Weather’s Effect on Traffic Incidents

In Portland and Seattle

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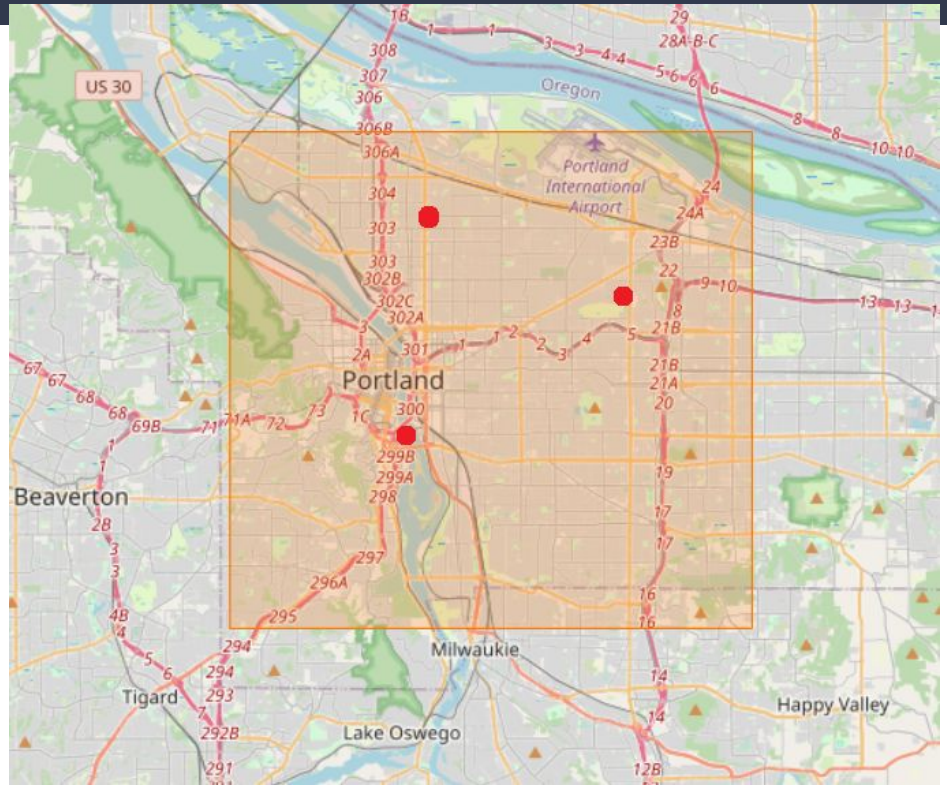
The Data

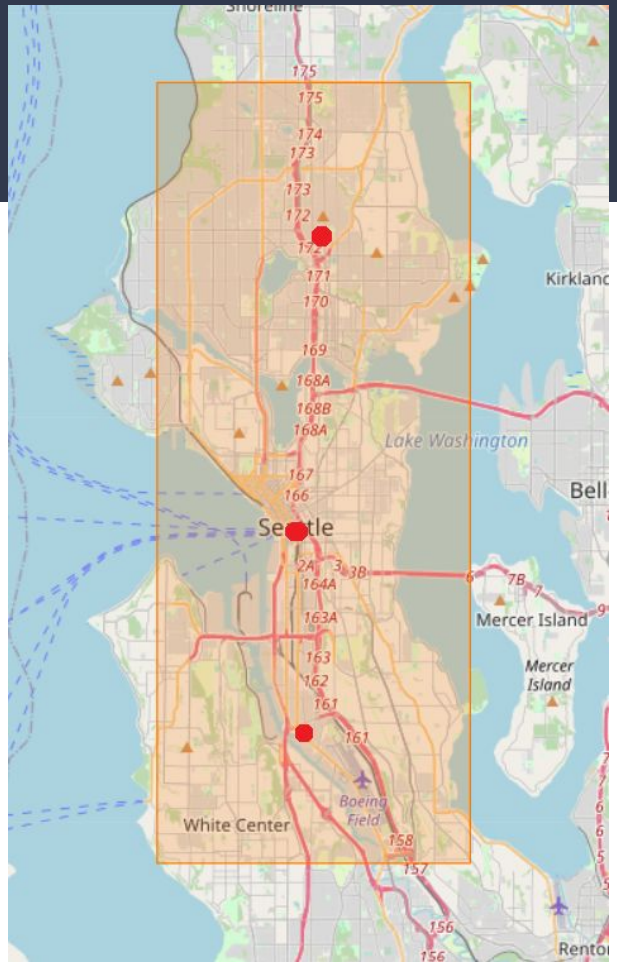
- 2.5 Openweather API
  - Current Weather

- Mapquest Traffic Incidents API

- Chose to look at Seattle and Portland
  - Large Cities
  - Heavy Precipitation
  - Variable Weather in the Spring

Maps


US 30
Oregon
Portland International Airport
Portland
Beaverton
Tigard
Milwaukie
Lake Oswego
Happy Valley


Kirkland
Lake Washington
Seattle
Mercer Island
Mercer Island
White Center
Boeing Field

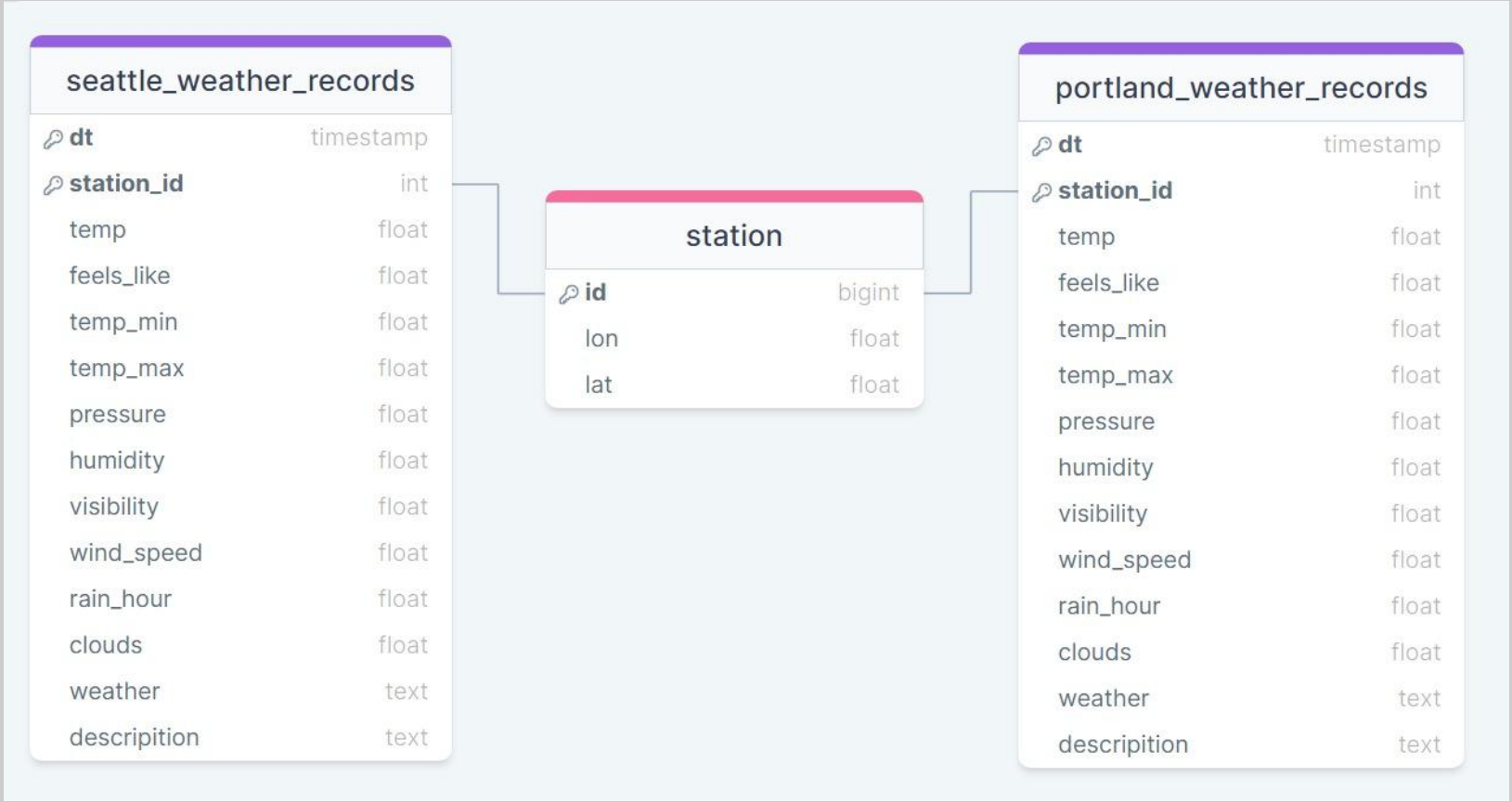
```
{
  "incidents": [
    {
      "id": "2273855287708804011",
      "type": 4,
      "severity": 3,
      "eventCode": 401,
      "lat": 47.51141,
      "lng": -122.29585,
      "startTime": "2024-04-24T13:19:34",
      "endTime": "2024-04-26T19:19:34",
      "impacting": true,
      "shortDesc": "Closed",
      "fullDesc": "Closed",
      "delayFromFreeFlow": 0,
      "delayFromTypical": 0,
      "distance": 0.12181479179614667,
      "iconURL": "http://content.mqcdn.com/mqtraffic/incid_sev.png",
      "parameterizedDescription": {}
    },
    {
      "id": "1064660022454052013",
      "type": 1,
      "severity": 1,
      "eventCode": 703,
      "lat": 47.50632,
      "lng": -122.25449,
      "startTime": "2022-11-28T08:00:00",
      "endTime": "2025-01-02T07:59:00",
      "impacting": true,
      "shortDesc": "Road maintenance operations",
      "fullDesc": "Between 74th Ave S and Martin Luther King Jr Way S - Road maintenance operations",
      "delayFromFreeFlow": 0,
      "delayFromTypical": 0,
      "distance": 2.4244872591671847,
      "iconURL": "http://content.mqcdn.com/mqtraffic/const_min.png",
      "parameterizedDescription": {}
    }
```

```
{
  "coord": {
    "lon": -122.3243,
    "lat": 47.6901
  },
  "weather": [
    {
      "id": 501,
      "main": "Rain",
      "description": "moderate rain",
      "icon": "10d"
    }
  ],
  "base": "stations",
  "main": {
    "temp": 282.43,
    "feels_like": 280.83,
    "temp_min": 282.43,
    "temp_max": 282.43,
    "pressure": 1007,
    "humidity": 94,
    "sea_level": 1007,
    "grnd_level": 998
  },
  "visibility": 10000,
  "wind": {
    "speed": 2.94,
    "deg": 128,
    "gust": 9.23
  },
  "rain": {
    "1h": 1.19
  },
  "clouds": {
    "all": 100
  },
  "dt": 1714091432,
  "sys": {
    "country": "US",
    "sunrise": 1714050049,
    "sunset": 1714101190
  },
  "timezone": -25200,
  "id": 5810301,
  "name": "Shoreline",
  "cod": 200
}
```

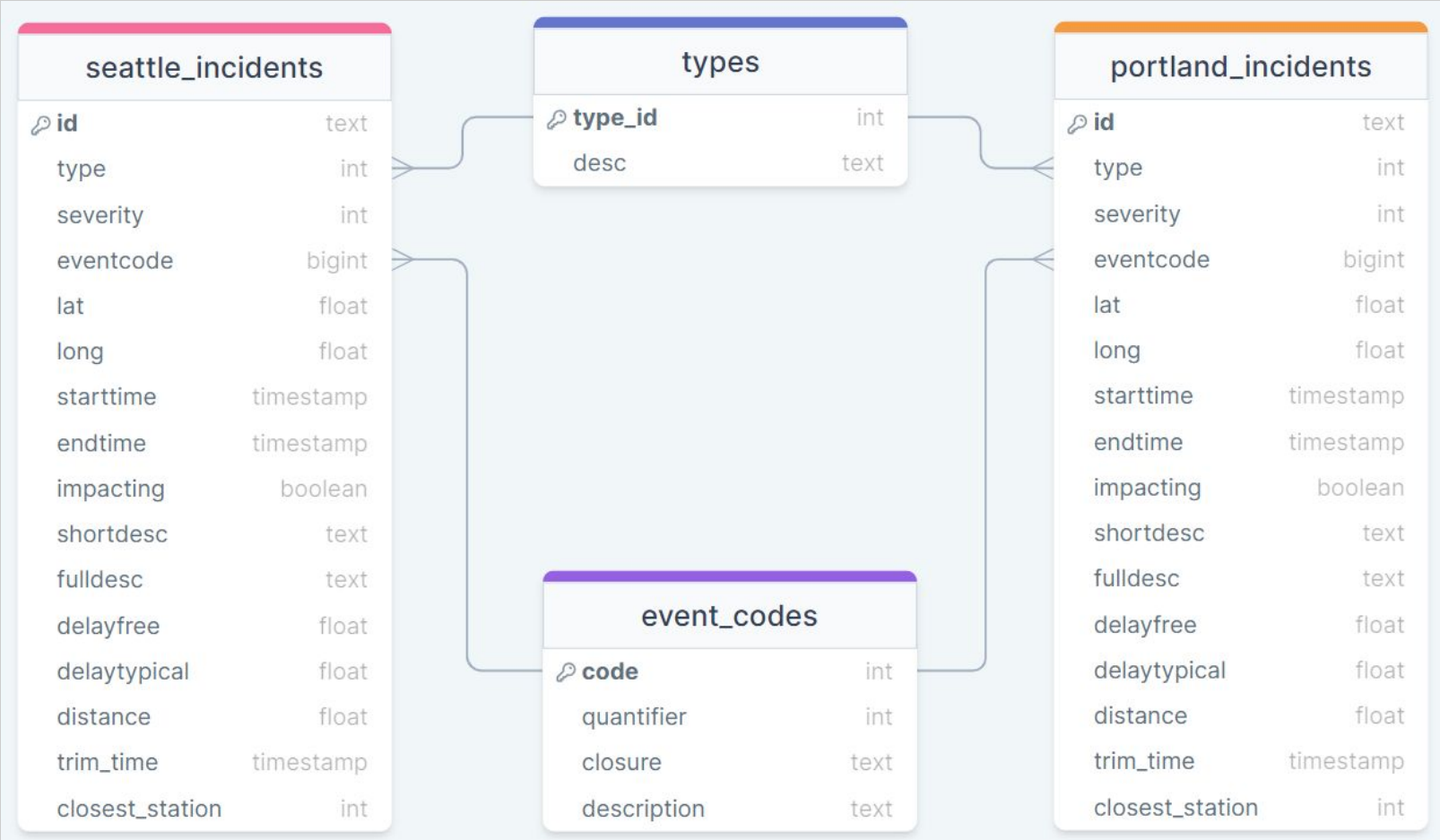

Raw json Data Formats

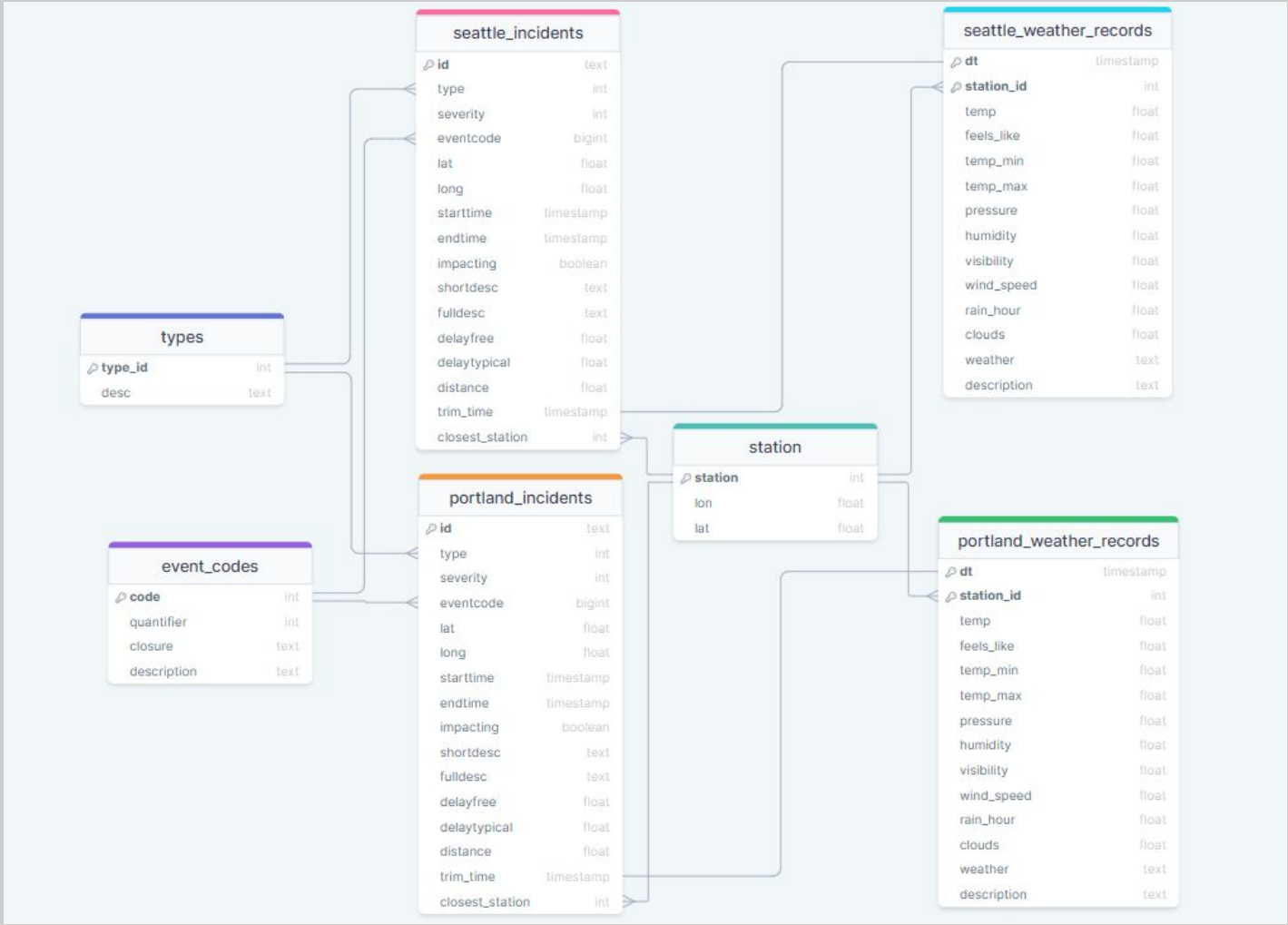
Data Processing and Obstacles

- Data in Weather API was nested in a way that made populating tables in 3rd normal form difficult
  - Used a cross join lateral statement to populate the station table
- Joined on pulled at and Station ID
  - Incidents had their own coordinates
  - Calculated distance to nearest station
  - Iterated through stations and created a new column in incidents for nearest station


seattle_weather_records
dt timestamp
station_id int
temp float
feels_like float
temp_min float
temp_max float
pressure float
humidity float
visibility float
wind_speed float
rain_hour float
clouds float
weather text
descripition text
station
id bigint
lon float
lat float
portland_weather_records
dt timestamp
station_id int
temp float
feels_like float
temp_min float
temp_max float
pressure float
humidity float
visibility float
wind_speed float
rain_hour float
clouds float
weather text
descripition text

```sql
INSERT INTO weather_records
  (dt, station_id, temp, feels_like, temp_min, temp_max, pressure,
   humidity, visibility, wind_speed, rain_hour, clouds, weather, description)
SELECT
  to_timestamp((sr.raw_json->>'dt')::BIGINT) AS dt,
  s.id AS station_id,
  (sr.raw_json->'main'->>'temp')::NUMERIC AS temp,
  (sr.raw_json->'main'->>'feels_like')::NUMERIC AS feels_like,
  (sr.raw_json->'main'->>'temp_min')::NUMERIC AS temp_min,
  (sr.raw_json->'main'->>'temp_max')::NUMERIC AS temp_max,
  (sr.raw_json->'main'->>'pressure')::NUMERIC AS pressure,
  (sr.raw_json->'main'->>'humidity')::NUMERIC AS humidity,
  (sr.raw_json->>'visibility')::NUMERIC AS visibility,
  (sr.raw_json->'wind'->>'speed')::NUMERIC AS wind_speed,
  (sr.raw_json->'rain'->>'1h')::NUMERIC AS rain_hour,
  (sr.raw_json->'clouds'->>'all')::NUMERIC AS clouds,
  (w->>'main') AS weather,
  (w->>'description') AS description
FROM
  seattle sr
JOIN
  station s ON (sr.raw_json->'coord'->>'lon')::NUMERIC = s.lon AND
  (sr.raw_json->'coord'->>'lat')::NUMERIC = s.lat
CROSS JOIN LATERAL
  jsonb_array_elements(sr.raw_json->'weather') AS w;
```


seattle_incidents
id text
type int
severity int
eventcode bigint
lat float
long float
starttime timestamp
endtime timestamp
impacting boolean
shortdesc text
fulldesc text
delayfree float
delaytypical float
distance float
trim_time timestamp
closest_station int
types
type_id int
desc text
event_codes
code int
quantifier int
closure text
description text
portland_incidents
id text
type int
severity int
eventcode bigint
lat float
long float
starttime timestamp
endtime timestamp
impacting boolean
shortdesc text
fulldesc text
delayfree float
delaytypical float
distance float
trim_time timestamp
closest_station int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closest_station int
seattle_weather_records
dt timestamp
station_id int
temp float
feels_like float
temp_min float
temp_max float
pressure float
humidity float
visibility float
wind_speed float
rain_hour float
clouds float
weather text
description text
types
type_id int
desc text
station
station int
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lat float
portland_incidents
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severity int
eventcode bigint
lat float
long float
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endtime timestamp
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delayfree float
delaytypical float
distance float
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closest_station int
event_codes
code int
quantifier int
closure text
description text
portland_weather_records
dt timestamp
station_id int
temp float
feels_like float
temp_min float
temp_max float
pressure float
humidity float
visibility float
wind_speed float
rain_hour float
clouds float
weather text
description text

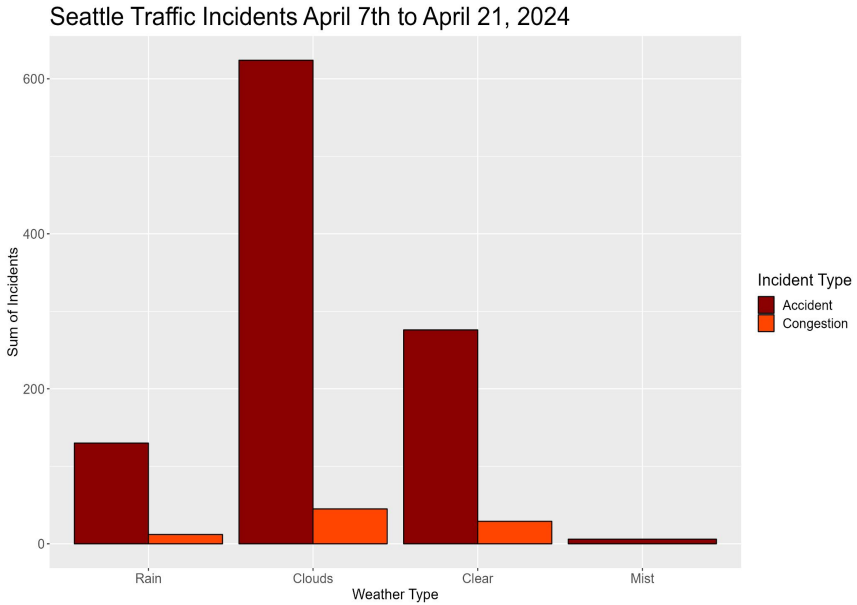
Our API

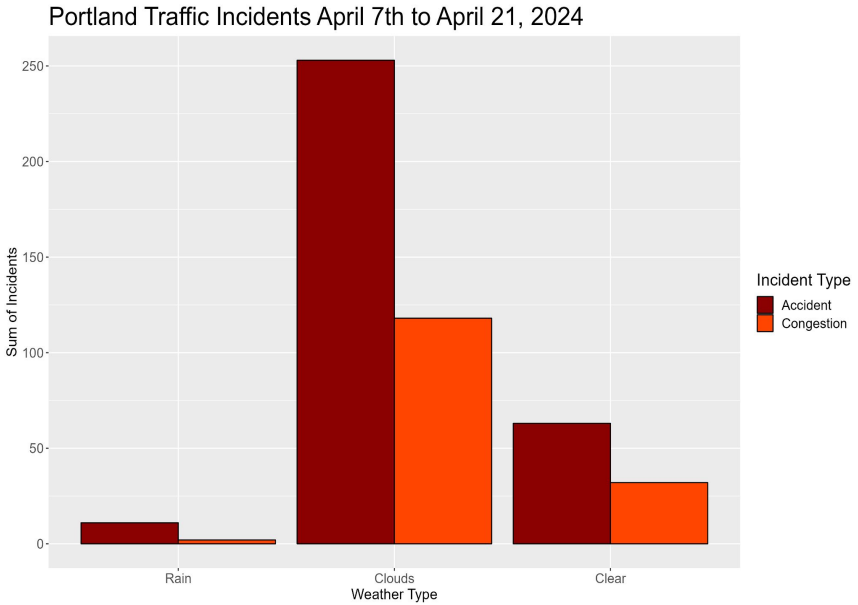
- Endpoints:
  - https://pikegomezapi-production.up.railway.app/cityweather
  - https://pikegomezapi-production.up.railway.app/portland
  - https://pikegomezapi-production.up.railway.app/seattle
- Outputs:
  - Weather Report at the stations within the city:
    - Temperature
    - Weather at the time
  - Count of Accidents
  - Count of Congestion Incidents

Does rain cause more accidents?

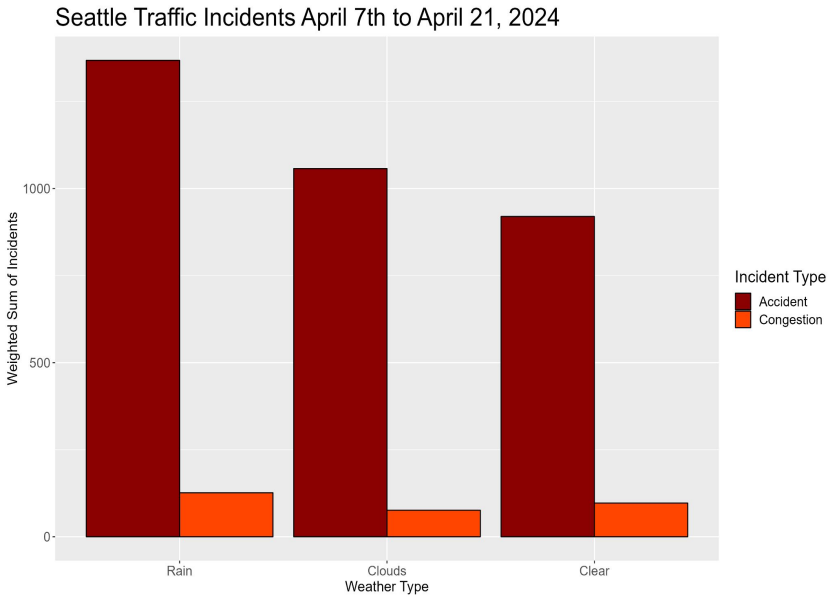
- Hypothesis: Yes

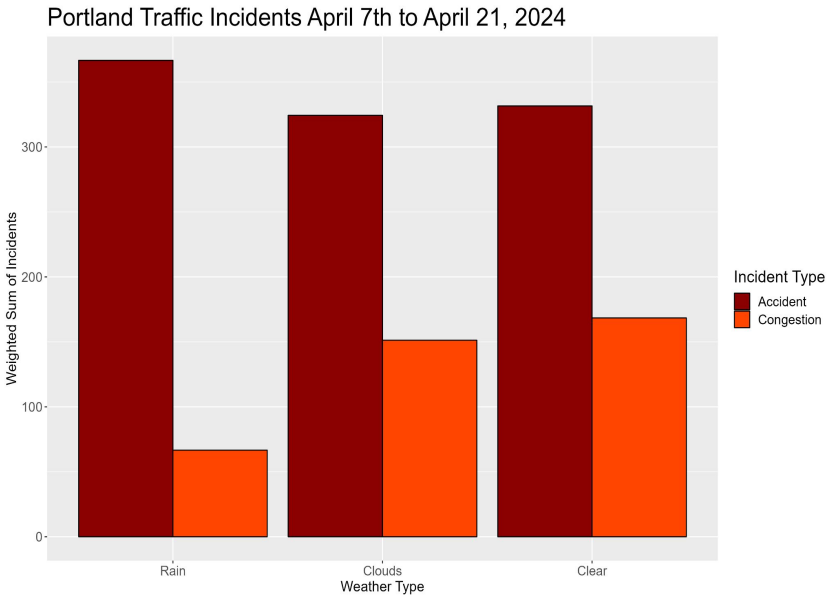
EDA: Sum of Incidents





Results: Weighted Analysis





Conclusions, Limitations, and Further Questions

- It appears that rainy weather does correlate with more accidents
- Two weeks is a small sample size especially when only pulling every 4 hours
- Cloudy was by far the most common weather type
- Timing of pulls doesn't exactly align with time of traffic incidents
- With more data, volume of rainfall could be taken into account
- Looking at cities where rain is less common could be interesting
- Set up more complicated API endpoints