

A panoramic view of the Seattle skyline, featuring the Space Needle prominently on the left. The city's skyscrapers are visible in the background, and Mount Rainier is seen in the distance under a clear blue sky. The foreground shows some greenery and lower buildings.

Electric Cars of Washington State

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Outline

01

Domain & Data Sources

Domain, goals and
data sources

02

Ontology

Domain model

03

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



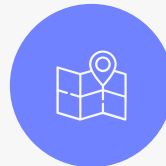
Charging Stations

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

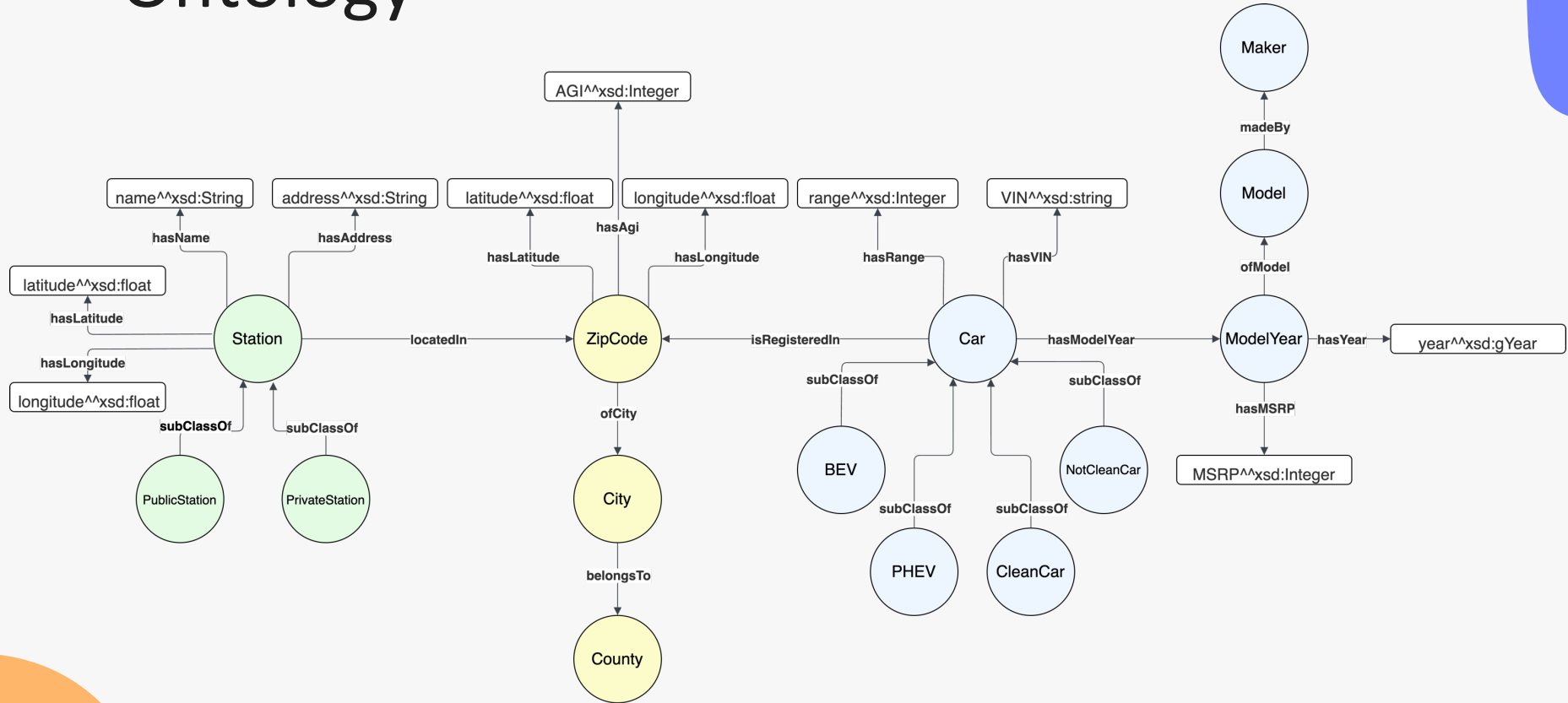
Data about Public and
Private station to charge
electric vehicles



02

Ontology

Ontology





03

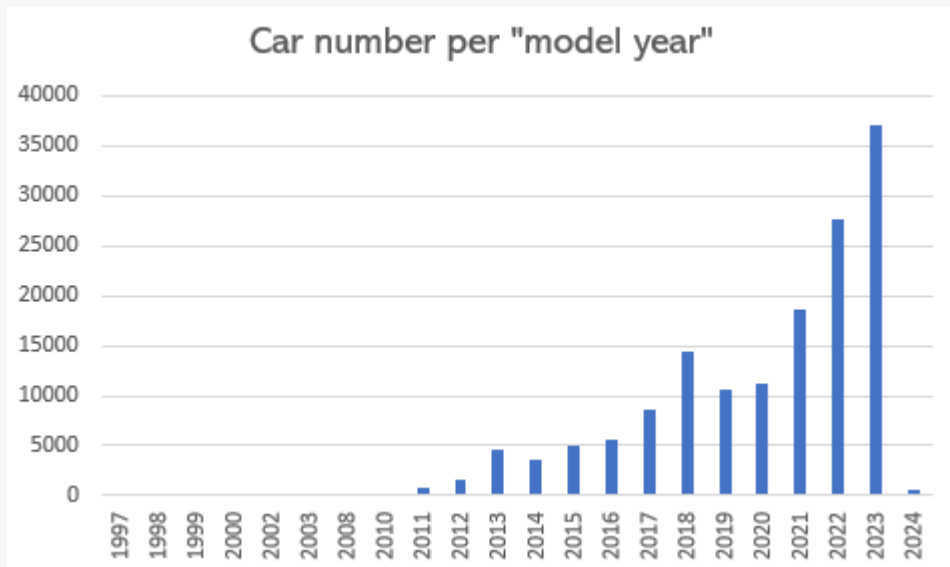
Queries & Data Analysis



Cars Over Time

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

➤ Indicator of EV adoption through time.



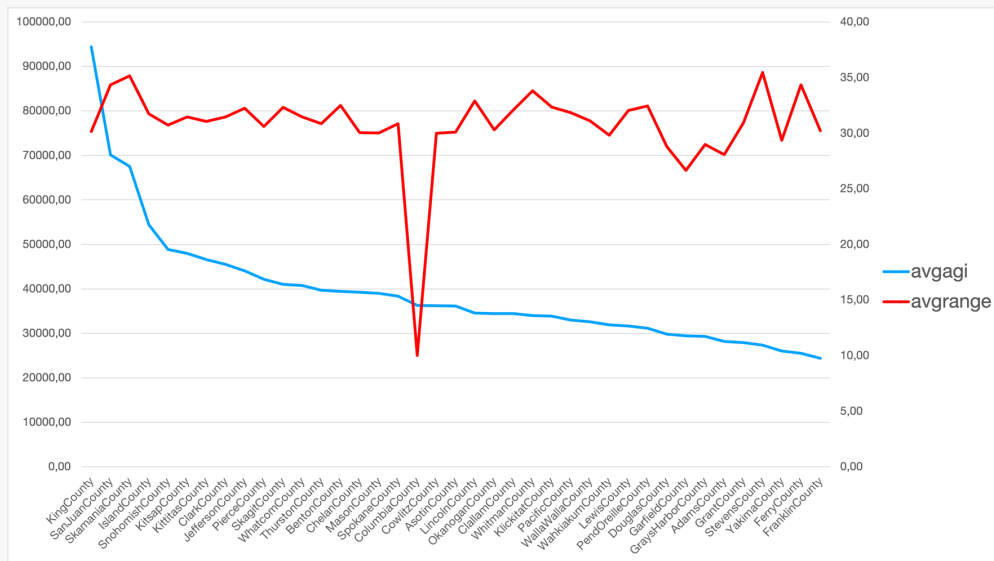
```
SELECT ?year (COUNT(?car) as ?amount) WHERE{  
  ?car elec:hasModelYear ?moye .  
  ?moye elec:hasYear ?year .  
}  
GROUP BY ?year
```

PHEV Cars Range and AGI

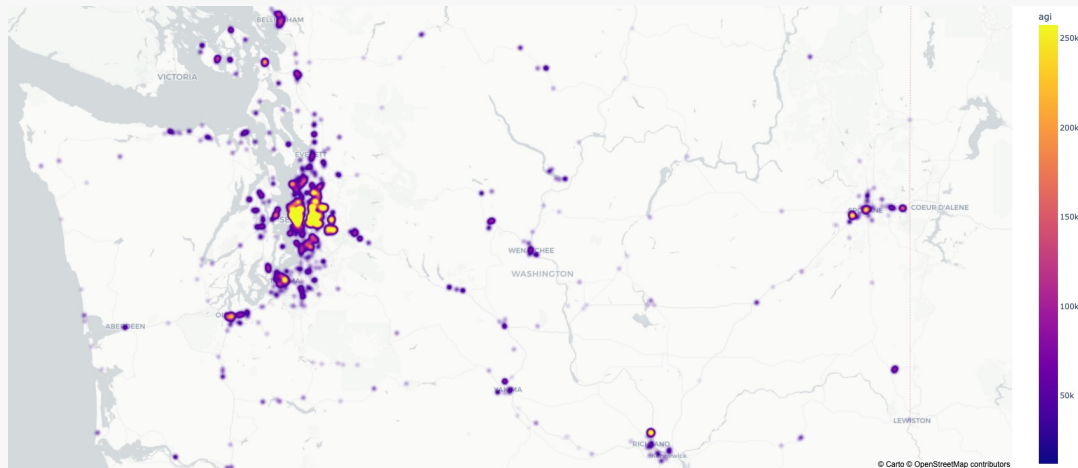
What is the average range of PHEV cars and average AGI for each county?

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

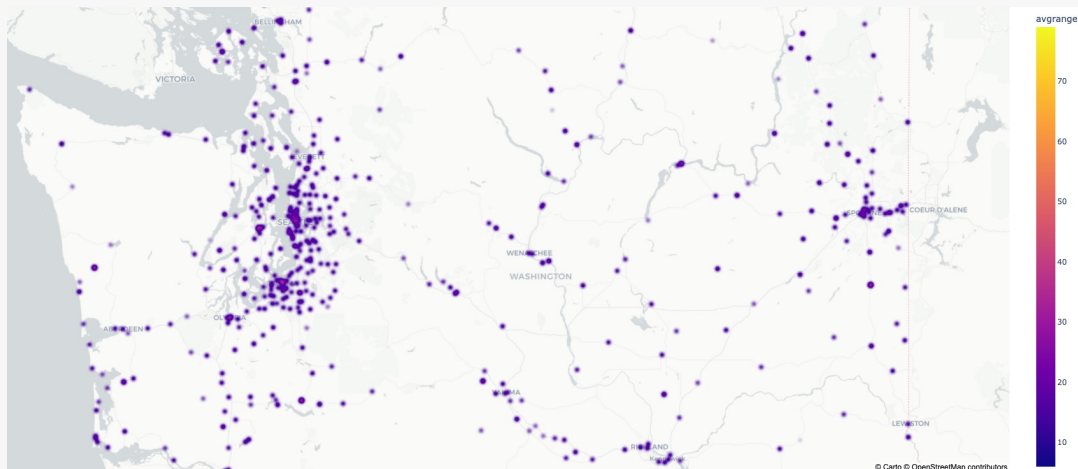
```
select ?county (AVG(?avgagi) AS ?avgagi) (AVG(?avgrange) AS ?avgrange) where {  
  ?county a elec:County.  
  ?city elec:belongsTo ?county.  
  ?zipcode elec:ofCity ?city.  
  ?car a elec:PHEV;  
    elec:isRegisteredIn ?zipcode;  
    elec:hasRange ?range.  
  
  FILTER(?county=?agicounty)  
  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



AGI distribution



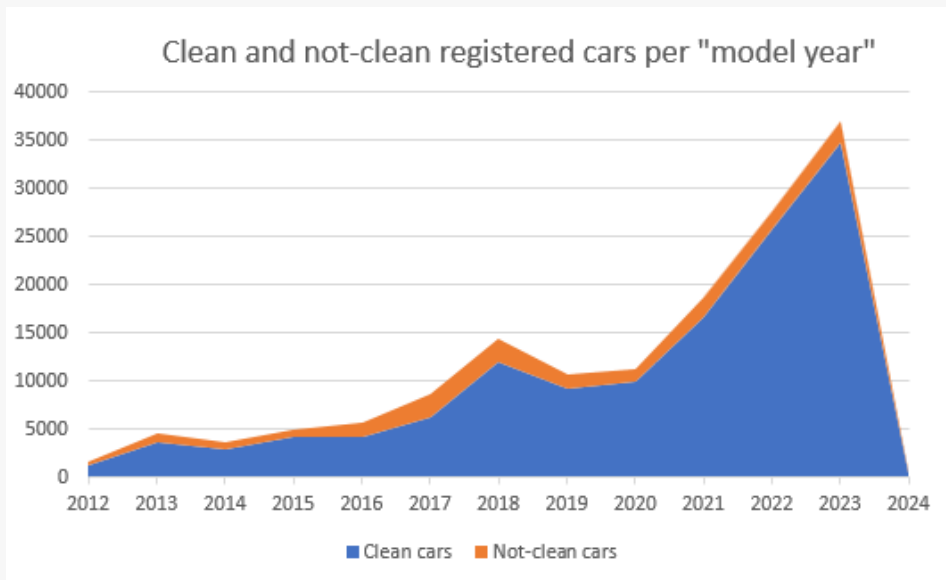
PHEV car range



Clean and Not Clean Cars

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

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

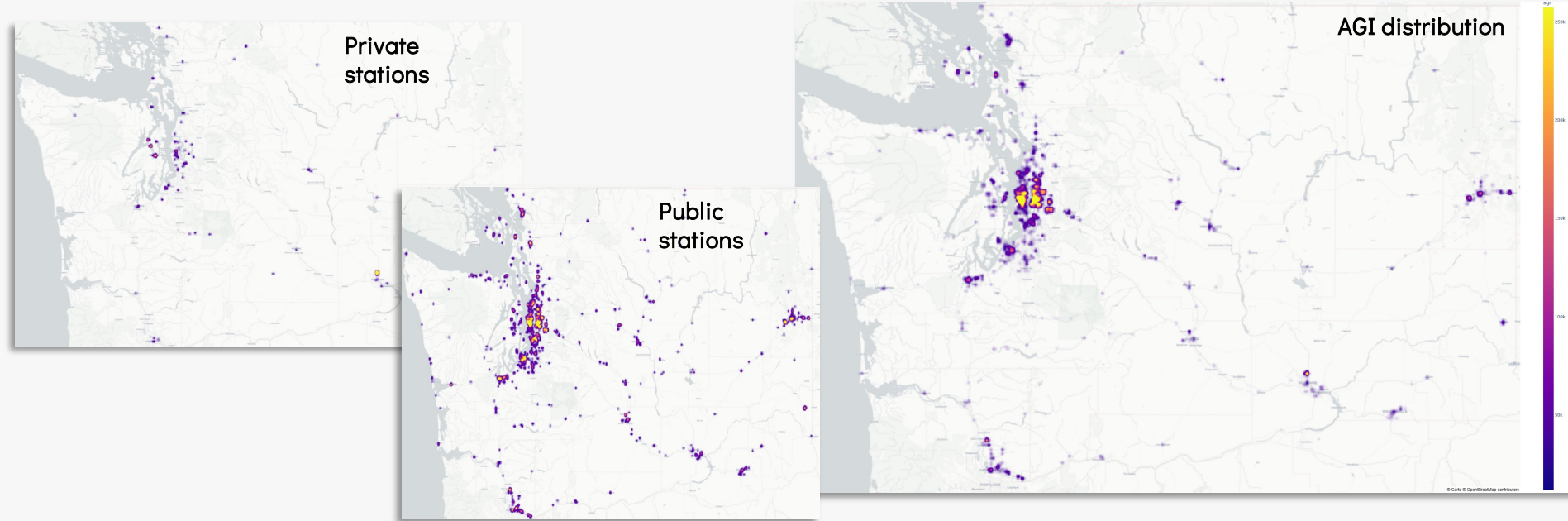


```
SELECT ?year ?clc ?nclc WHERE{
  # Below, the amount of registered clean "model years" is queried.
  {
    SELECT ?year (COUNT(?car) AS ?clc) WHERE{
      ?moye elec:hasYear ?year .
      ?car elec:hasModelYear ?moye .
      ?car rdf:type elec:CleanCar .
    }
    GROUP BY ?year
  }
  # Below, the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

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

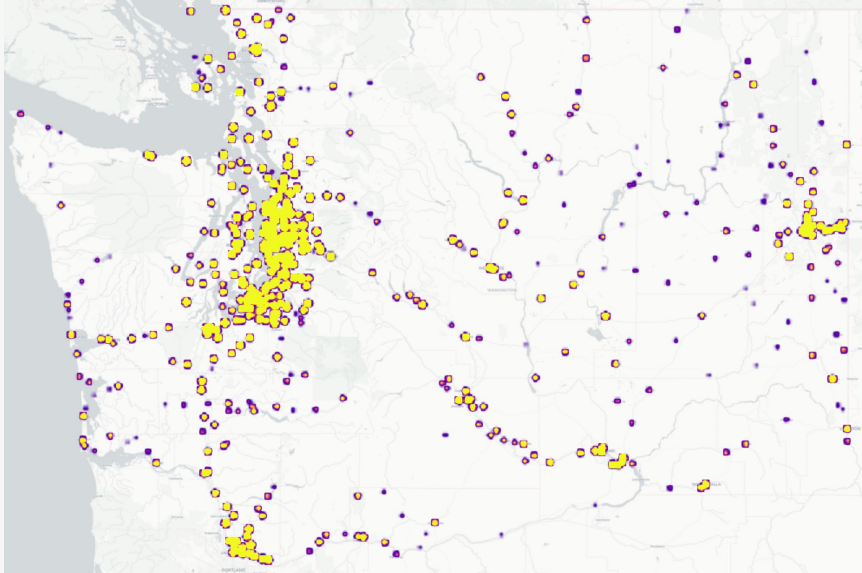


Car and Station densities

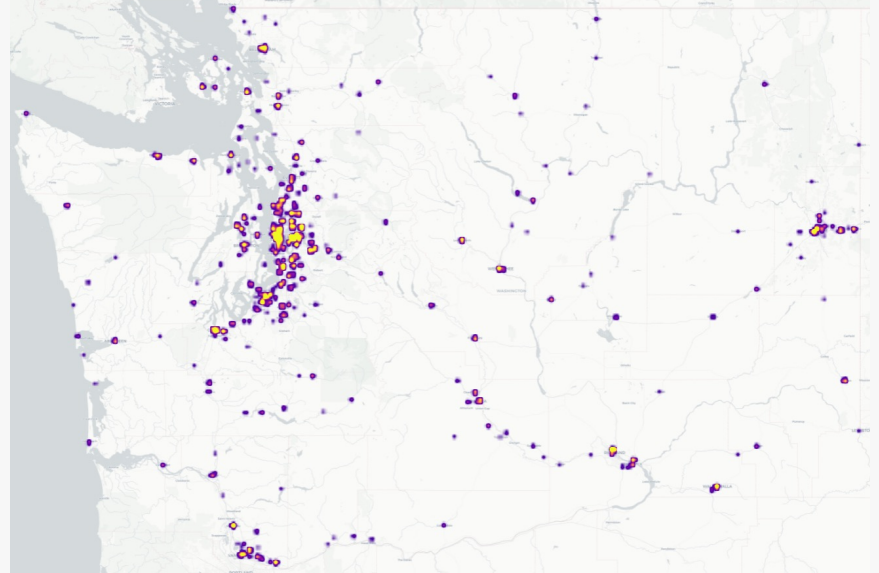
What are the cars and the electric stations distributions?

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

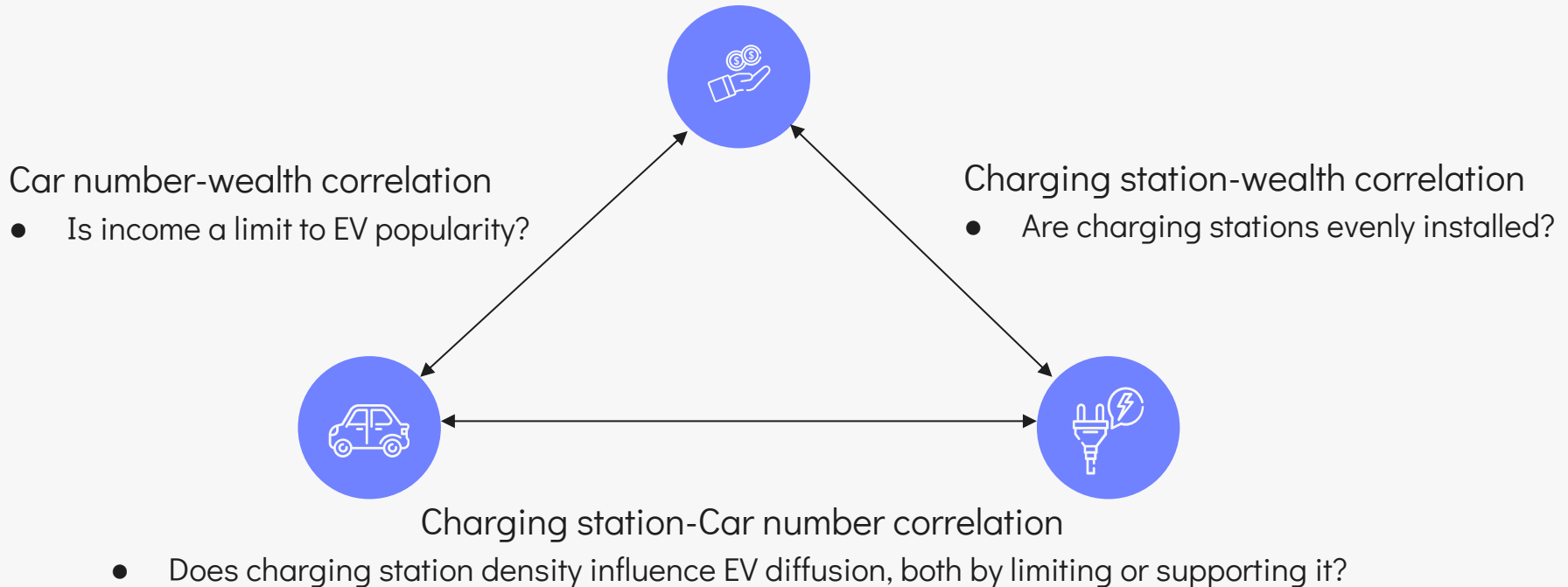
Car density



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!**