

A panoramic view of the Seattle skyline, featuring the Space Needle prominently on the left. The city's dense urban landscape is visible, with various skyscrapers and buildings. In the background, the snow-capped Mount Rainier rises against a hazy sky. The foreground shows some greenery and lower-level buildings, partially obscured by the text.

# **Electric Cars of Washington State**

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# Outline

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## Domain & Data Sources

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data sources

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## Ontology

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## Queries & Data Analysis

Queries, heatmaps  
and graphs

04

## Future Work

Future work &  
possible expansion



**01**

# **Domain & Data Sources**

# Domain



## Electric Cars

Plug-In and Battery cars  
registered in the state of  
Washington



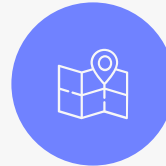
## Charging Stations

Private and Public  
Stations to recharge  
electric vehicles



## Adjusted Gross Income

Adjusted Gross Income (AGI)  
for each ZIP Code



## ZIP Codes

ZIP Codes and related  
cities and counties

# Goal

The goal of our work is to provide a knowledge graph to evaluate the electric vehicles accessibility by highlighting the **correlation** between:

- The **electric cars**
- The **charging stations**
- The **average income**

of the people living in the state of Washington, focusing on the different territorial divisions.

# Data Sources



## Electric Cars

Plug-In and Electric (BEV)  
cars

2 possible sources:

- Kaggle
- data.wa.gov



## AGI

Adjusted Gross Income for  
each ZIP Code



## Charging Station

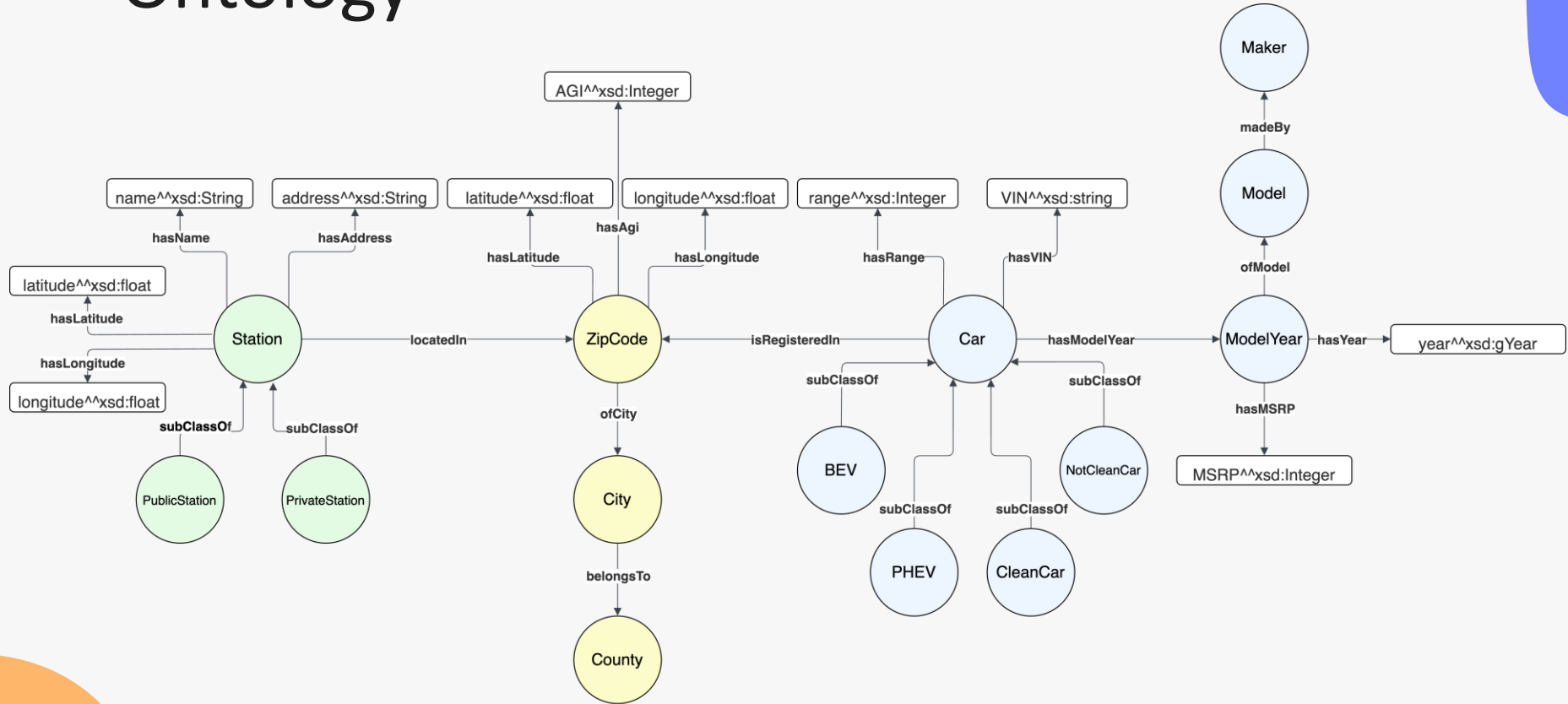
Data about Public and  
Private station to charge  
electric vehicles



02

# Ontology

# Ontology







03

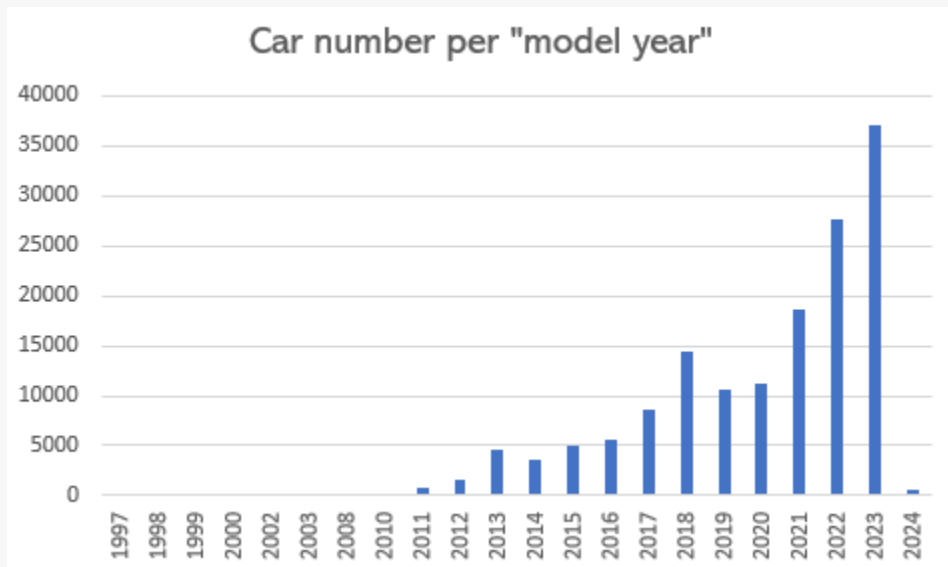
# Queries & Data Analysis



# Cars Over Time

How many electric cars are registered for each model-year?

➤ Indicator of EV adoption through time.



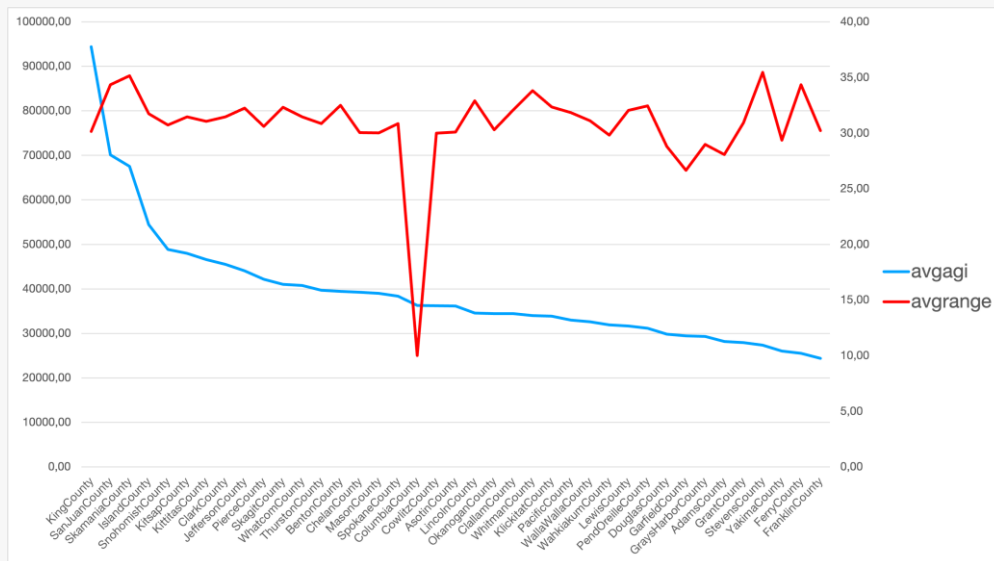
```
SELECT ?year (COUNT(?car) as ?amount) WHERE{  
    ?car elec:hasModelYear ?moye .  
    ?moye elec:hasYear ?year .  
}  
GROUP BY ?year
```

# PHEV Cars Range and AGI

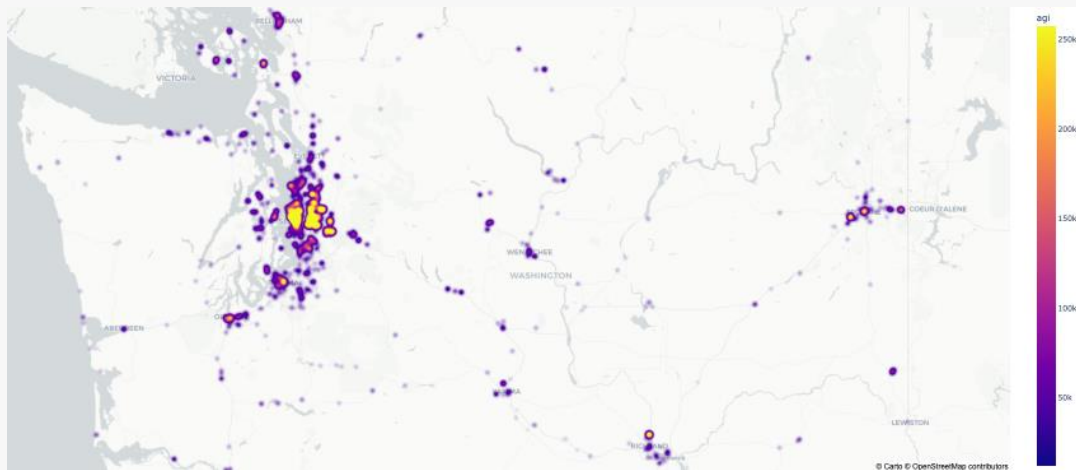
What is the average range of PHEV cars and average AGI for each county?

➤ Do, on average, richer regions buy longer-range hybrid vehicles?

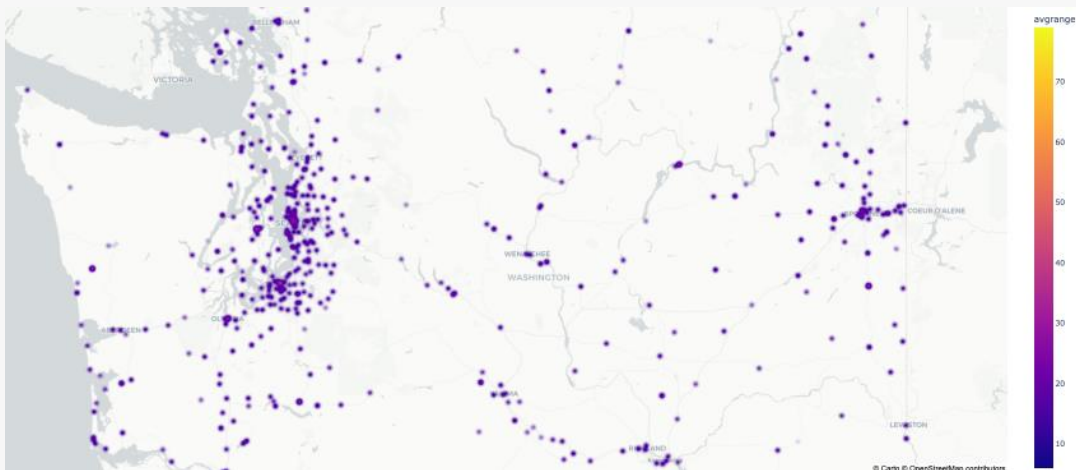
```
select ?county (AVG(?avgagi) AS ?avgagi) (AVG(?range) AS ?avgrange) where {  
  ?county a elec:County.  
  ?city elec:belongsTo ?county.  
  ?zipcode elec:ofCity ?city.  
  ?car a elec:PHEV;  
    elec:isRegisteredIn ?zipcode;  
    elec:hasRange ?range.  
  
  FILTER(?county=?agicity)  
  
  {  
    select ?agicity (AVG(?agi) AS ?avgagi) where {  
      ?agicity a elec:County.  
      ?city elec:belongsTo ?agicity.  
      ?zipcode elec:ofCity ?city;  
      elec:hasAgI ?agi.  
    }  
    GROUP BY ?agicity  
    ORDER BY asc(?agicity)  
  }  
}  
  
GROUP BY ?county  
ORDER BY desc(?avgagi)
```



AGI distribution



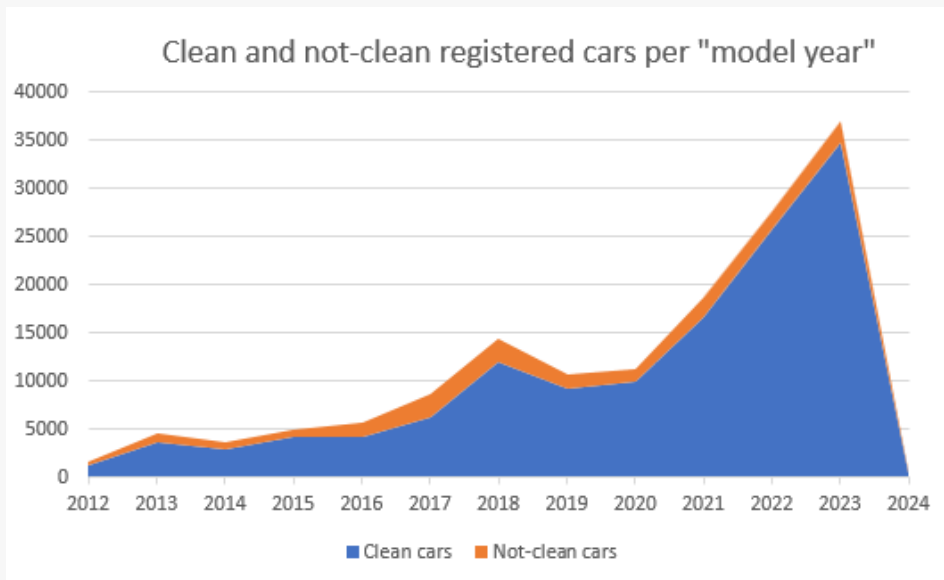
PHEVcarrange



# Clean and Not Clean Cars

What is the clean and non-clean car count for each production year?

- Highlights how the amount of clear and non-clean registered vehicles varied over time and their proportion.

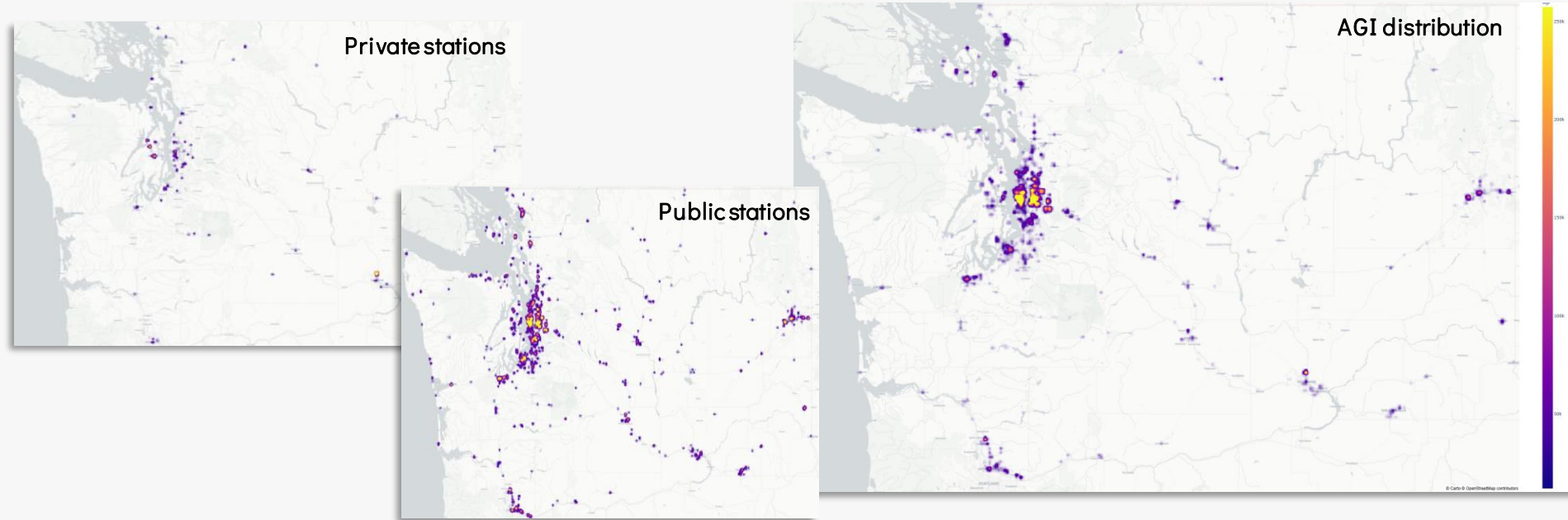


```
SELECT ?year ?clc ?nclc WHERE{
  # Below, the amount of registered clean "model years" is queried.
  {
    SELECT ?year (COUNT(?car) AS ?clc) WHERE{
      ?moye elec:hasYear ?year .
      ?car elec:hasModelYear ?moye .
      ?car rdf:type elec:CleanCar .
    }
    GROUP BY ?year
  }
  # Below, the amount of registered non-clean "model years" is queried.
  {
    SELECT ?year (COUNT(?car) AS ?nclc) WHERE{
      ?moye elec:hasYear ?year .
      ?car elec:hasModelYear ?moye .
      ?car rdf:type elec:NotCleanCar .
    }
    GROUP BY ?year
  }
}
ORDER BY DESC(?year)
```

# AGI and Station densities

What are the mean AGI and charging station amount/type distributions?

- Highlights the eventual correlation between wealth and charging station density/type

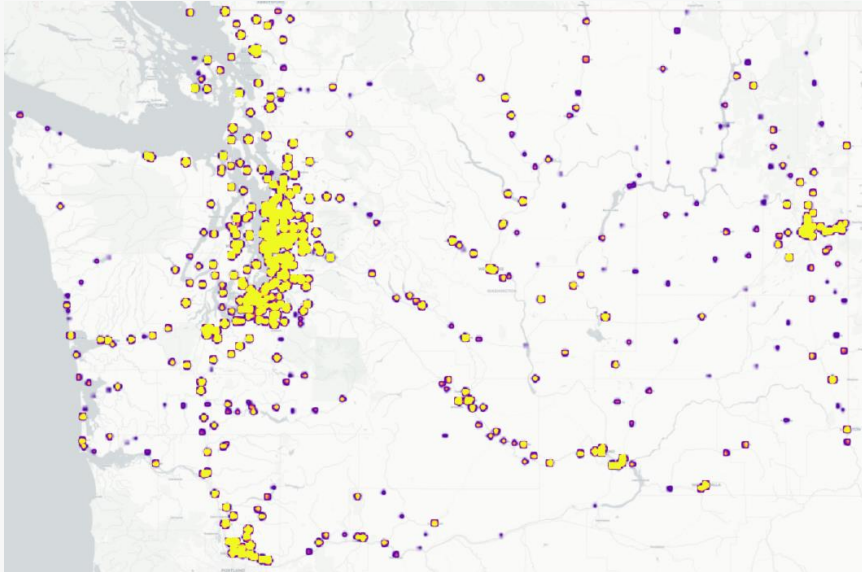


# Car and Station densities

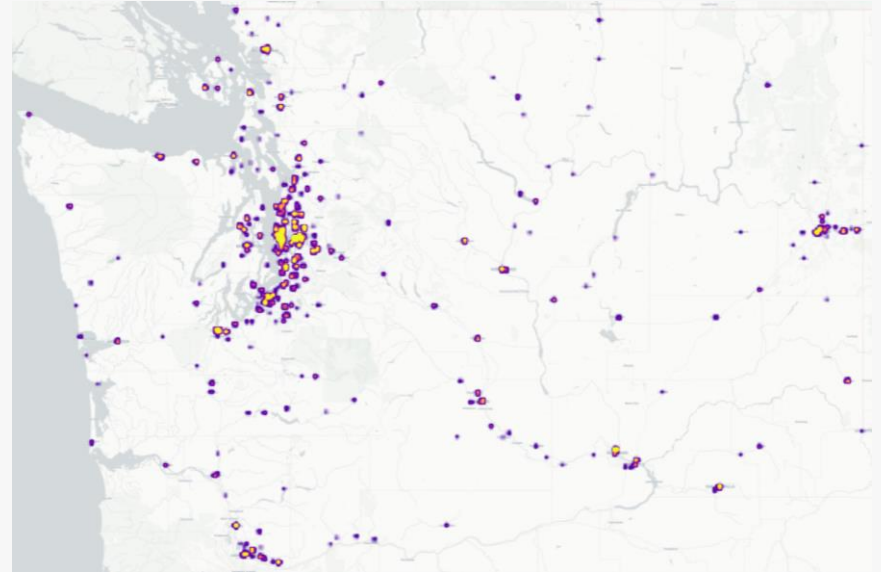
What are the car and the electric station distributions?

- Highlights the eventual correlation between car density and charging station density

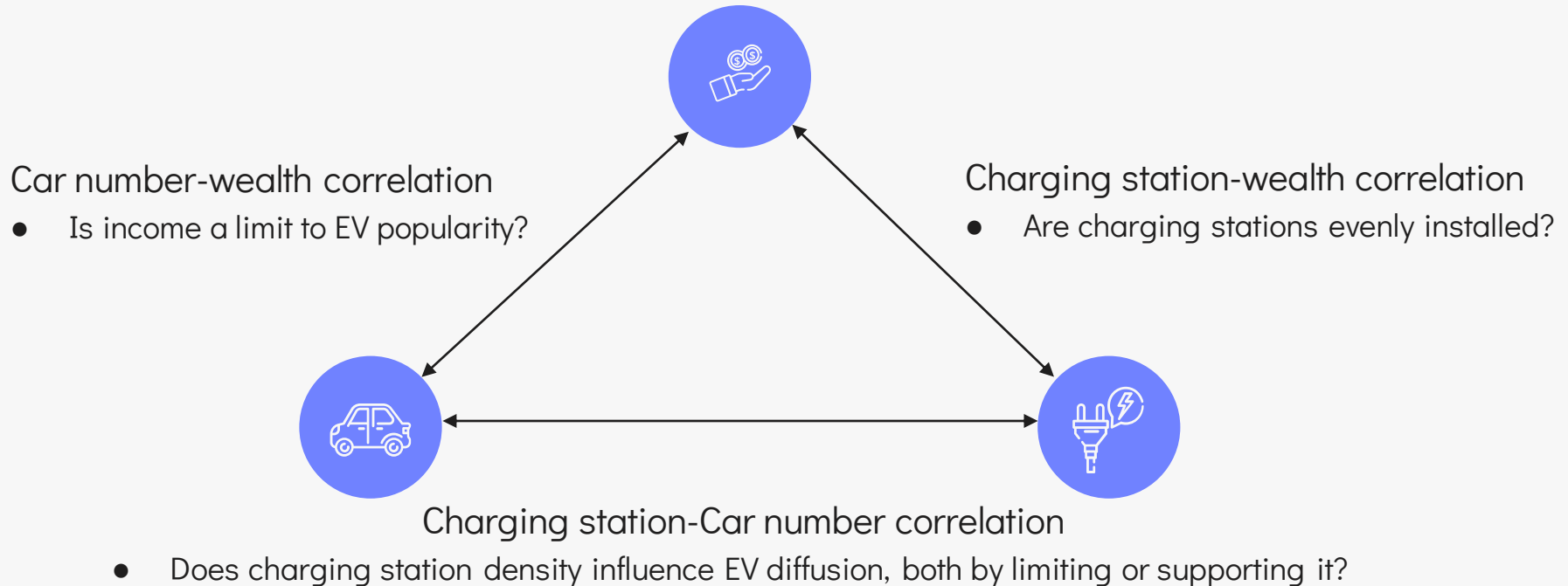
Car density



Station density



# KG Applications







04

# Future Work

# Future Development & Expansion

## ✦ **Add more US States**

Expand the kg with data from other US states

## ✦ **Range of electric cars**

Range of electric cars is not maintained since they are considered all clean

## ✦ **Expand to Europe/World**

Challenge due to the ZIP Codes

## ✦ **Add power suppliers**

Need a data source to merge cars and stations power suppliers



**Thanks for your  
attention!**