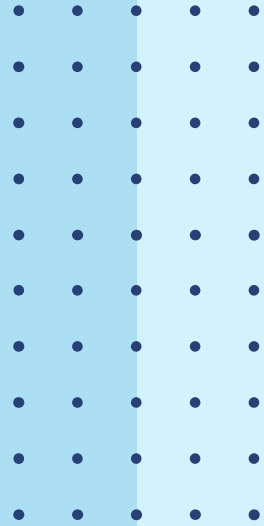


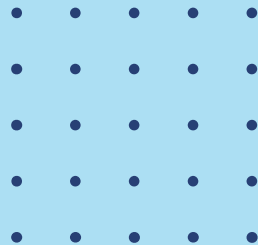
# **Weather and Traffic Incidents in Salem, OR**

## **DATA 503 Final Project**

Jordyn Irwin & Brittany Fisher



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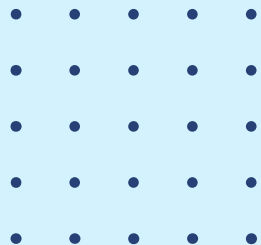
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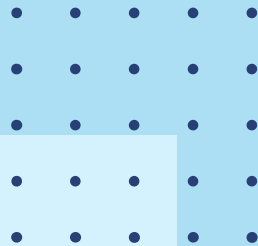
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# 01. Ingestion

API Endpoints



# Retrieving Latitude and Longitude



## How to make an API call

### API call

```
http://api.openweathermap.org/geo/1.0/zip?zip={zip code},  
{country code}&appid={API key}
```



### Parameters

<input type="text" value="zip code"/>	required	Zip/post code and country code divided by comma. Please use ISO 3166 country codes.
<input type="text" value="appid"/>	required	Your unique API key (you can always find it on your account page under the "API key" tab)

```
{"zip": "97301", "name": "Salem", "lat": 44.949, "lon": -123.004, "country": "US"}
```

# Open Weather API - Current Weather Data

## How to make an API call

### API call

```
https://api.openweathermap.org/data/2.5/weather?lat={lat}&lon={lon}&appid={API key}
```



### Parameters

lat	required	Latitude. If you need the geocoder to automatic convert city names and zip-codes to geo coordinates and the other way around, please use our <a href="#">Geocoding API</a>
lon	required	Longitude. If you need the geocoder to automatic convert city names and zip-codes to geo coordinates and the other way around, please use our <a href="#">Geocoding API</a>
appid	required	Your unique API key (you can always find it on your account page under the <a href="#">"API key" tab</a> )
mode	optional	Response format. Possible values are <code>xml</code> and <code>html</code> . If you don't use the <code>mode</code> parameter format is JSON by default. <a href="#">Learn more</a>
units	optional	Units of measurement. <code>standard</code> , <code>metric</code> and <code>imperial</code> units are available. If you do not use the <code>units</code> parameter,

- Used lat and lon retrieval from previous step
- Included units = imperial
  - Gets temp in Fahrenheit
- Scraped every hour on the hour via Railway
  - Cron schedule: 0 \* \* \* \*
- Inserted into Postgres table via Railway connection to Beekeeper

# Data Retrieved:

- Weather type - clouds, rain, etc.
- Current temperature
- Visibility
- 1hr rain amount
- Cloud percent
- Wind speed
- Humidity
- Pressure
- ... And more!

Also added:

- A serial ID
- Added\_at column for time retrieved

# Retrieving traffic incident data from TomTom

- Required API key and the bounding box for Salem, Oregon.
- A bounding box is the rectangular coordinate system used to define a geographical area on maps.
- Scraped hourly and inserted into Postgres table via Railway connection to Beekeeper

## Request data

HTTPS method: GET

- Constants and parameters enclosed in curly brackets {} must be replaced with their values.
- Please see the following [Request parameters](#) section with tables of required and optional parameters and their values. The generic request format is as follows.

## URL format

GET Request URL with bounding box

```
https://{baseUrl}/traffic/services/{versionNumber}/incidentDetails?
```

GET Request URL with IDs

```
https://{baseUrl}/traffic/services/{versionNumber}/incidentDetails?
```

## Data Retrieved:

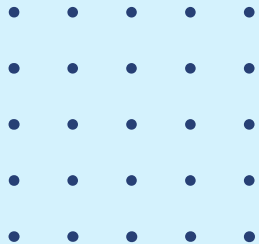
- Incident ID
- Incident type
- Geometry
- Coordinates
- Category code
- Magnitude of delay code



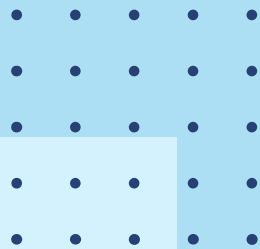
# 02.

## Transformation

Clean.sql and 3NF



# Clean.sql



## Weather Table:

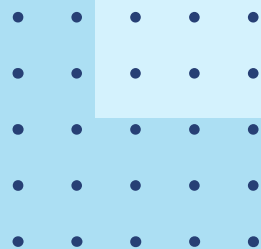
- Transforms added\_at time to PDT
- Inserts raw\_json keys into designated columns in weather table
- On conflict of serial id, is instructed to do nothing

## Weather\_type Table:

- Inserts distinct values of weather id into weather\_type table
- Inserts weather type descriptions into appropriate columns
- On conflict of weather\_id, is instructed to do nothing

## Cron Schedule:

5 \* \* \* \* (every hour at minute 5)

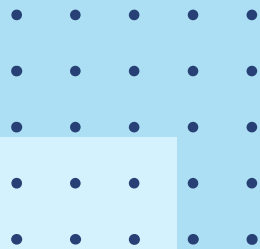


# Weather tables

weather	
🔑 id	bigint
weather_type_id	bigint
time_added	timestamp
temperature	float
humidity	int
pressure	int
temp_max	float
temp_min	float
feels_like	float
visibility	int
rain_1hr_amt	float
cloud_percent	int
wind_speed	float
wind_deg	int
wind_gust	float

weather_type	
🔑 weather_id	bigint
weather	text
weather_description	text

# Clean.sql



## Traffic table:

- Inserts raw\_json keys into designated columns in weather table
- On conflict of serial id, is instructed to do nothing

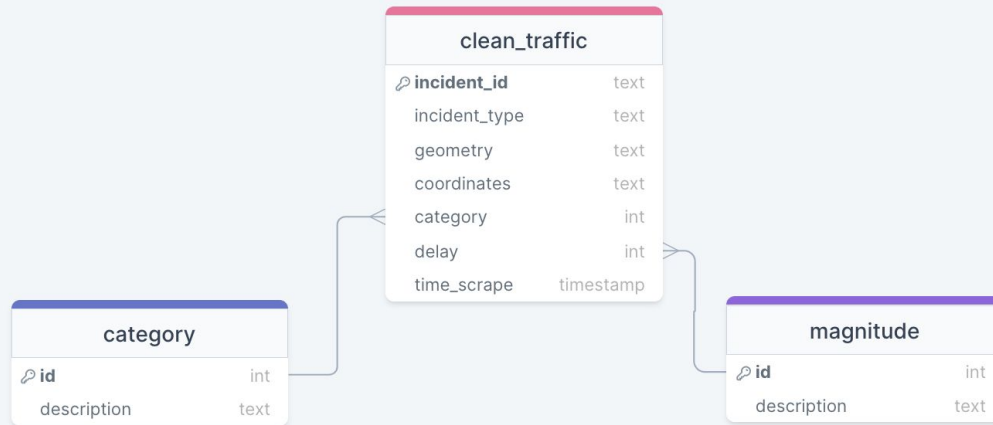
## Magnitude of delay and incident categories tables:

- Tables were created from the data definitions from TomTom.

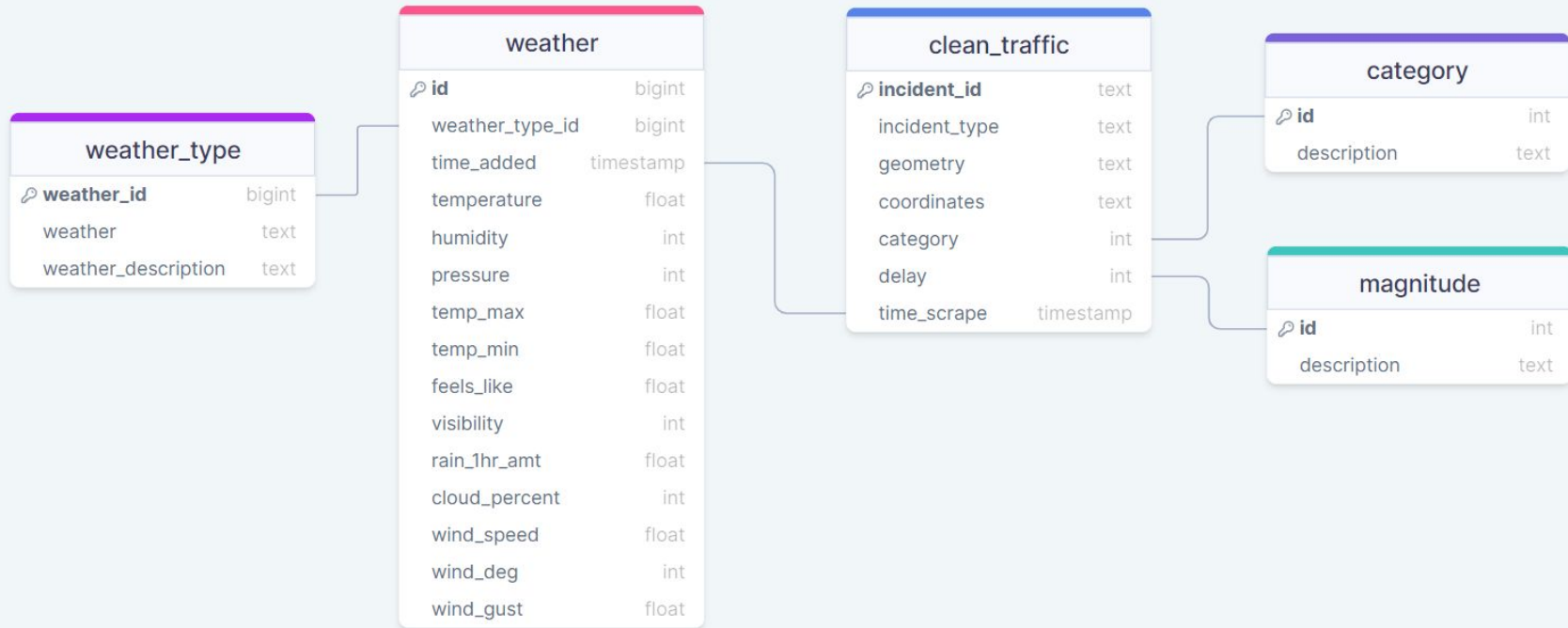
## Cron Schedule:

5 \* \* \* \* (every hour at minute 5)

# Traffic tables



# Table Connections

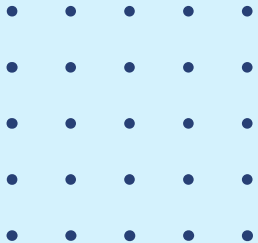


# 03.

## Statistical Analysis

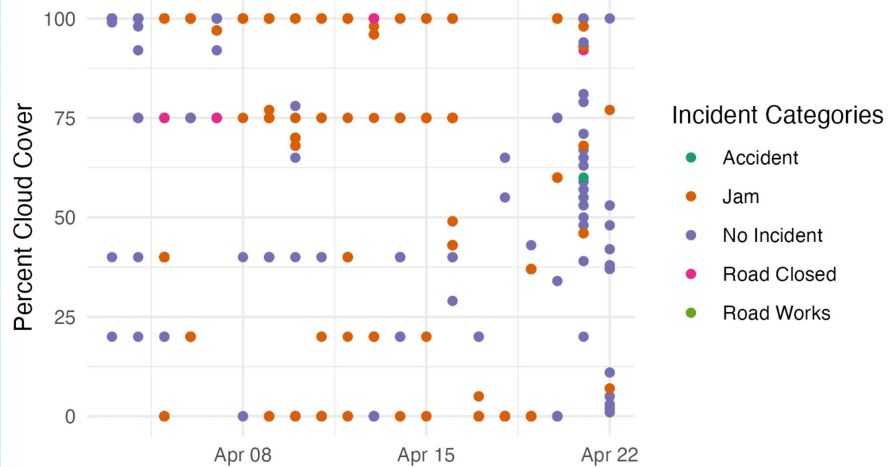
Traffic and weather

Do any trends exist regarding rainfall, cloud cover, wind speed, or temperature?

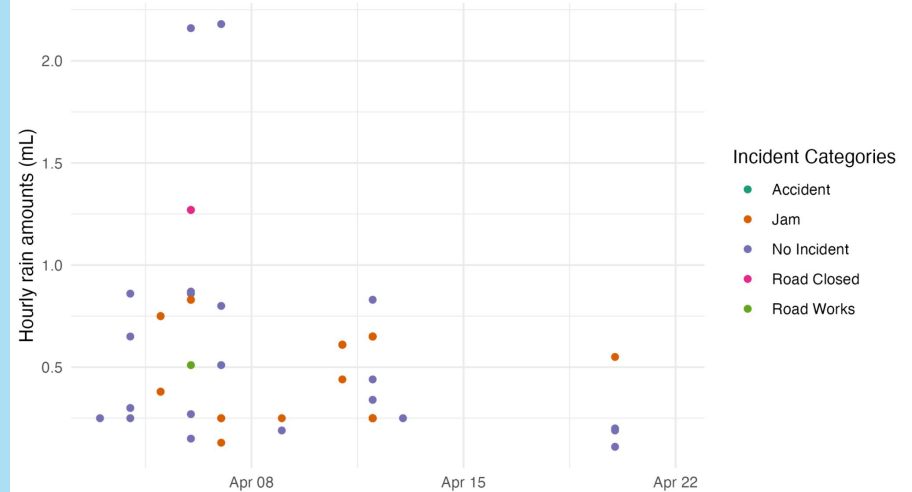


# Rainfall and cloud cover

Does cloud cover affect traffic incidents?



Do rain amounts affect traffic incidents?

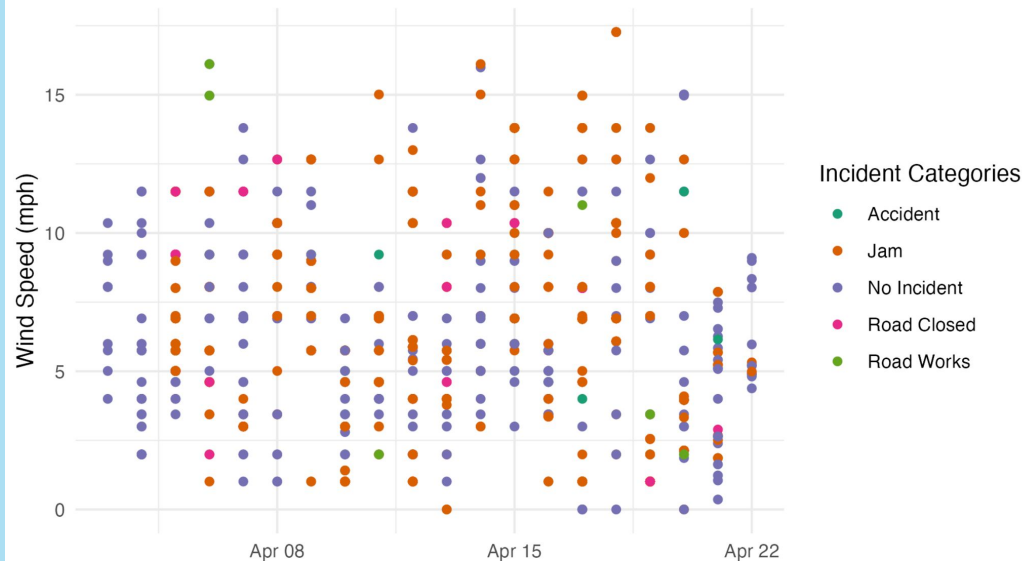




# Wind speed

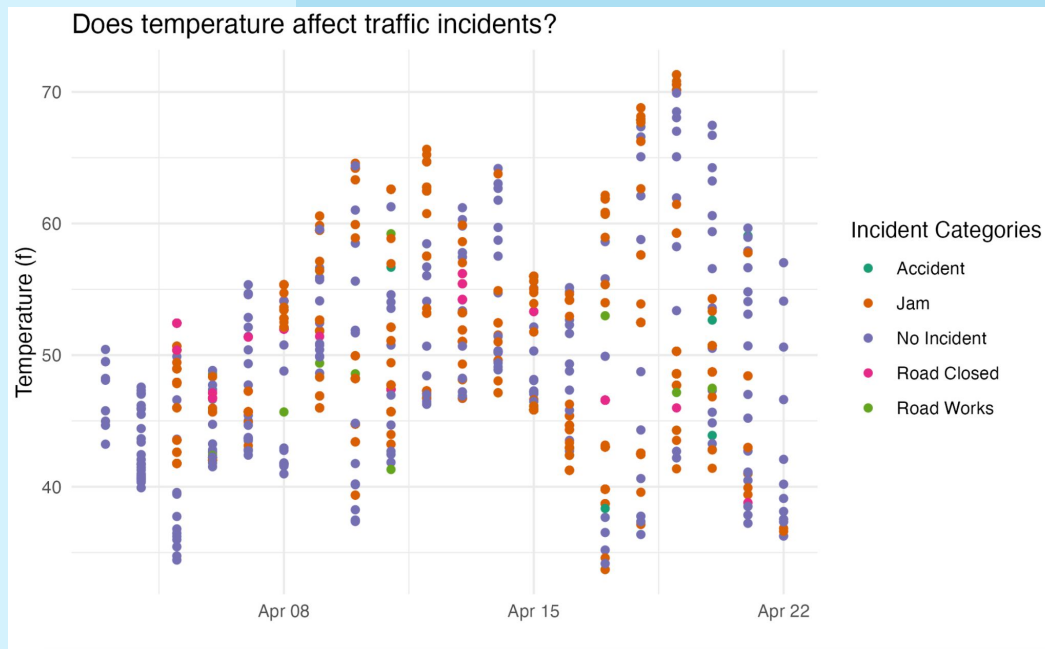
Category <fctr>	avgWind <dbl>
Accident	6.649091
Jam	6.562144
No Incident	6.401712
Road Closed	8.395455
Road Works	7.285106

Do wind gusts affect traffic incidents?



- If split into the categories and compared, wind speeds are higher during road closure incidents vs no incident (p-value = 0.007) and traffic jams (p-value = 0.01), but overall there is no difference between open and closed roads depending on wind speed.

# Temperature

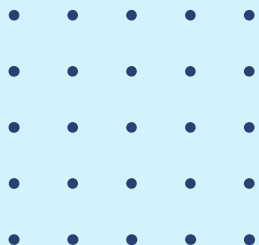


Category <fctr>	avgTemp <dbl>
Accident	52.02636
Jam	50.54369
No Incident	48.62895
Road Closed	50.69841
Road Works	49.16383

- When split by category, temperature is higher on average when traffic jams occur compared to no traffic incidents (p-value = 0.006).

# Conclusions

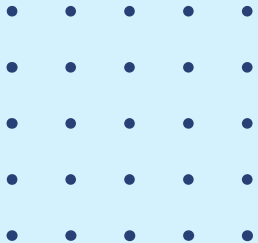
- Based on this analysis, rainfall, cloud cover, wind speed, and temperature don't have much of an impact on traffic incidents.
- However, there are serious limitations to this data including:
  - It's been a very mild and boring spring regarding weather– this gives us very homogenous data to explore and analyze.
  - Time constraints on data scraping meant that we had a very small pool of data to explore.
- Future steps would include longer data collection and more data traffic collected such as number of incident reports along with specific start and end times.



# 04.

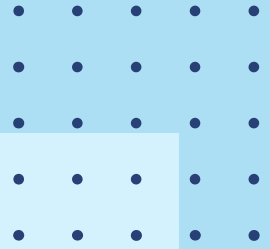
## Data Serving

A Tour Through our Power BI  
Dashboard!



# Power BI Dashboard

- Linked to both railway/postgres databases
- Automatically pulls in new data after it has been scraped and cleaned
  - Just press “Refresh” button!
- Visuals are interactive and update automatically as data is refreshed
- Can filter visuals based on weather, date, and traffic incident severity



# Power BI Report

## Weather Type

- ☒ Select all
- ☒ Clear
- ☒ Clouds
- ☒ Mist
- ☒ Rain

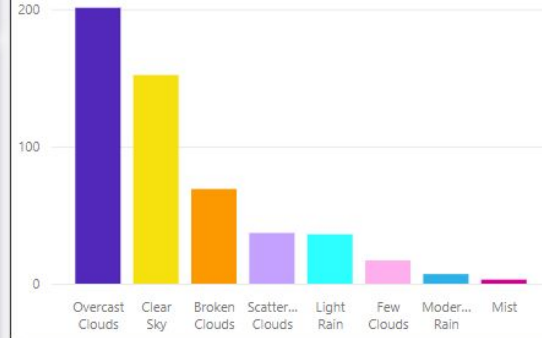
## Date Selection

4/3/2024

4/25/2024

date	Accident Count	Sum of rain_1hr_amt	Avg Temp	Max Temp
Wednesday, April 03, 2024		0.25	47.02	53.98
Thursday, April 04, 2024		2.06	43.28	52.00
Friday, April 05, 2024	73	1.13	42.85	55.72
Saturday, April 06, 2024	38	6.92	44.95	50.97
Sunday, April 07, 2024	10	3.87	47.44	57.97
Monday, April 08, 2024	45		48.28	57.20
Tuesday, April 09, 2024	44	0.44	53.12	64.56
Wednesday, April 10, 2024	35		50.35	67.10
Thursday, April 11, 2024	54	1.05	50.38	65.80
Friday, April 12, 2024	43	2.76	53.80	67.82
Saturday, April 13, 2024	28	0.25	53.56	68.11
<b>Total</b>	<b>855</b>	<b>28.49</b>	<b>50.00</b>	<b>72.99</b>

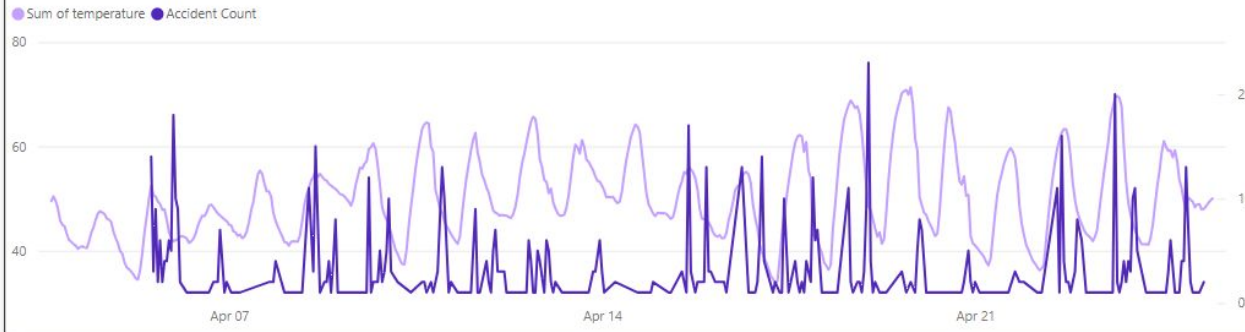
## Weather Type



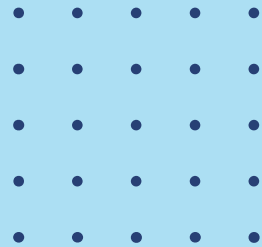
## Accident Magnitude

- ☒ Select all
- ☒ Major
- ☒ Minor
- ☒ Moderate
- ☒ Undefined (used...)
- ☒ Unknown

## Salem, OR Temperature



# Thank you!



# Questions?

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