

# Electrical Vehicle Analysis

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# Objectives

## Motivation

- Wide spread of electric vehicles in USA
- Environment impact
- Technology innovation

## Our aim

- Analyze the distribution of the registered electric vehicles in USA
- Design a business plan for Auto repair company in Washington city





# 01

## Data cleaning and inspection





# Dataset : Electric Vehicle Population Data (data.wa.gov)

## Key Columns:

Electric Vehicle Type:

- Pure electric or plug-in hybrid.

Make & Model:

- Manufacturer & Model of car

Electric Range:

- Traveling distance purely using electricity

Location:

- Location of registered electric vehicles

	count	unique	top	freq
VIN (1-10)	210165	12377	7SAYGDEE6P	1215
County	210165	203	King	107115
City	210165	758	Seattle	33854
State	210165	47	WA	209720
Make	210165	43	TESLA	91379
Model	210165	153	MODEL Y	44038
Electric Vehicle Type	210165	2	BEV	165554
Clean Alternative Fuel Vehicle (CAFV) Eligibility	210165	3	Unkown	118654
Legislative District	210165	50	41	13196
Vehicle Location	210165	931	POINT (-122.13158 47.67858)	5256
Electric Utility	210165	74	PUGET SOUND ENERGY INC  CITY OF TACOMA - (WA)	76606



# Data cleaning

	NaN
VIN (1-10)	0
County	4
City	4
State	0
Postal Code	4
Model Year	0
Make	0
Model	0
Electric Vehicle Type	0
Clean Alternative Fuel Vehicle (CAFV) Eligibility	0
Electric Range	5
Base MSRP	5
Legislative District	445
DOL Vehicle ID	0
Vehicle Location	10
Electric Utility	4
2020 Census Tract	4

- Ensure that all field are valid through changing the NaN fields into string “nan”
- Fill NaN values using forward fill method (ffill)
- Ensure consistent formatting across each column



# 02

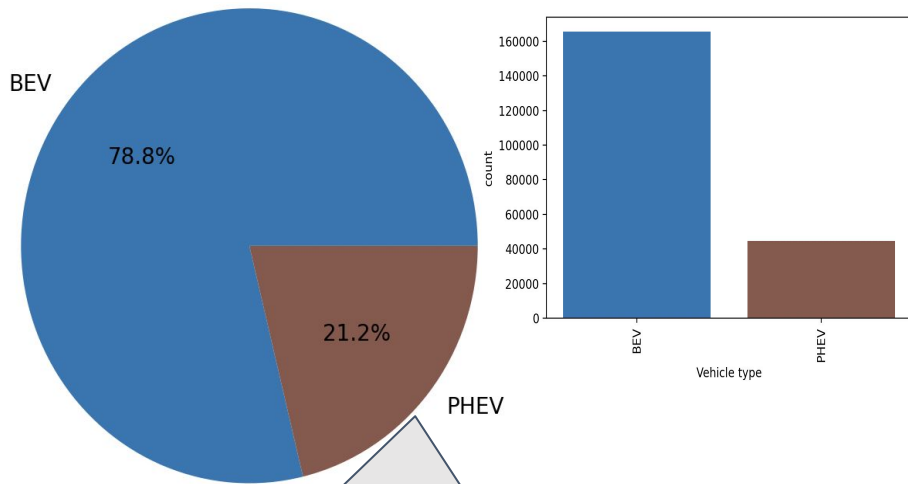
## EV Distribution Analysis over USA



# Counting of EV over USA

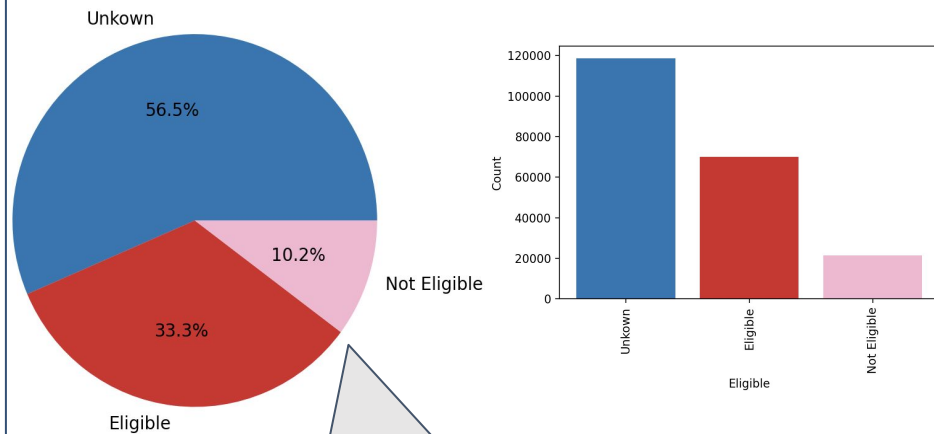


## Count by the electric type



Battery Electric Vehicles(BEV) are more popular than Plug-in Hybrid Electric Vehicles(PHEV)

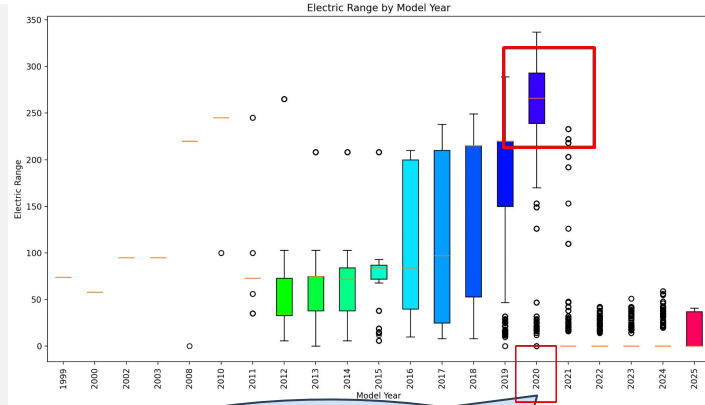
## Count of CAFV



34 % of the vehicles are eligible for alternative fuel, while 10 % are not.

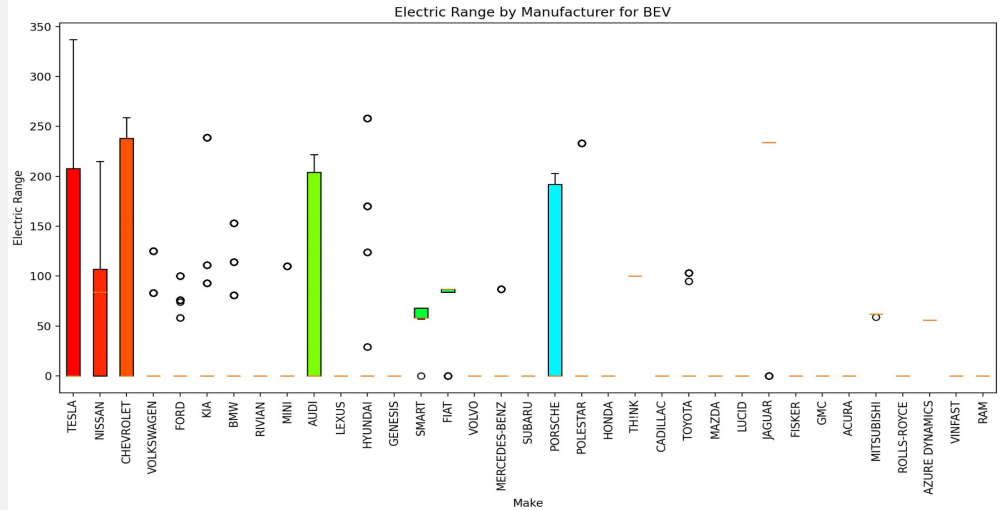
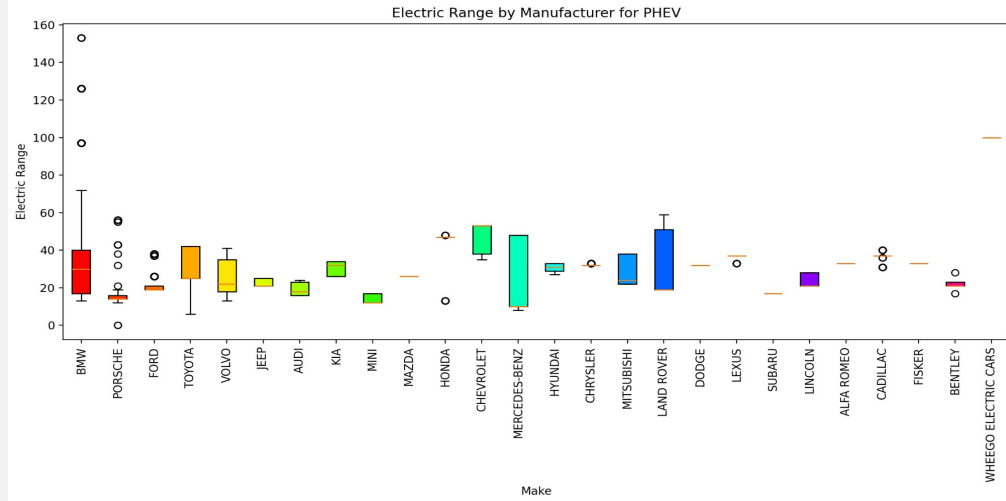
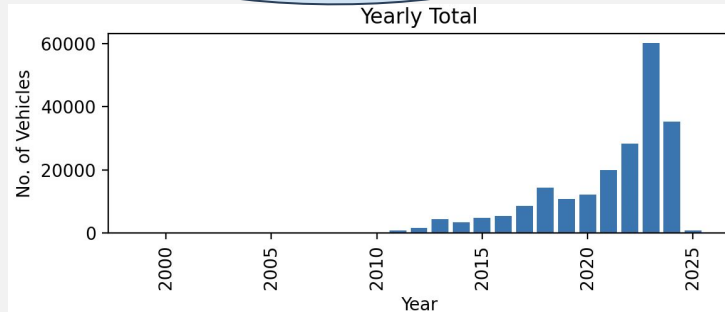


# Electrical range



Observation contradict with expectation!

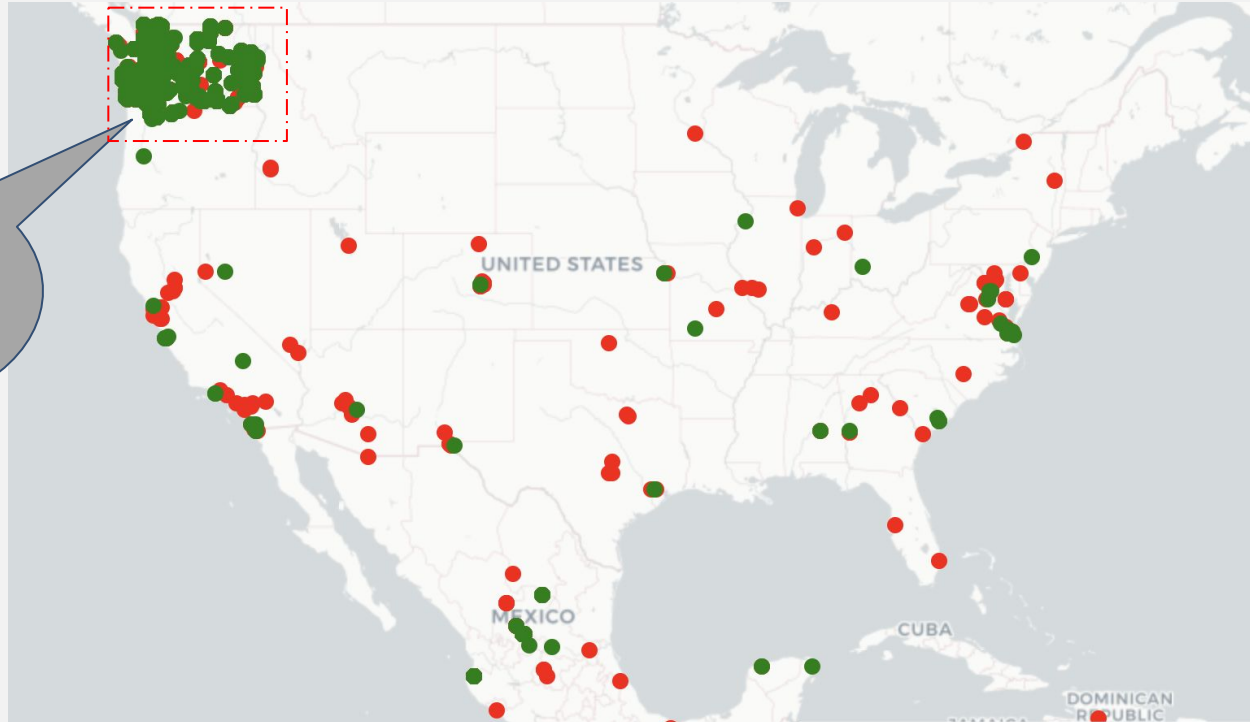
Electric range trend over years does not align with technology and innovation.



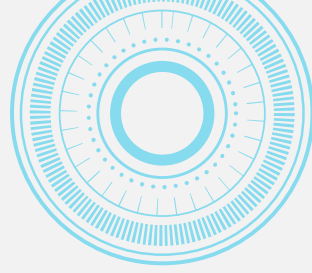


# BEV and PHEV distribution over USA

BEV(red) and PHEV(green) distribution over USA



Account for more than 99% of the electric cars in this dataset



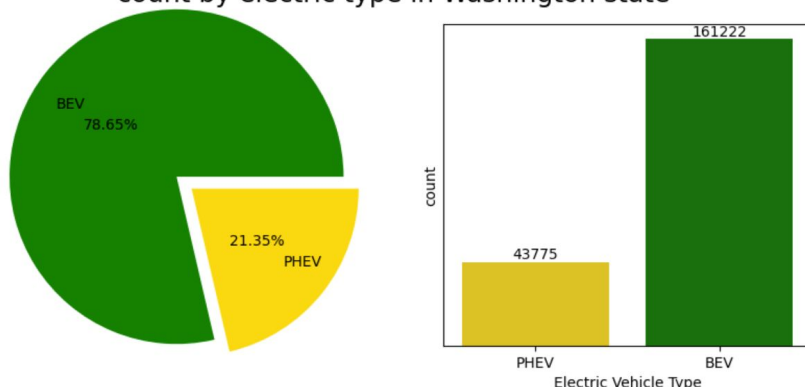
# 03

## Focus on Washington state

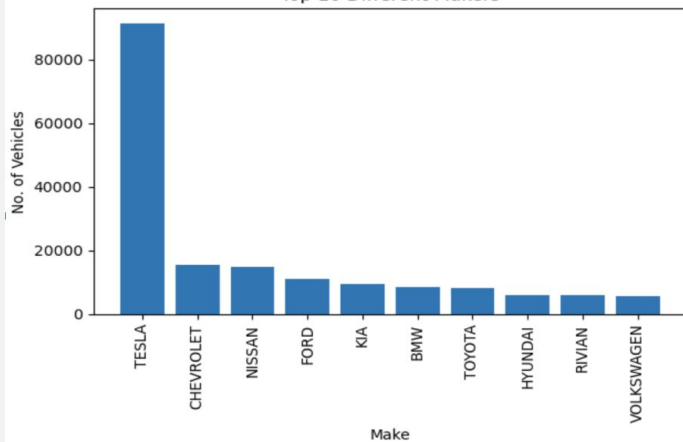
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# Gross Counts of EV in Washington

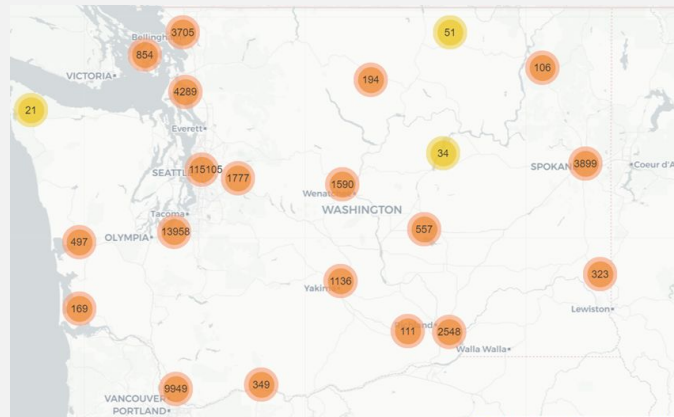
count by electric type in Washington state



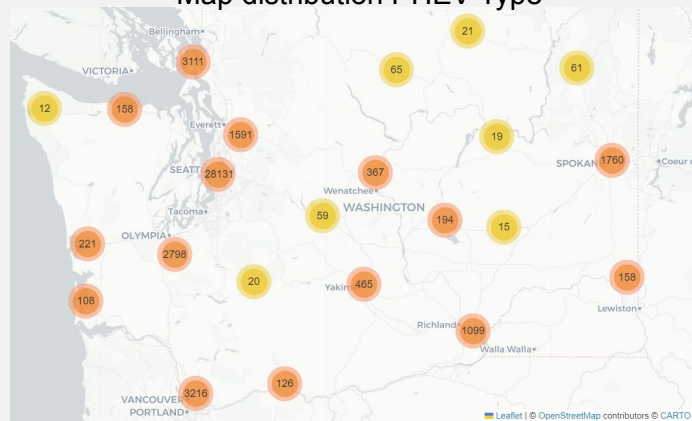
Top 10 Different Makers



Map distribution BEV Type



Map distribution PHEV Type



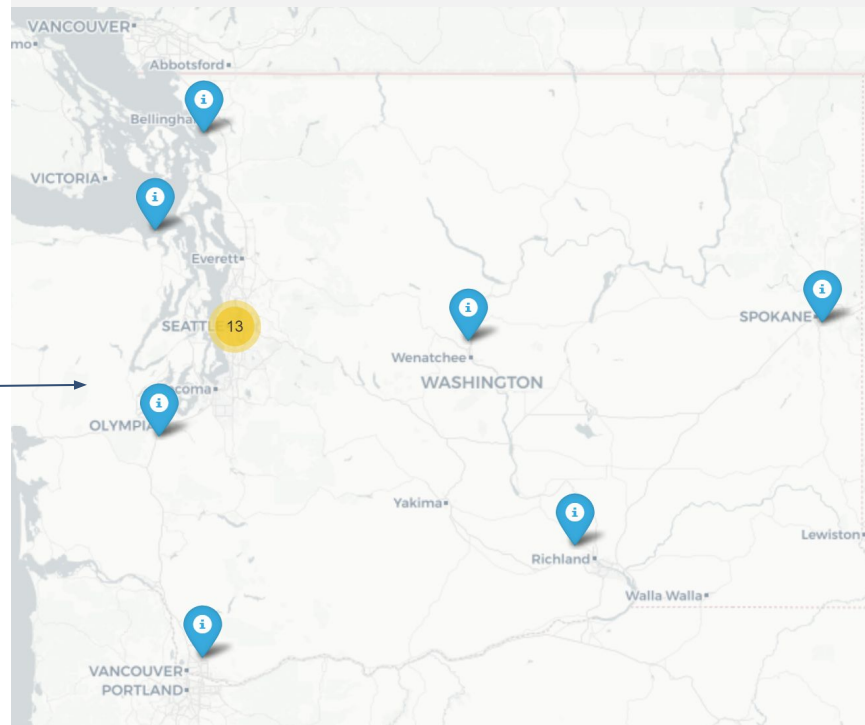
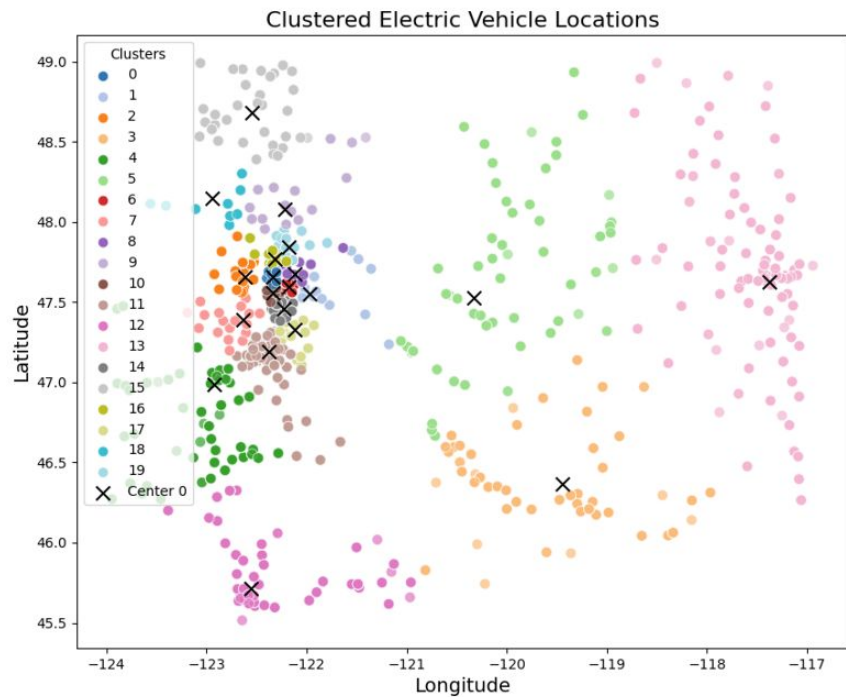


# Business planner for an Auto Repair company

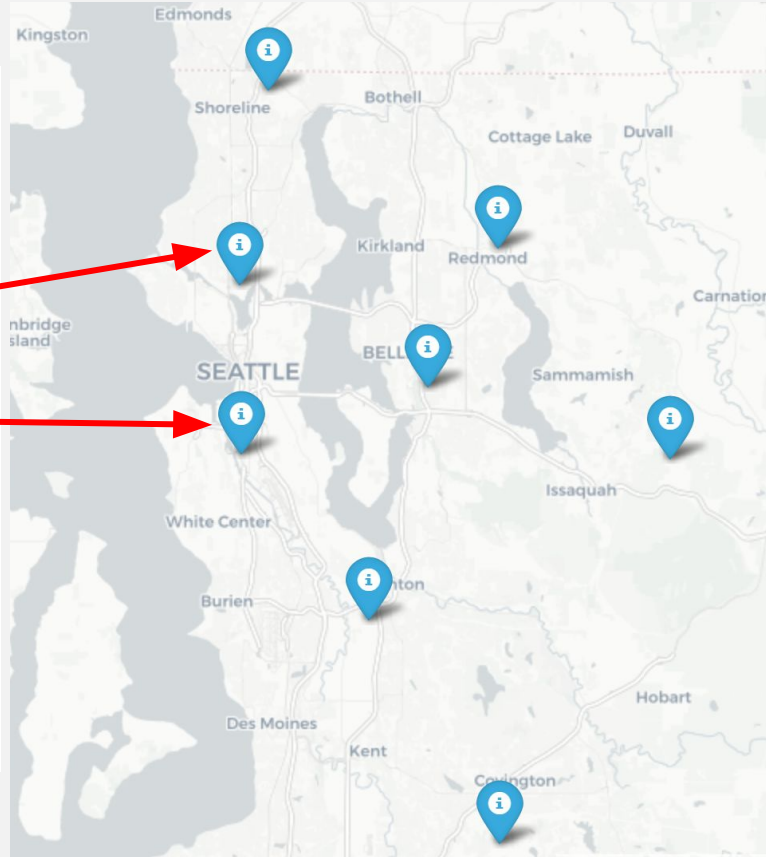
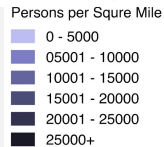
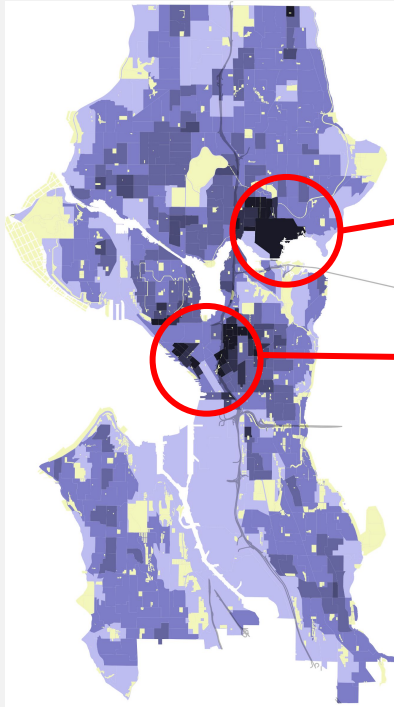




# Clustering



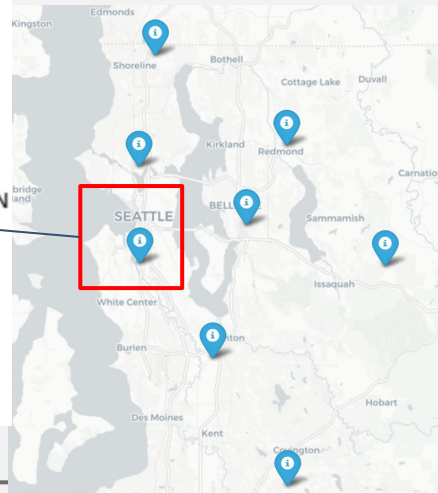
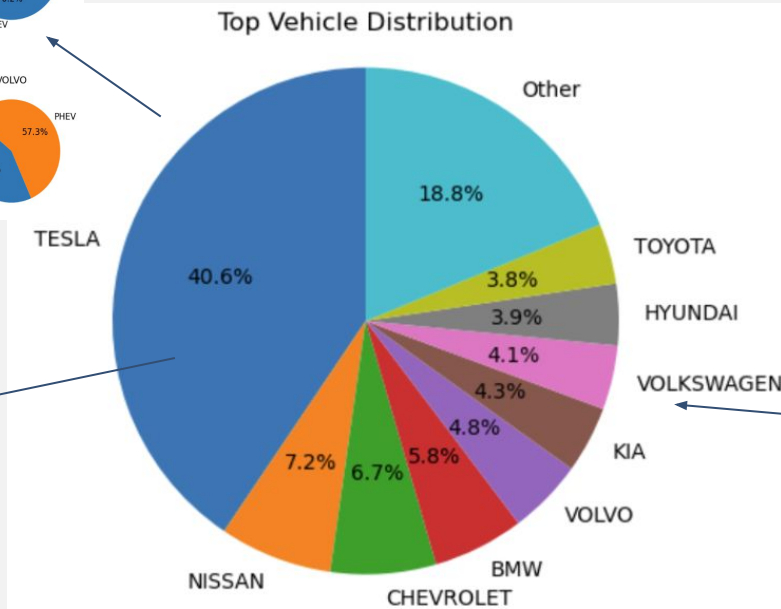
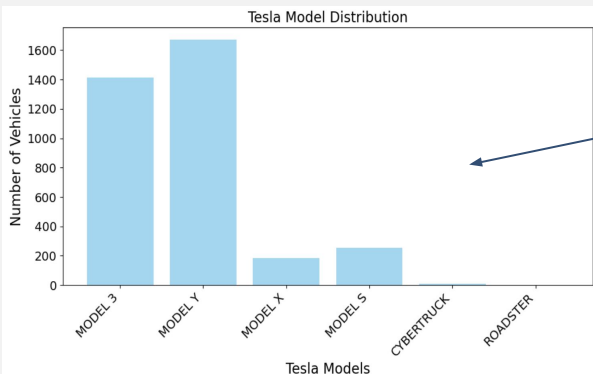
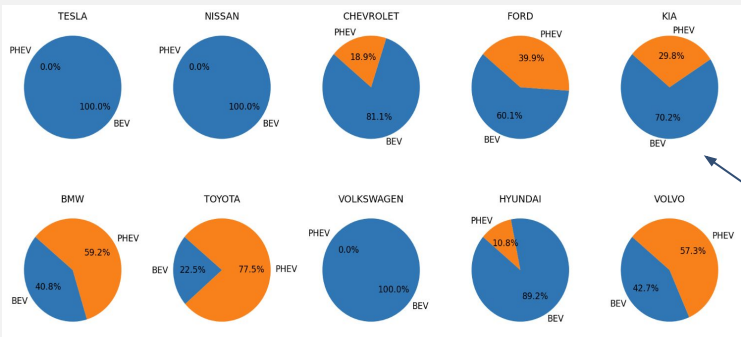
# Shattering







# Vehicle Distribution around Shop in Downtown Seattle





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