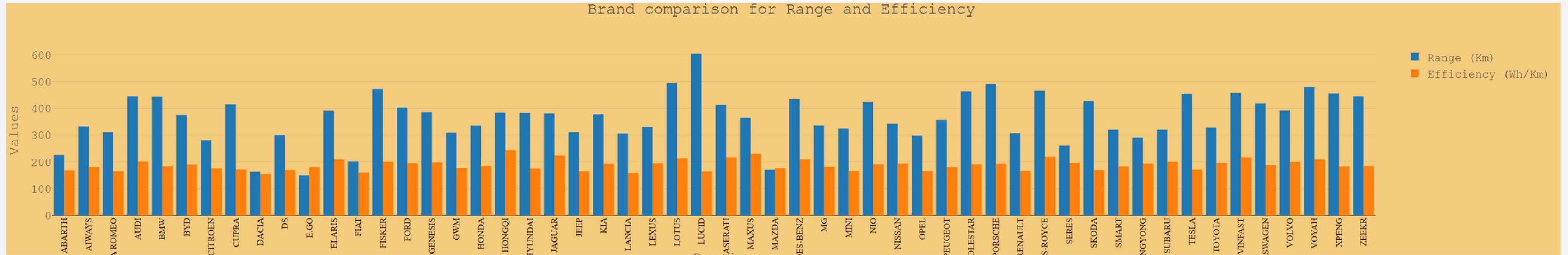


# MODELS RANGE CHART

- Dropdown menu to select the brand
- Models range for a specific brand

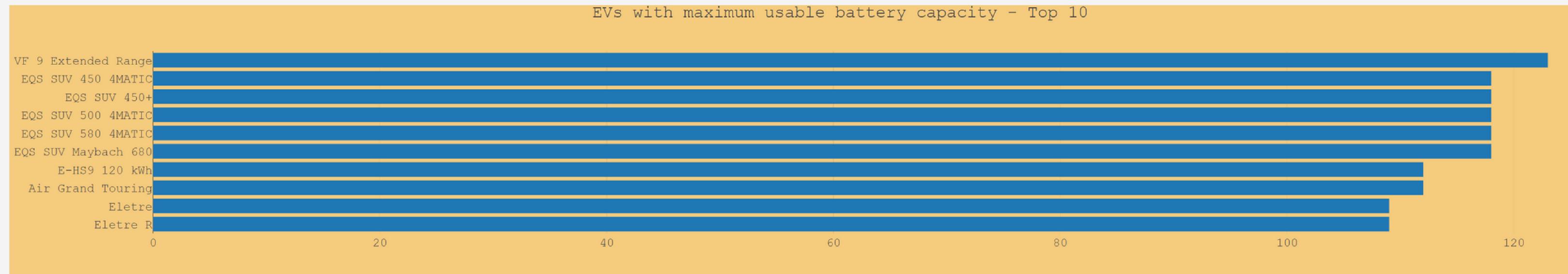


# RANGE AND EFFICIENCY EVALUATION



- Average range and efficiency of the models for each brand.
- The range and efficiency are the mean of all the models for the brand.
- Bar plots are grouped by the brand name.
- Lucid EV -Air Grand Touring has maximum range.
- Mercedes- Benz has maximum efficiency

# USABLE BATTERY CAPACITY



- Top 10 Evs having maximum usable battery capacity.
- Sorting and Slicing method in plotly is used to create the graph.
- Vin Fast VF9 has maximum usable capacity followed by more of Mercedes Benz models.

# CONCLUSIONS

## Evs with maximum

Parameters	Brand	Model	Value
Battery Capacity	VINFAST	VF 9 Extended Range	123 kWh
Range	LUCID	Air Grand Touring	665 km
Efficiency	"MERCEDES-BENZ"	EQV 300 Long	286 Wh/km

## Comparison for model

Model	Battery (kWh)	Range (km)	Efficiency( Wh/km)
VF 9 Extended Range	123	520	237
Air Grand Touring	112	665	168
EQV 300 Long	90	315	286

- Efficiency = Battery capacity/ Range
- Other technical components like motor, mechanism, weight do effect the range and efficiency.

Scope:

More parameters need to be included to make better decision.



**DEMO - WEBPAGE**