An Exploratory Analysis of ELECTRIC VEHICLES in WASHINGTON STATE

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PROJECT OUTLINE

QUESTIONS AND DATASETS

Investigated Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) that are currently registered through Washington State Department of Licensing (DOL) to understand the following:

I. Popularity of EV models
II. Correlation of EV count per model and electric range
III. Correlation of EV count per county and median income
IV. Correlation of EV count per county and population size
V. Map showing concentration of cars per county
VI. Correlation of EV's by city and EV charge stations by city
VII. Trend of EV purchases over the last 15 years

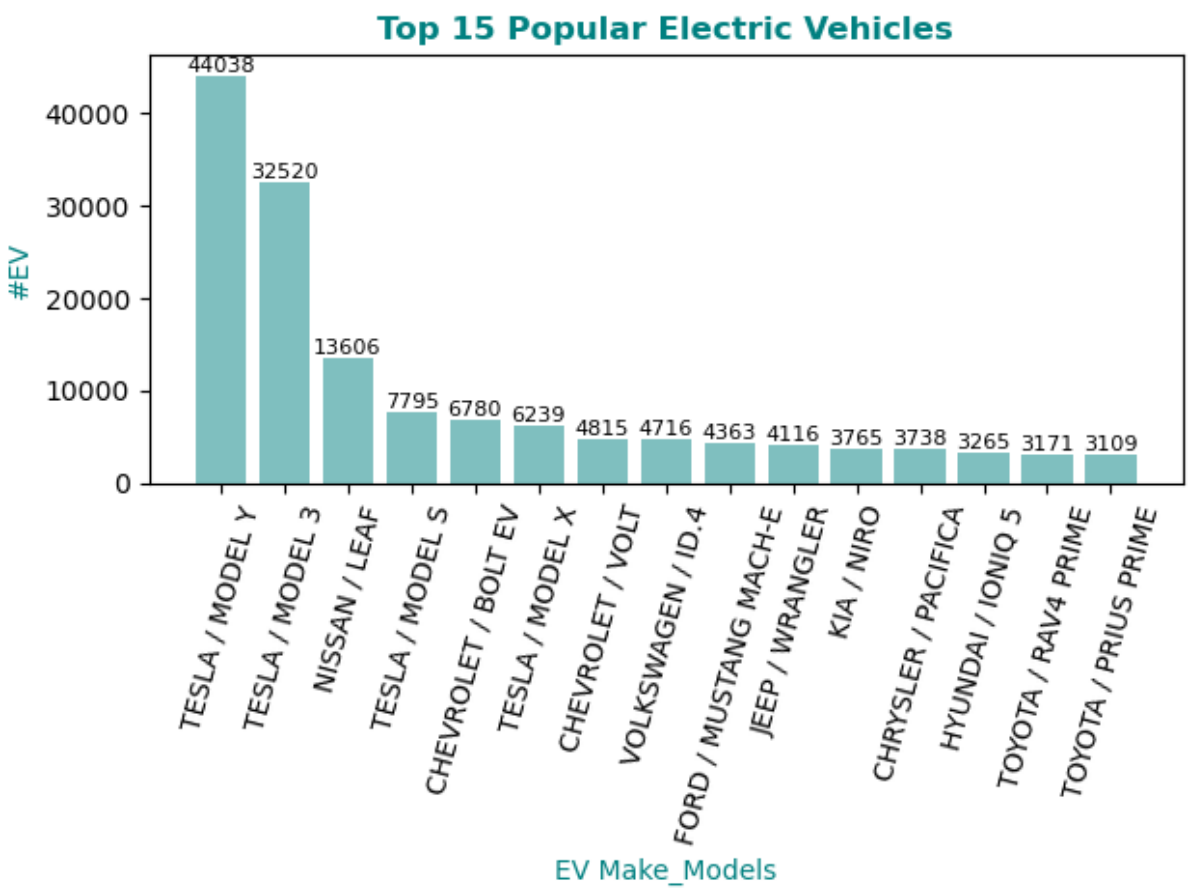
datasets

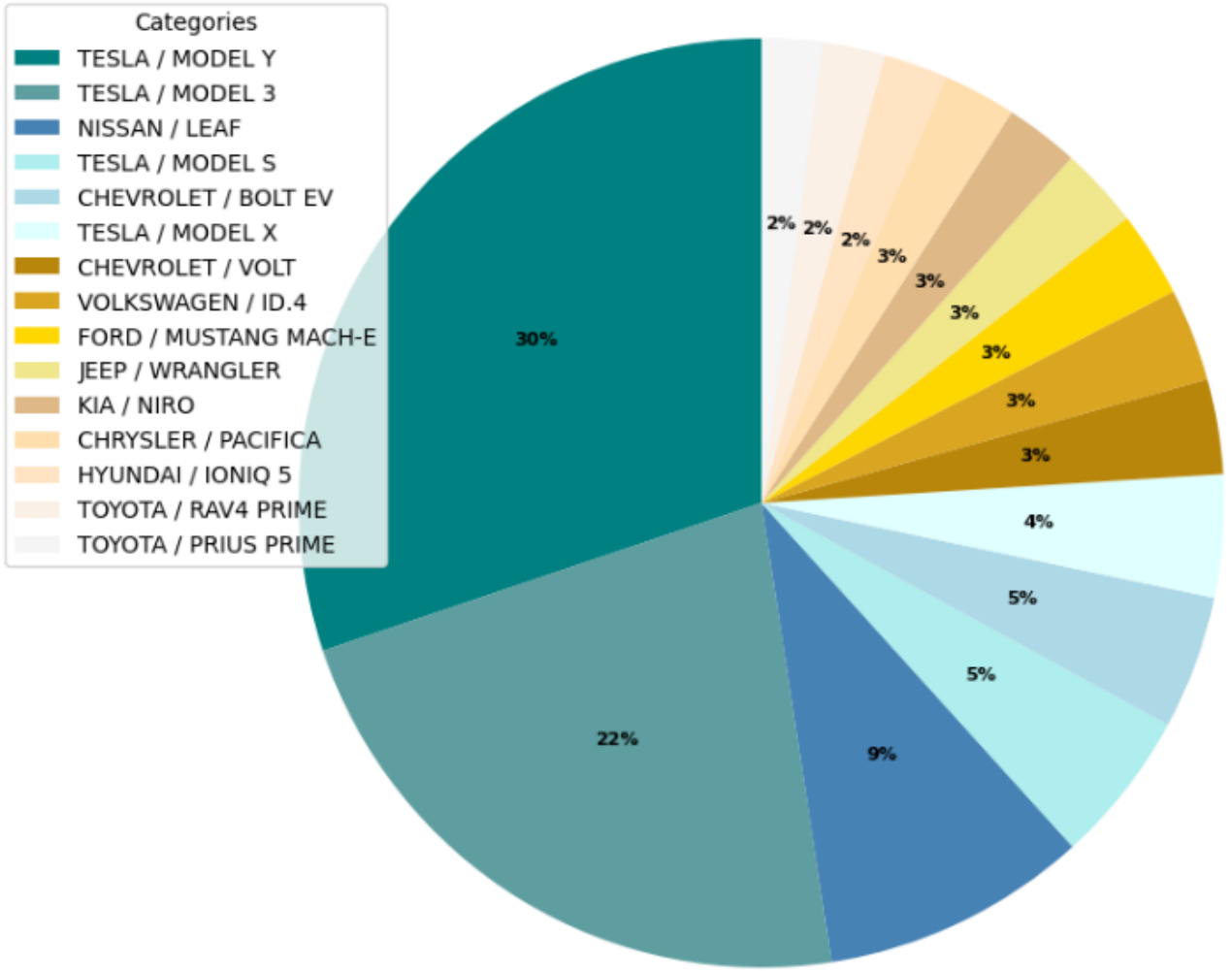
- Electric Vehicle Population Data
- Alternative Fuels Data Center: Electric Vehicle Charging Station Locations (energy.gov)
- Washington Income
- Washington Population

AND THE MOST POPULAR ELECTRIC VEHICLE IS ...

** Based on EV registrations in Washington State

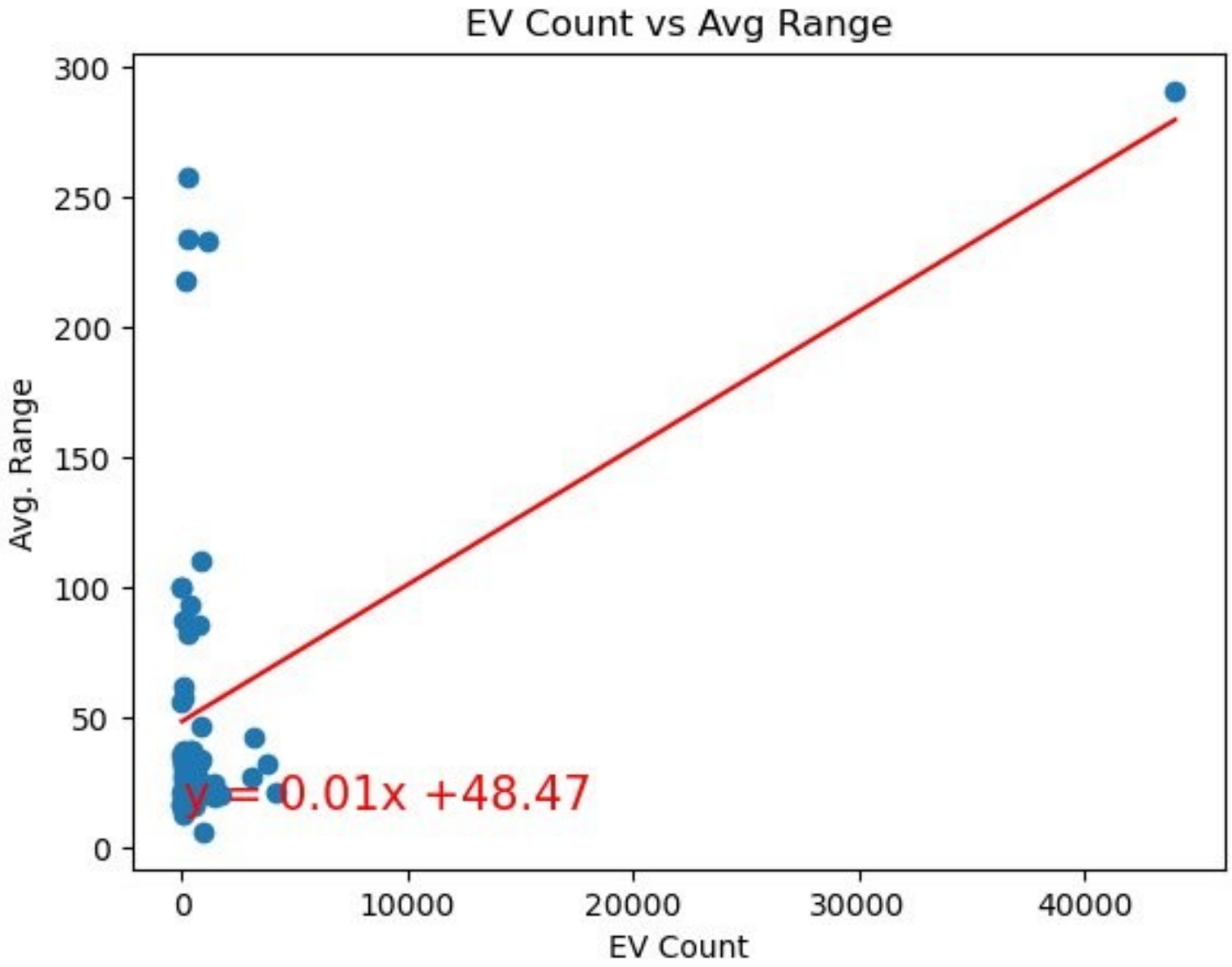
Tesla Model Y and Model 3 make up more than 50 % of the top 15 EVs registered in Washington State



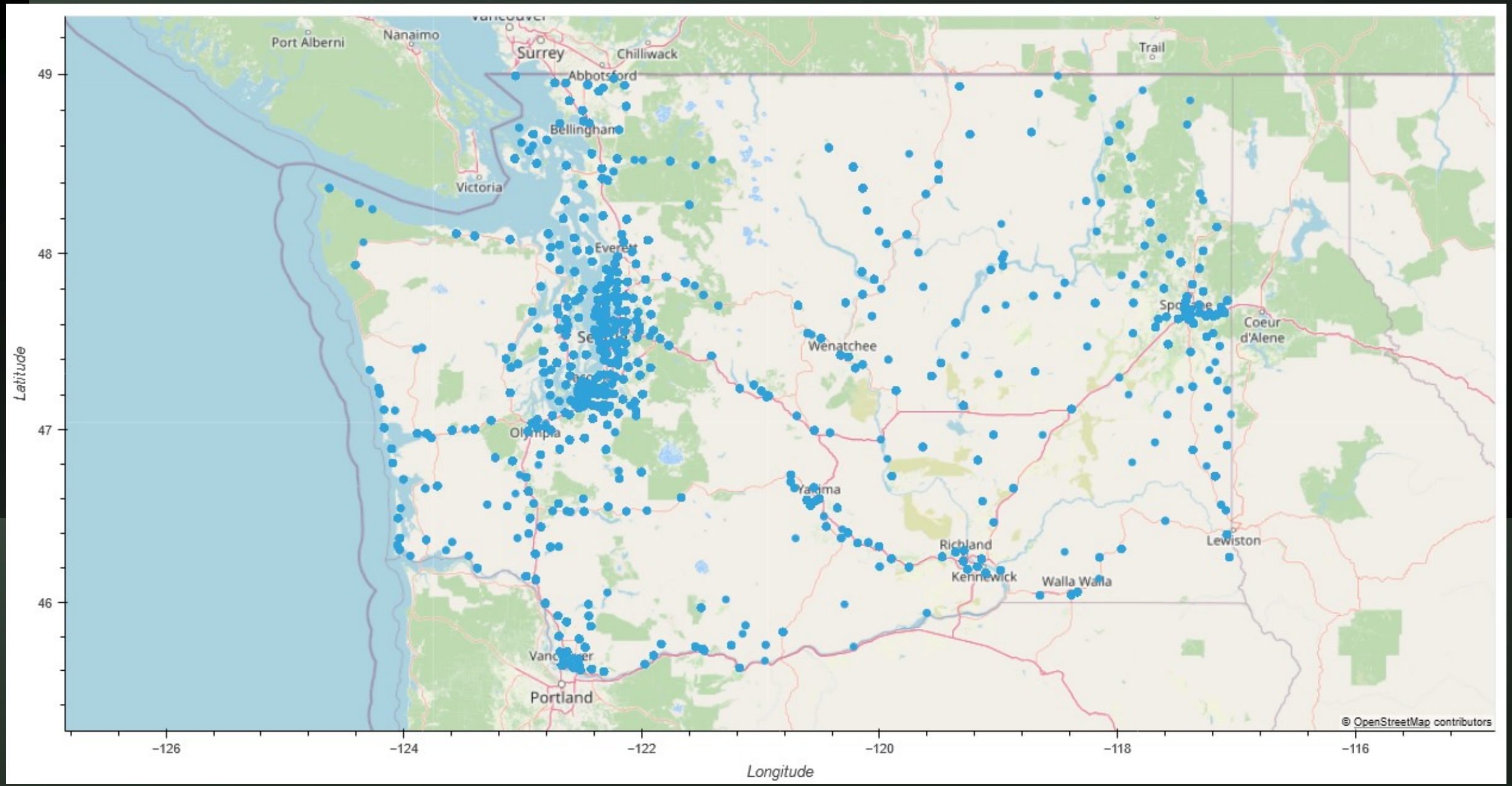


While it's not very high, 22% suggests that the model explains some variability, but there’s a significant amount of unexplained variance (78%).

This means other factors or variables not included in the model may play a role in influencing the "popularity" of EVs.



The r^2-value is: 0.222016715951401 9


Port Alberni
Nanaimo
Surrey
Chilliwack
Abbotsford
Trail
Bellingham
Victoria
Everett
Wenatchee
Coeur d'Alene
Olympia
Yakima
Richland
Kennewick
Walla Walla
Lewiston
Portland
49
48
47
46
Latitude
−126
−124
−122
−120
−118
−116
Longitude
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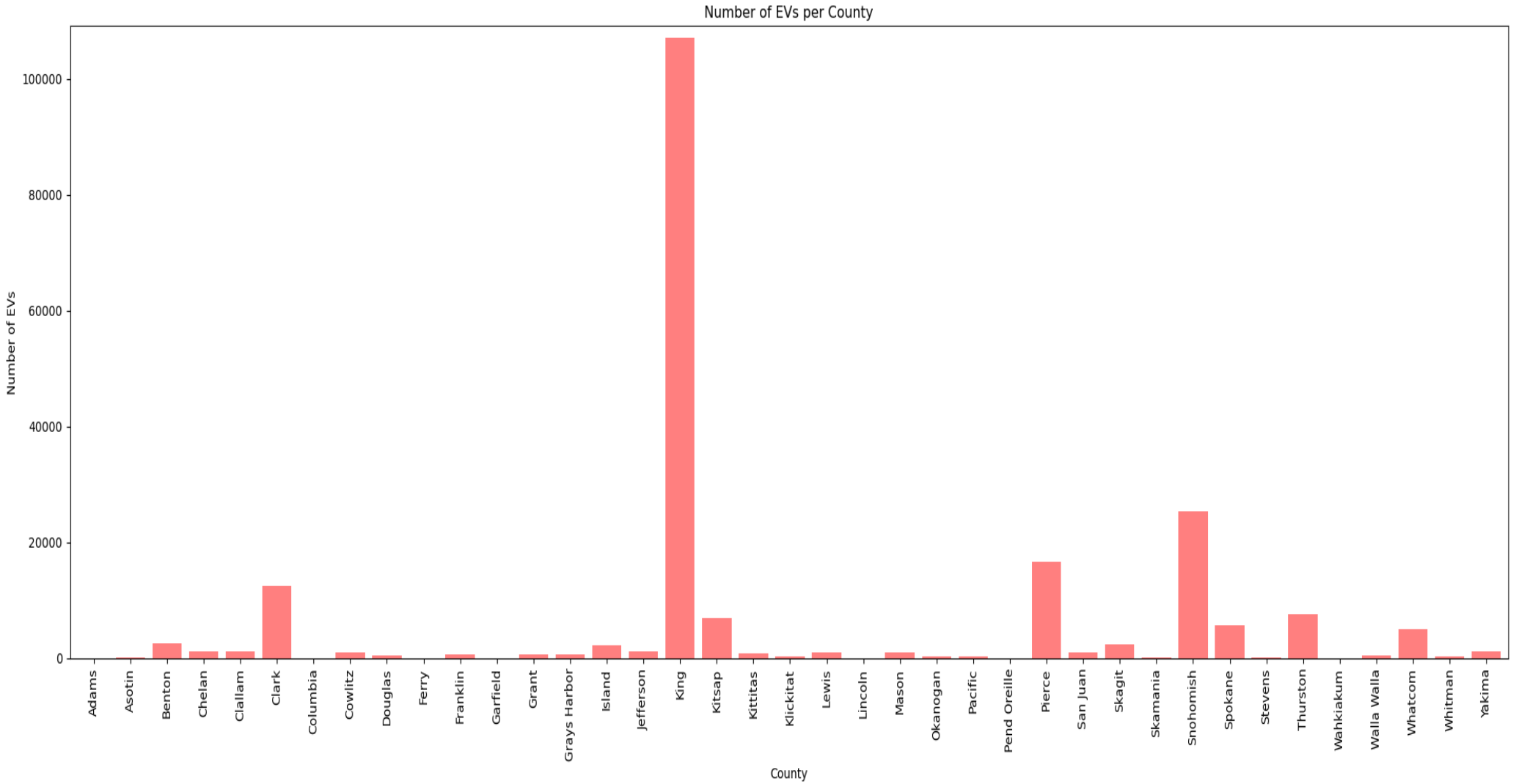
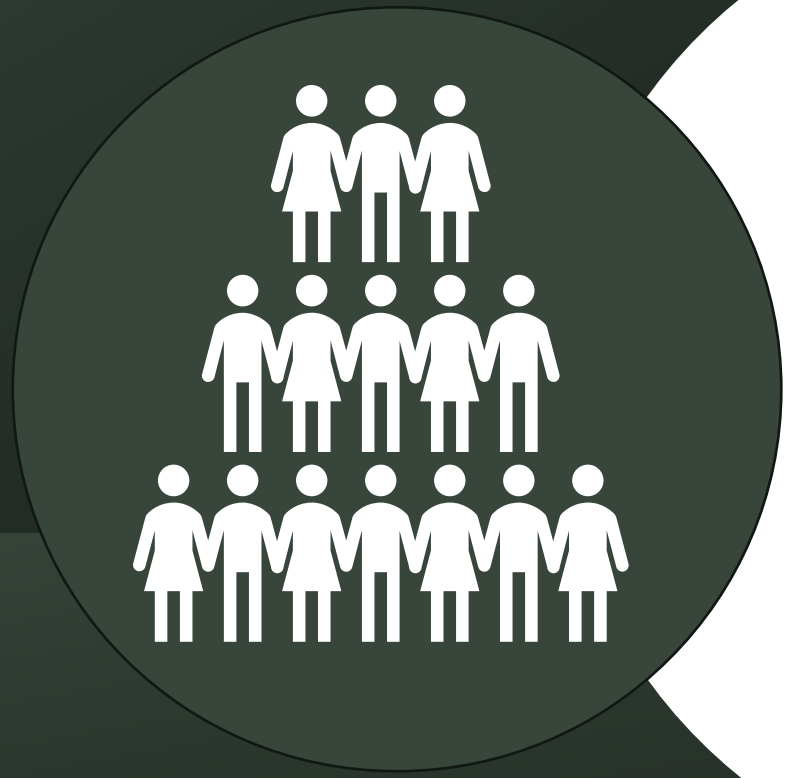
Is it worth to be (in) King ?!

The number of EVs in King county are at least 5 times greater than then any other county

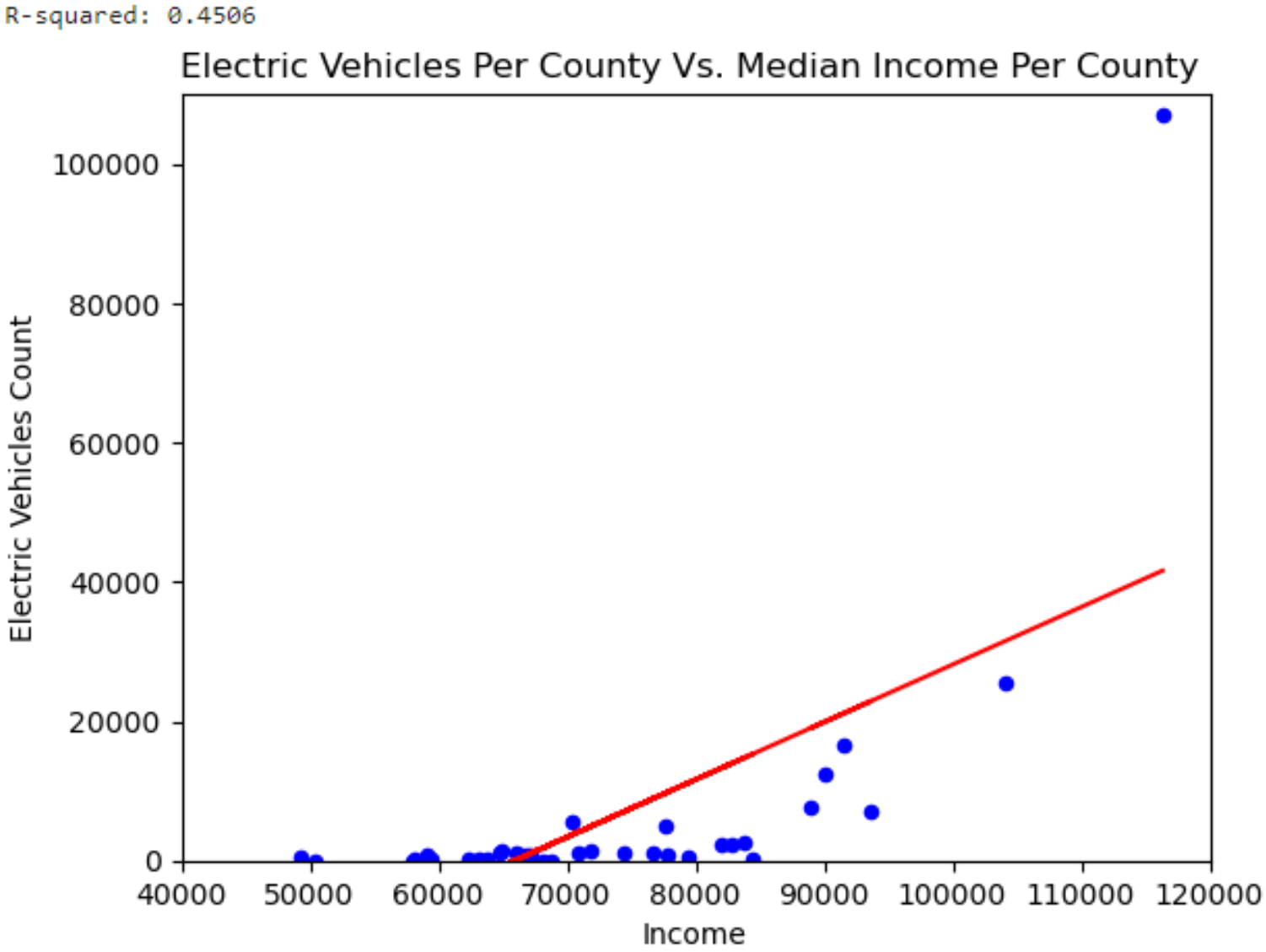


Income

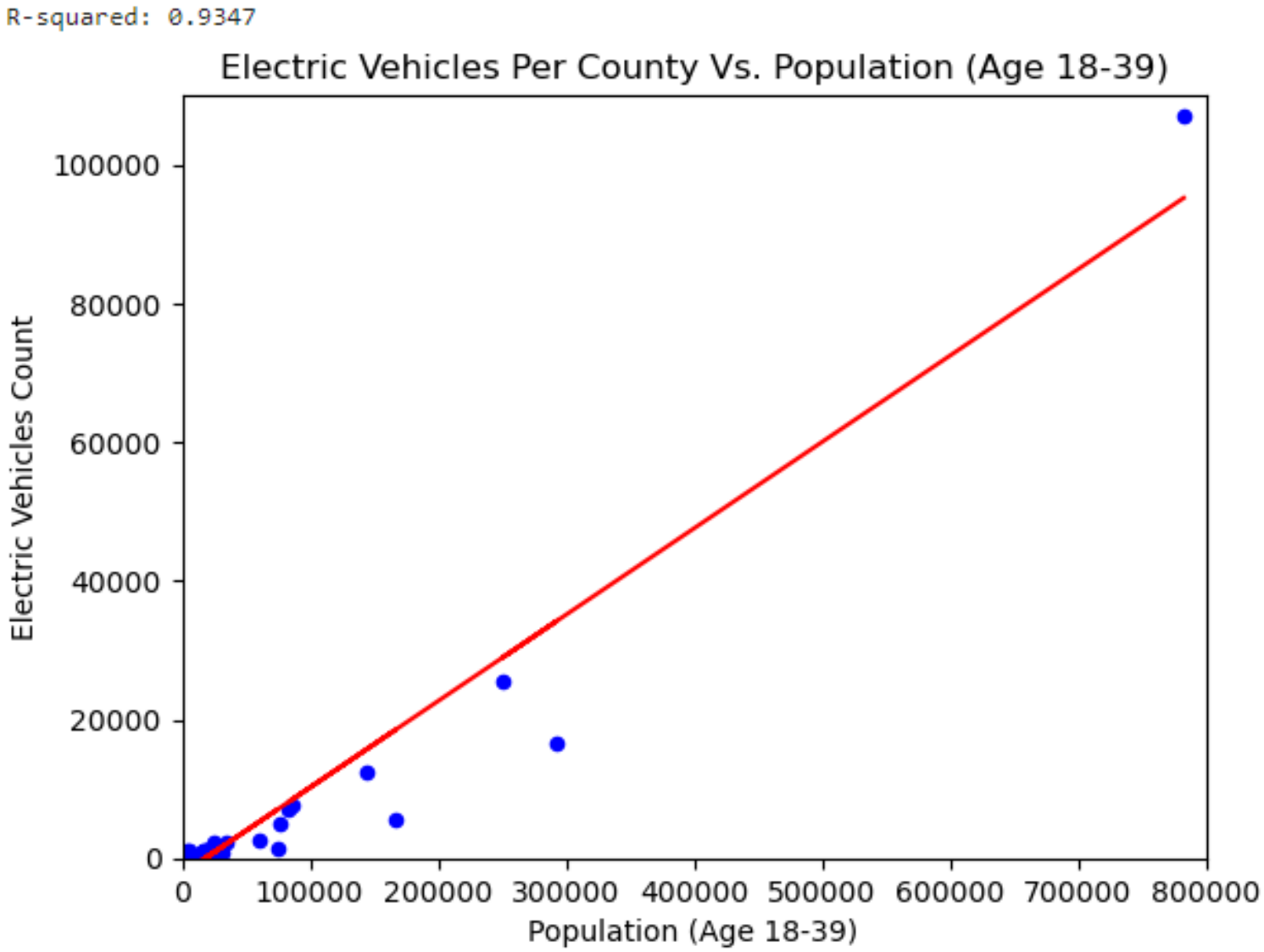


While it's not very high, 45% suggests that the model explains some variability, but there’s a significant amount of unexplained variance 55%).

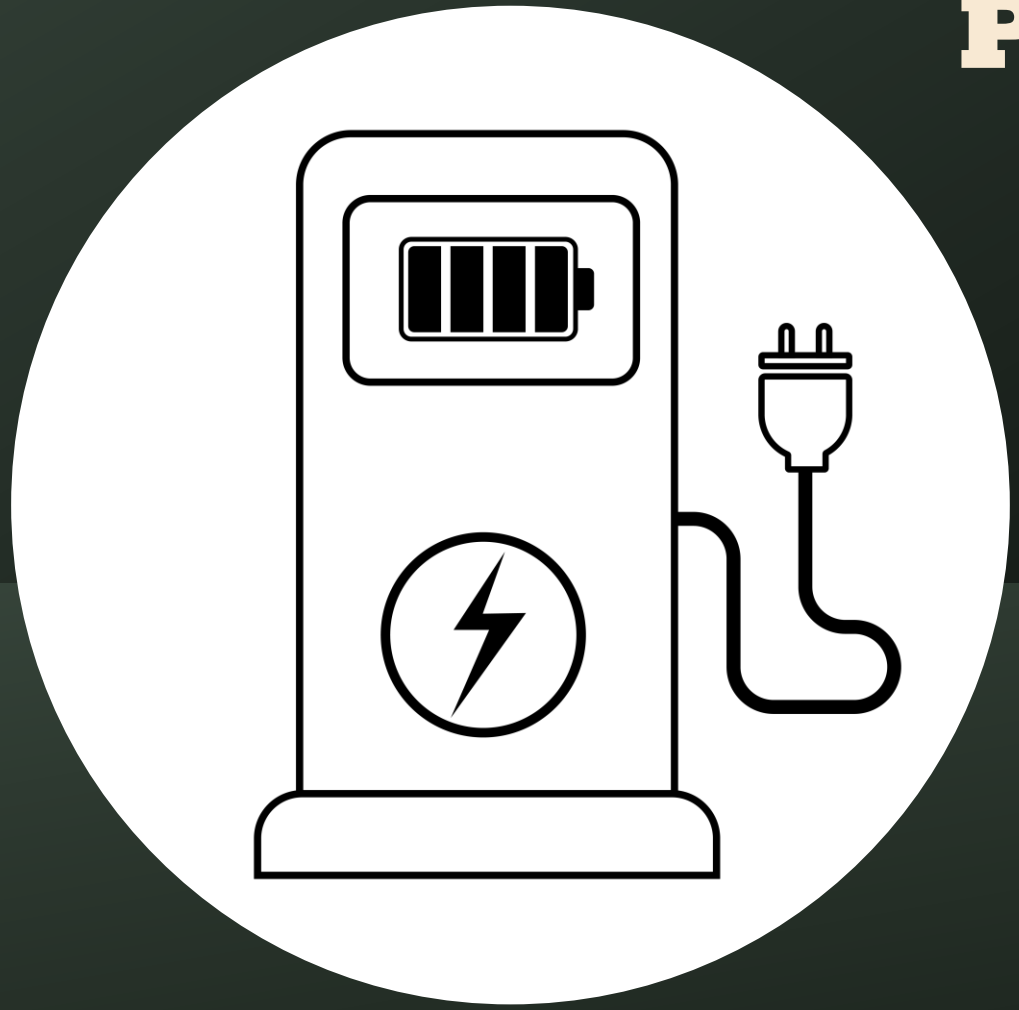
This means other factors or variables (other than income) not included in the model may play a role in influencing the of EV counts.



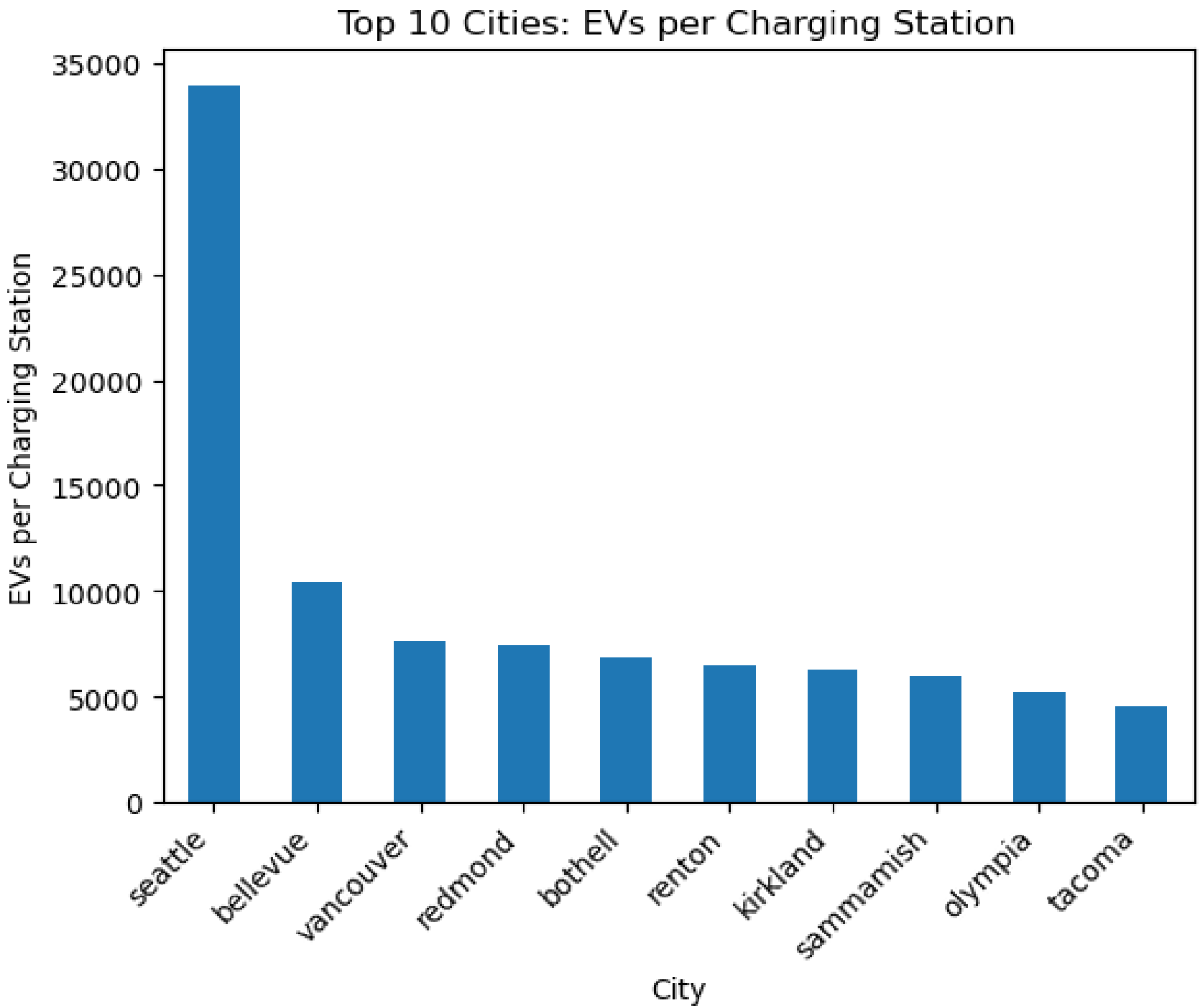
Correlation of .9347 suggest that the model explains most of the variability, greater population will result in an increase number of Evs about 93% of the time.



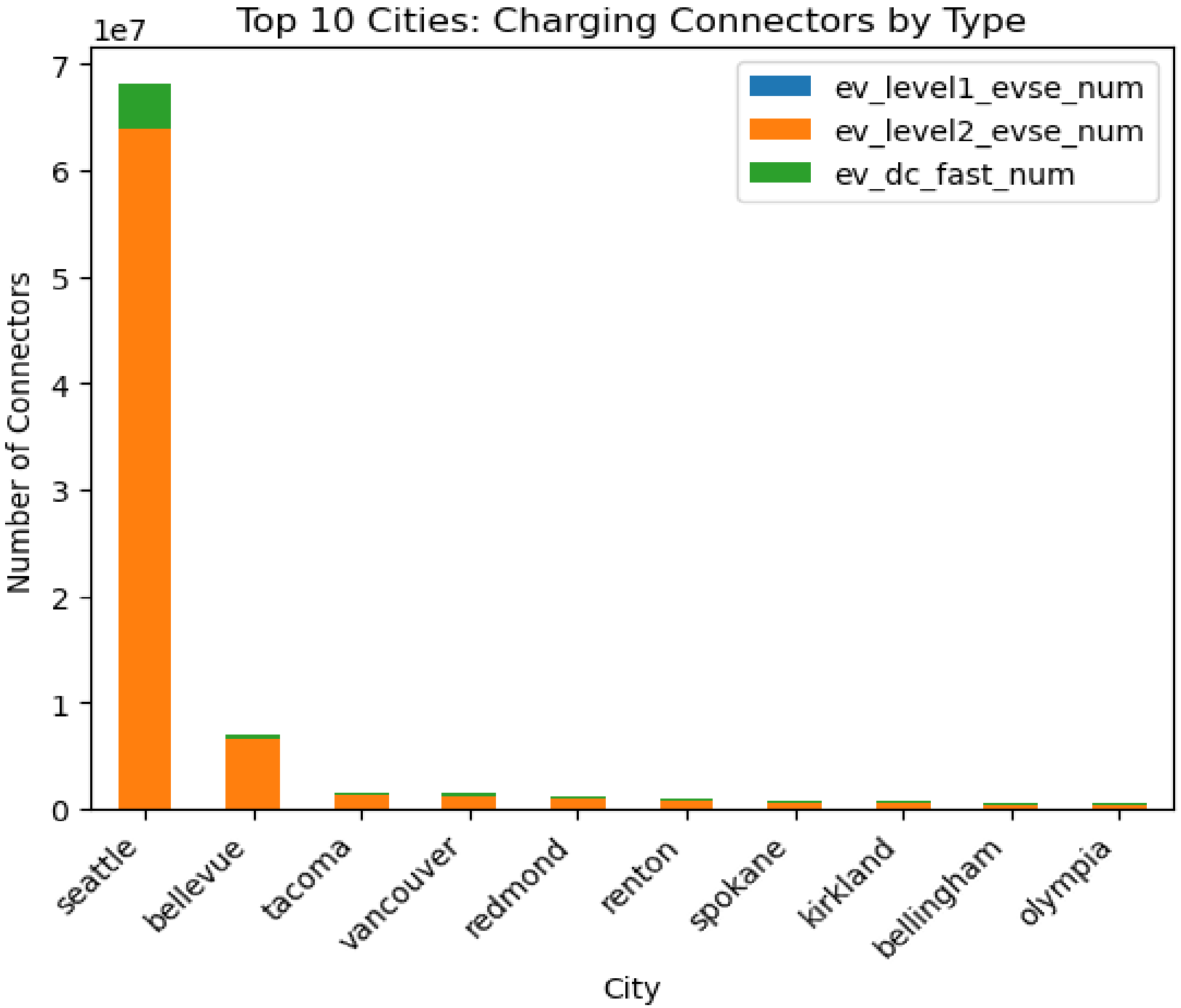
PLUG IT IN ...



- Seattle leads in EV-to-charging-station ratios, with each station supporting 33,944.52 EVs, followed by Bellevue with 10,414 EVs per station and Vancouver with 7,577 EVs per station.
- These high ratios imply that while Seattle has many connectors, its stations still face significant demand, likely leading to congestion.
- Bellevue and Vancouver are also under pressure, as the high EV counts per station show potential for bottlenecks, especially during peak usage times.
- This underscores a need for additional stations or faster-charging options, particularly in these high-density cities, to reduce wait times and enhance accessibility for EV drivers.

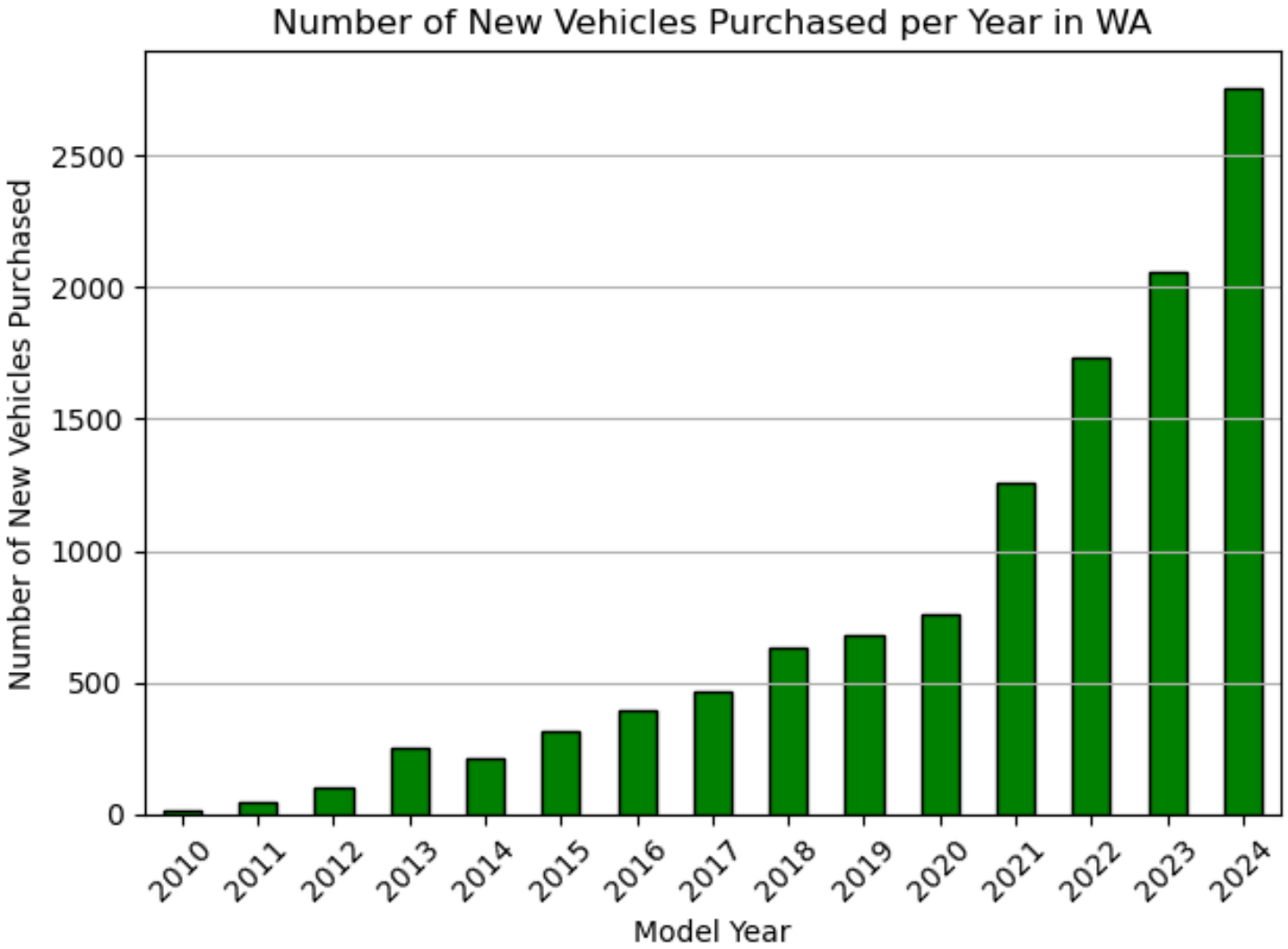


- Seattle overwhelmingly leads in total charging connectors, with 63,944 Level 1, 76,150,708 Level 2, and 6,036,339 DC Fast connectors, far surpassing other cities.
- The majority are Level 2 connectors, providing a medium-speed option that balances charging time and availability.
- Bellevue, Vancouver, and other cities in the top 10 show significantly fewer connectors, suggesting a disparity in infrastructure availability.
- This dominance in connector count, particularly in Seattle, reflects the city's commitment to supporting a growing EV population, though it indicates that other cities will need to expand their infrastructure to keep pace with EV growth.

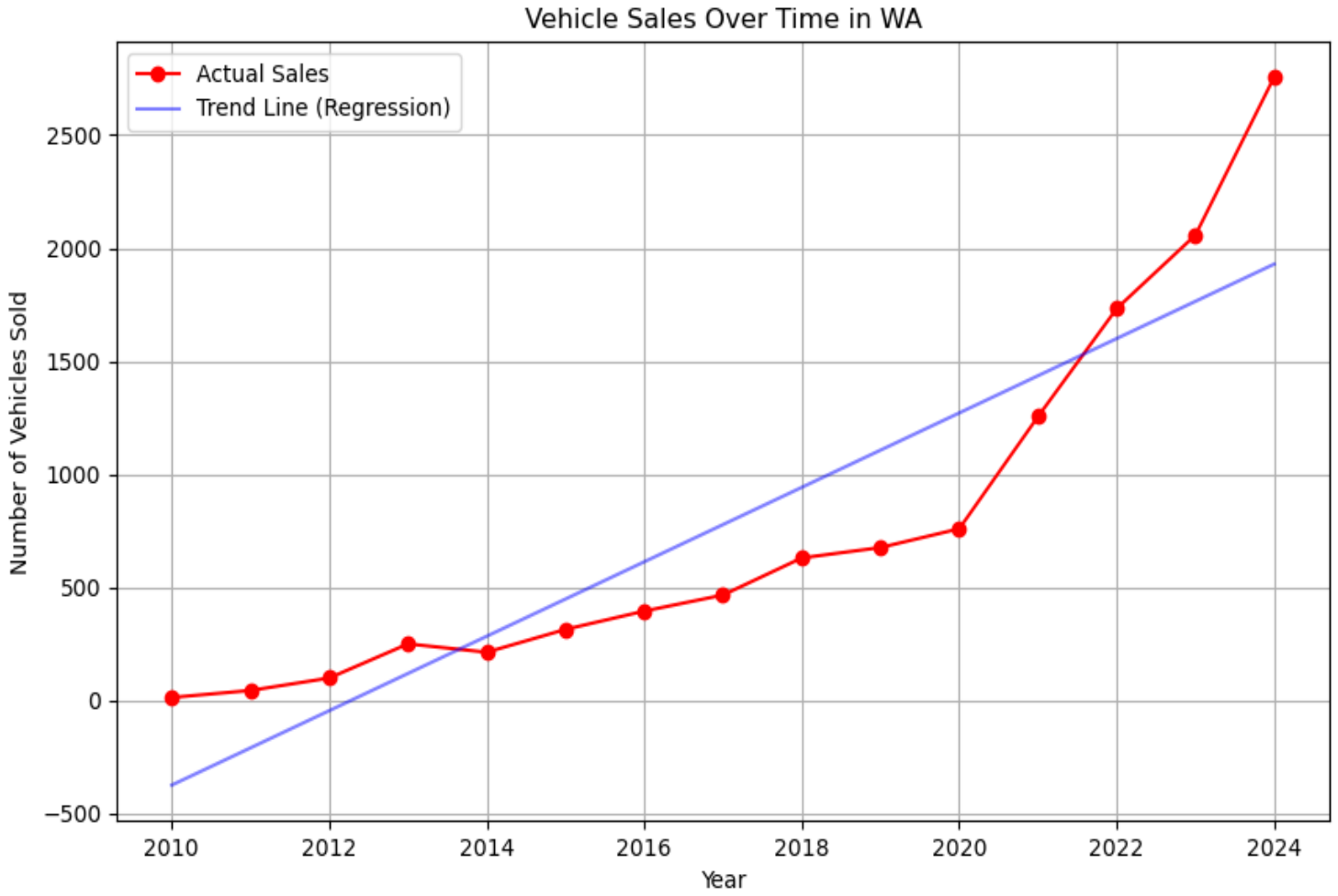


ARE EVs trendy?

- Washington has experienced a steady rise in the number of purchases of new electric vehicles (EV's) over the past 15 years.
- WA experienced a 211.07% increase in new EV purchases since 2010.



- There is a positive correlation between Number of Vehicles Sold and Year.
- Correlation Coefficient = 0.90
- The compound annual growth rate (CAGR) for new EV purchases in WA from 2010 to 2024 is 46.61%, showing a consistent annual increase in purchases.



CONCLUSION

The analysis of EV ownership in Washington State reveals several key insights:

1. **Tesla Dominance**: Tesla's Model Y and Model 3 are the most popular models, comprising over half of the top EV registrations, highlighting brand influence on consumer choice.
2. **Income and EV Ownership Correlation**: Counties with higher median incomes have more EVs, suggesting that financial capacity significantly impacts EV adoption due to the higher upfront cost of these vehicles.
3. **Population Density as a Factor**: Larger, more densely populated counties, particularly King County, have the highest EV ownership rates, influenced by both income levels and infrastructure availability.

with high EV-to-charging-station ratios, face charging congestion, underlining the need for expanded or faster-charging infrastructure in high-density areas.

5. **Consistent Growth in EV Purchases**: EV purchases in Washington have grown steadily since 2010, with a compound annual growth rate of 46.61% and a high correlation with time, driven by advancements in EV technology, policy support, and infrastructure expansion.