

ELECTRIC VEHICLES

Machine Learning - Capstone Project
December 1st, 2021

WHAT IS AN EV?

An **electric vehicle (EV)** is a vehicle that uses one or more electric motors for propulsion. It can be powered by a collector system, with electricity from extravehicular sources, or it can be powered autonomously by a battery (sometimes charged by solar panels, or by converting fuel to electricity using fuel cells or a generator).^[1] EVs include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft and electric spacecraft.

ARE EVS NEW?

EVs first came into existence in the mid-19th century, when electricity was among the preferred methods for motor vehicle propulsion, providing a level of comfort and ease of operation that could not be achieved by the gasoline cars of the time. Internal combustion engines were the dominant propulsion method for cars and trucks for about 100 years, but electric power remained commonplace in other vehicle types, such as trains and smaller vehicles of all types.

ARE EVS HERE TO STAY?

Government incentives to increase adoption were first introduced in the late 2000s, including in the United States and the European Union, leading to a growing market for the vehicles in the 2010s.^{[3][4]}

Increasing public interest and awareness and structural incentives, such as those being built into the green recovery from the COVID-19 pandemic, is expected to greatly increase the electric vehicle market.

INSPIRATION & DESIGN CHOICES

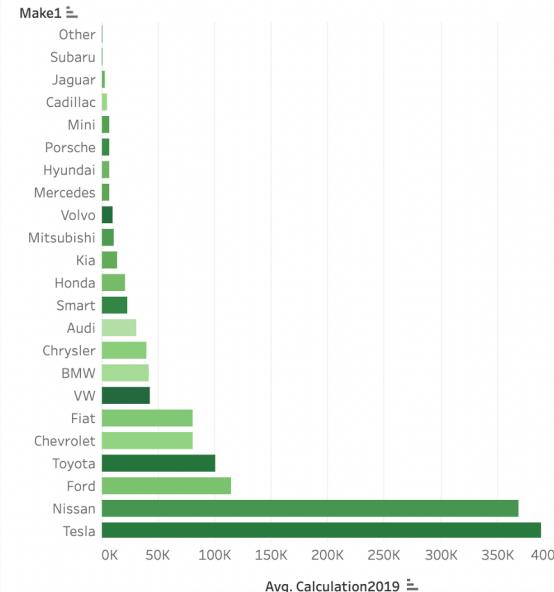
- Streamlined design with a nod to clean energy and green living.
- Staying inline with the “living green” aesthetic, our color choices were blues and greens in our site style and visuals.
- our site was designed to be a streamlined site with a navigation bar in the upper left corner, a tableau link and homepage with our predictions link.

DATA SOURCE & DATA CLEANING

- Kaggle Electric Vehicle Dataset
- Kaggle EV Sales Dataset

TABLEAU - SALES VISUALIZATIONS

2019 Sales



2018 Sales

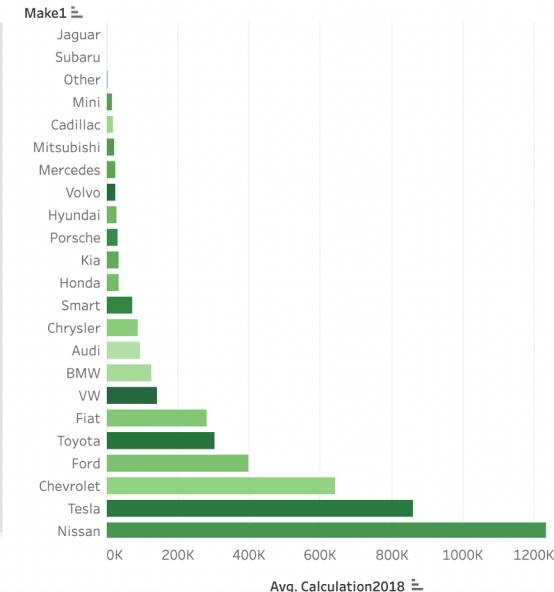


TABLEAU - ACCELERATION & RANGE

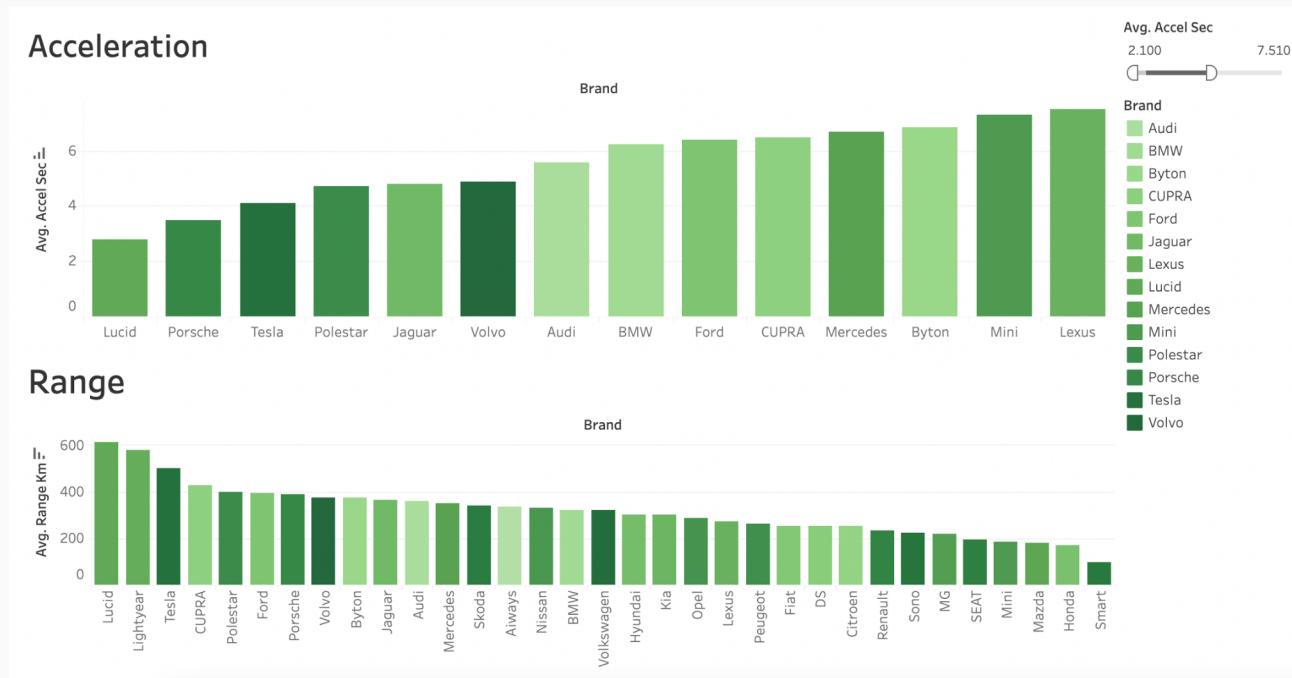


TABLEAU - BATTERY SIZE & FAST CHARGE

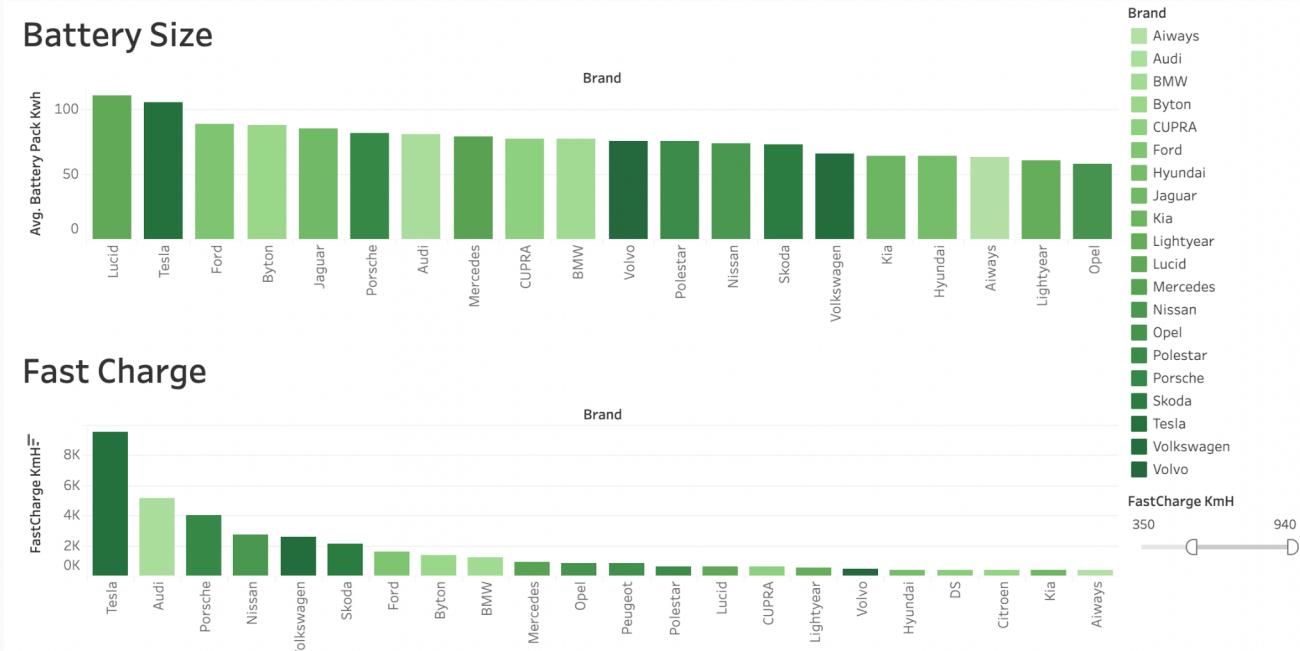
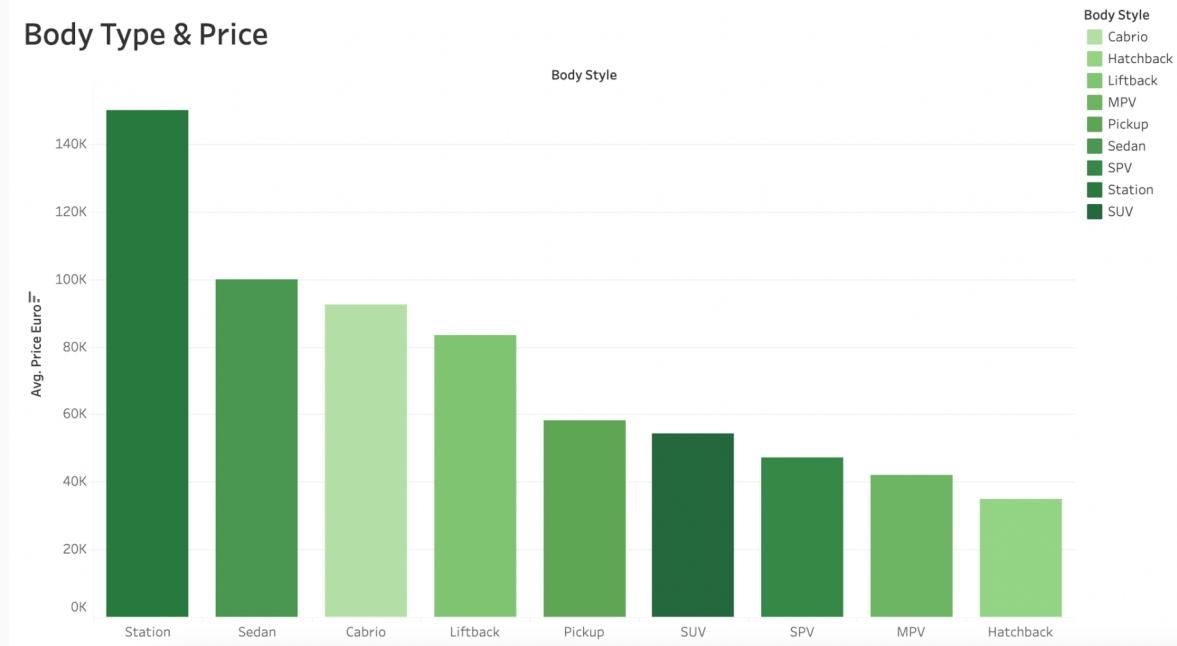
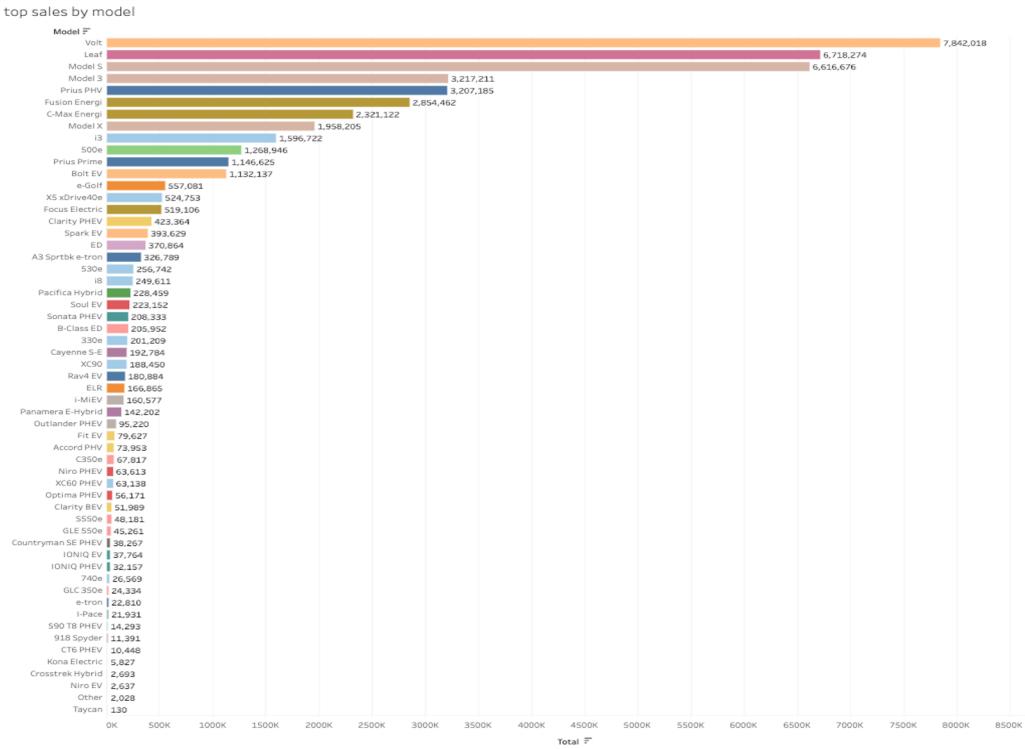


TABLEAU - BODY TYPE & PRICE



ALL MODEL COMPARISON



MACHINE LEARNING HYPOTHESIS

- Will electric vehicle prices level out with the rising popularity and increased availability from more car companies?
- Will electric vehicle sales continue to rise?
- What are the most sought after features?
- Based on analysis comparing Gas, Hybrid and Electric Vehicles, we believe that the ROI in an Electric Vehicle will pay off.

EV Price Prediction using Machine Learning

This page uses a Random Forest machine learning model to predict the price of an electric vehicle. The model was trained on data that included numerous electric vehicles, their prices and the features of each car.

- Acceleration - Time it takes for the car to reach 60 mph
- Top Miles Per Hour - The top speed of the car
- Range - The amount of miles a vehicle can travel on a full charge
- Number of Seats - The amount of seats in the vehicle
- Fast Charge - The amount of miles added to the range with an hour long charge
- Body Style - Shape of the vehicle
- Drive - The powered axle on the vehicle

FILTERS

Acceleration (seconds)	Number of Seats
<input type="text" value="5.0"/>	<input type="text" value="5"/>
Top Miles Per Hour	Fast Charge (Miles)
<input type="text" value="120.0"/>	<input type="text" value="200"/>
Range (miles)	Body Style
<input type="text" value="300.0"/>	<input type="button" value="Hatchback ▾"/>
Drive	<input type="button" value="Rear Wheel Drive ▾"/>
<input type="button" value="PREDICT PRICE"/>	



LIMITATIONS & FUTURE WORK

Limitations

- Lacking up to date data that is complete.
- Data Source to merge with our main data source to match up the car models.

Future Work

- Analysis of charging station availability by state.
- In depth analysis of maintenance costs.



CONCLUSIONS & ACTIONABLE INSIGHTS 1

- Tesla and Audi were consistently in the top 5-6 when it came to features analyzed.
- Top average sales were from Nissan, Tesla and Ford.

Sales

- 1) **2019 Top sales** - Ford, Nissan and Tesla with Chevrolet dropping from the previous year.
- 2) **2018 sales top performers** - Nissan, Tesla, Chevrolet, Ford and Toyota.



CONCLUSIONS & ACTIONABLE INSIGHTS 2

Features

- 1) **Fast charge Top Performers** - Tesla, Audi, Porsche, Nissan, Volkswagen and Ford.
- 2) **Battery Size** - Tesla, Ford, Jaguar, Porsche, and Audi.
- 3) **Acceleration Rate** - Porsche, Tesla, Jaguar, Volvo and Audi.
- 4) **Range** - Tesla, Ford, Volvo, Jaguar and Audi.
- 5) **Body Type - (Most expensive)** Station, Sedan, Cabrio, Liftback, Pickup and SUV.



CONCLUSIONS & ACTIONABLE INSIGHTS 3

- 1) Least Expensive & Most Expensive** - 2022 Nissan LEAF S - \$20,875 and the Most Expensive - 2021 Porsche Teycan Turbo S Cross Turismo - \$181,450
- 2) Top Sales by Model** - Volt by Chevrolet (7,842,018 units), Leaf by Nissan (6,718,274 units), Model S & Model 3 by Tesla (6,616,676 & 2,217,211 units)



Great companies are built on great products.

Elon Musk

Q & A

THANKS!

Group 4

Kidist Gebremedhin

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