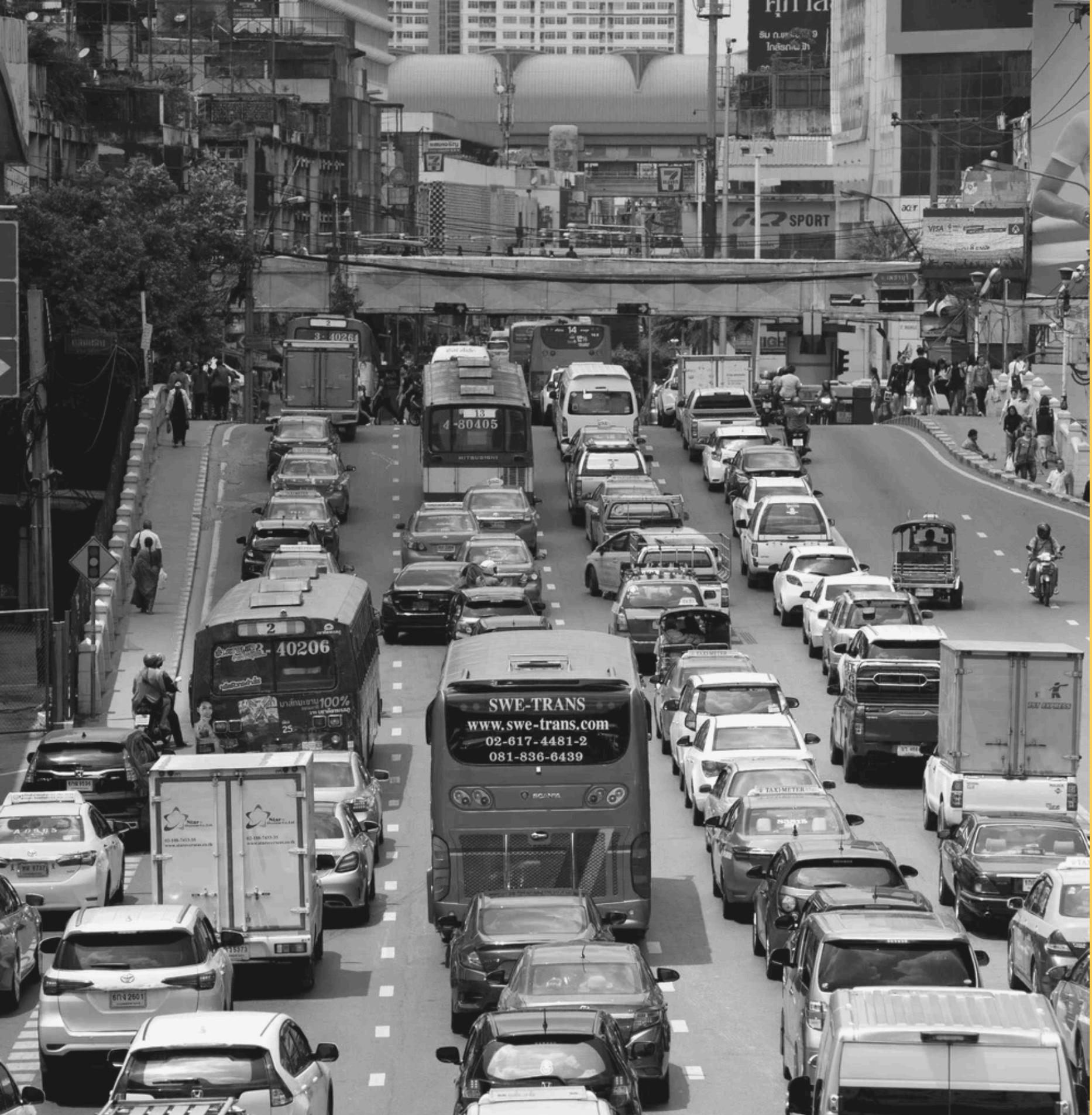




PATHFINDER-API

01219335 Data Acquisition and Integration

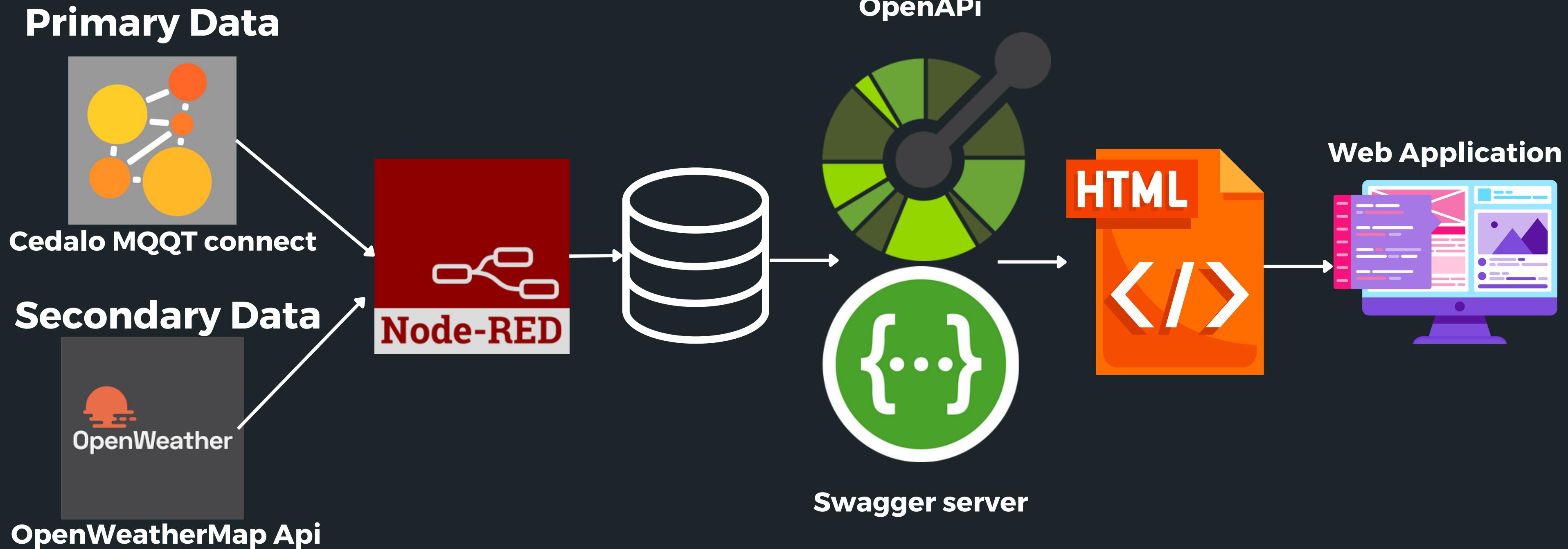


Project Overview

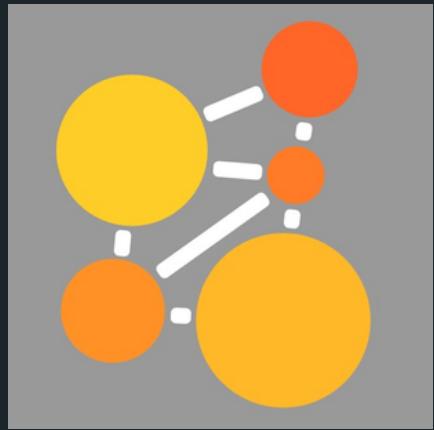
Our project is aim to investigate the relation between traffic and weather by collecting the data on traffic like linearX, linearY, linearZ, Latitude, Longitude ,and Timestamp in realtime and change into acceleration and time spent for each time we travel to University. To answer the question “Is it always traffic jam when it's raining?”.



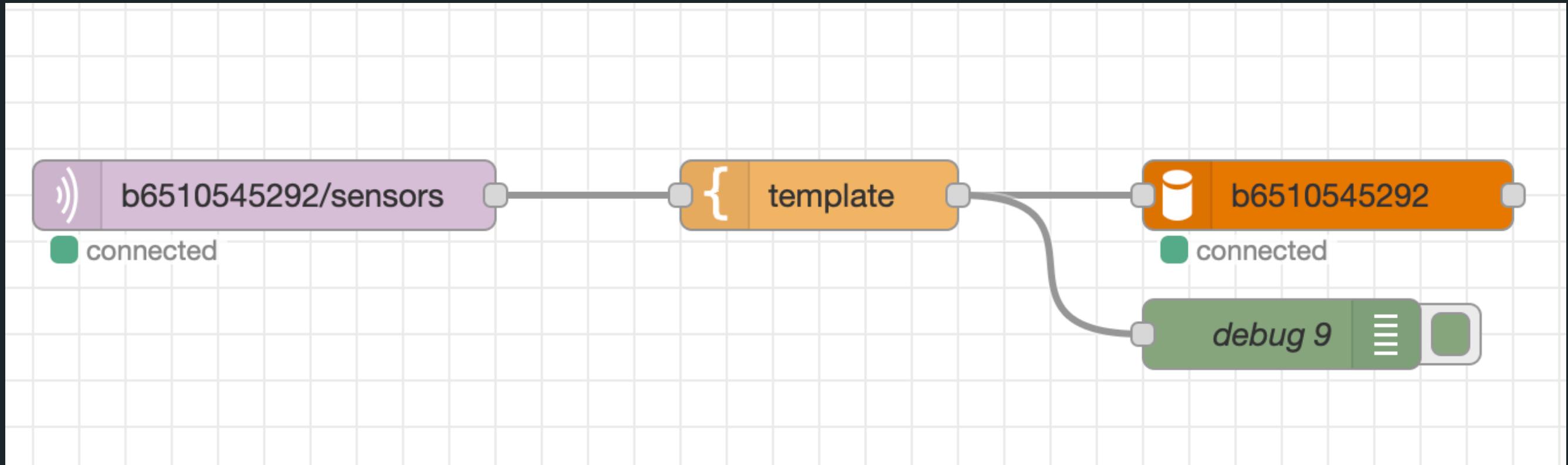
Architecture



Primary Data



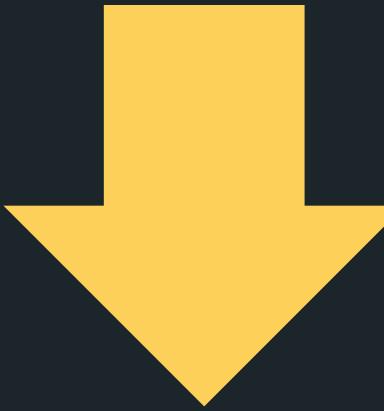
Cedalo MQQT connect



Our primary data is collected by using Cedalo MQQT Connect which sent LinearX, LinearY, LinearZ , Lat, and Lon from our mobile phone in real time, and using NODE-RED to sent it to the database. Then we calculate the Acceleration and Time-Spent for each time we travel near University.

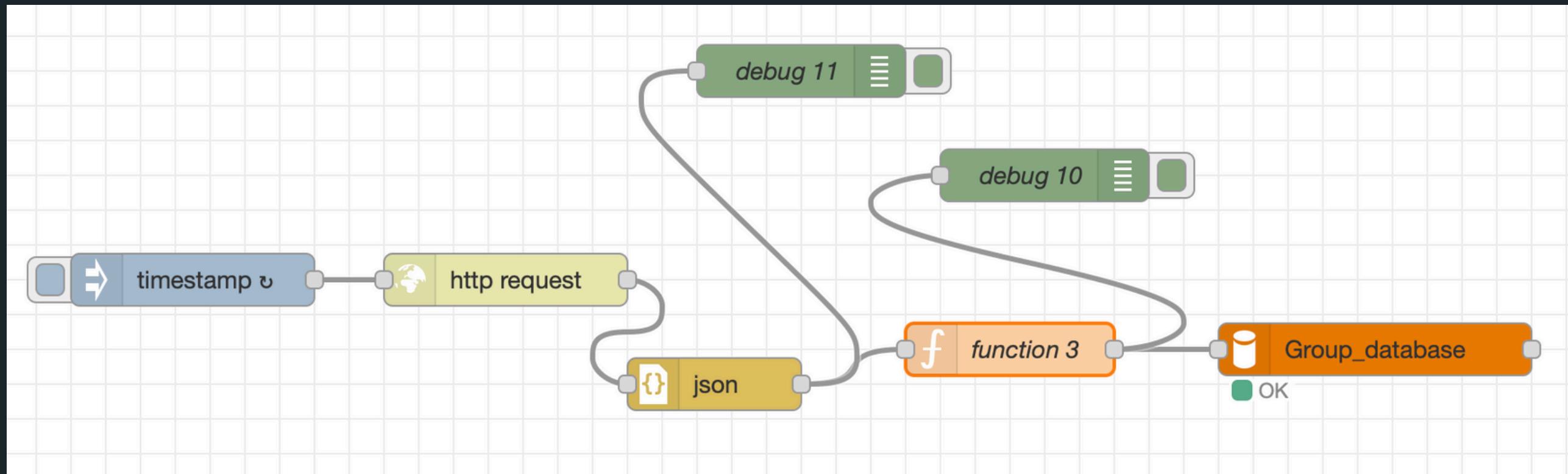
Primary Data

ID	LinearX	LinearY	LinearZ	Altitude	Latitude	Longitude	Timestamp	DeviceID
57	-3	1	3	8.21803	13.8456	100.567	2024-04-19 17:56:56	6FBF00F7-0101-472D-86EA-42D2B47459F0
58	2	-3	-2	8.52828	13.8451	100.567	2024-04-19 17:57:16	6FBF00F7-0101-472D-86EA-42D2B47459F0
59	0	3	-2	8.17294	13.8445	100.568	2024-04-19 17:57:36	6FBF00F7-0101-472D-86EA-42D2B47459F0
60	0	-2	-2	8.27447	13.8441	100.569	2024-04-19 17:57:56	6FBF00F7-0101-472D-86EA-42D2B47459F0
61	0	2	1	8.66387	13.8436	100.57	2024-04-19 17:58:16	6FBF00F7-0101-472D-86EA-42D2B47459F0



Timestamp	Latitude	Longitude	DeviceID	Acceleration	TravelID	
2024-04-19 18:02:36	13.84	100.575	6FBF00F7-0101-472D-86EA-42D2B47459F0	1	1	
2024-04-19 18:01:16	13.8407	100.574	6FBF00F7-0101-472D-86EA-42D2B47459F0	3.74166	1	
2024-04-19 17:59:56	13.841	100.573	6FBF00F7-0101-472D-86EA-42D2B47459F0	0	1	
2024-04-19 18:02:56	13.84	100.575	6FBF00F7-0101-472D-86EA-42D2B47459F0	0	1	
2024-04-19 18:02:16	13.84	100.575	6FBF00F7-0101-472D-86EA-42D2B47459F0	0	1	
2024-04-19 17:59:36	13.841	100.573	6FBF00F7-0101-472D-86EA-42D2B47459F0	1	1	

Secondary Data



Our secondary data is collected by using API from OpenWeatherMap Api to collect current weather elements and conditions, and using NODE-RED to fetch the data.

Database Schema

Updated_GPS_tracker	
PK ID	int
Timestamp	datetime?
Latitude	float?
Longitude	float?
DeviceID	varchar(40)?
Acceleration	float?
TravelID	int?

API_weather	
PK id	int
temp	float
hum	int
pres	int
dp	float
uni	float
cloud	int
vis	int
wmain	varchar(40)
wdes	varchar(40)
wicon	varchar(5)
Timestamp	datetime?

DATA SHARING API

1. Get/weather/{date}

Return weather elements from the specified date.

```
{  
  "Timestamp": "2024-05-10T00:04:15Z",  
  "cloud": 20,  
  "dp": 24.02,  
  "hum": 67,  
  "pres": 1010,  
  "temp": 30.86,  
  "uvi": 0,  
  "vis": 10000,  
  "wdes": "few clouds",  
  "wmain": "Clouds"  
},  
{  
  "Timestamp": "2024-05-10T00:14:15Z",  
  "cloud": 20,  
  "dp": 24.26,  
  "hum": 68,  
  "pres": 1010,  
  "temp": 30.86,  
  "uvi": 0,  
  "vis": 10000,  
  "wdes": "few clouds",  
  "wmain": "Clouds"  
},
```

```
{  
  "Timestamp": "2024-05-10T00:24:15Z",  
  "cloud": 20,  
  "dp": 23.69,  
  "hum": 66,  
  "pres": 1010,  
  "temp": 30.78,  
  "uvi": 0,  
  "vis": 10000,  
  "wdes": "few clouds",  
  "wmain": "Clouds"  
},  
{  
  "Timestamp": "2024-05-10T00:34:14Z",  
  "cloud": 20,  
  "dp": 23.72,  
  "hum": 66,  
  "pres": 1010,  
  "temp": 30.81,  
  "uvi": 0,  
  "vis": 10000,  
  "wdes": "few clouds",  
  "wmain": "Clouds"  
},
```

DATA SHARING API

2. Get/weather/average/{date}

Return average weather elements for the specified date.

```
[  
  {  
    "avg_cloud": 26.3415,  
    "avg_dp": 23.755,  
    "avg_hum": 60.439,  
    "avg_pres": 1009.3415,  
    "avg_temp": 32.6485,  
    "avg_uvi": 2.6278,  
    "avg_vis": 10000,  
    "occurrence_percentage": 86.014,  
    "wmain": "Clouds"  
  },  
  {  
    "avg_cloud": 20,  
    "avg_dp": 23.1215,  
    "avg_hum": 62.15,  
    "avg_pres": 1010.8,  
    "avg_temp": 31.2785,  
    "avg_uvi": 0,  
    "avg_vis": 10000,  
    "occurrence_percentage": 13.986,  
    "wmain": "Rain"  
  }  
]
```

DATA SHARING API

3. Get/weather/average/rainPercent

Return average weather elements and rain percent for every date.

```
[  
  {  
    "avg_cloud": 20,  
    "avg_dp": 24.1454,  
    "avg_hum": 59,  
    "avg_pres": 1006.3551,  
    "avg_temp": 34.1131,  
    "avg_uvi": 2.9439,  
    "avg_vis": 10000,  
    "date": "2024-04-25",  
    "rain_percentage": 2.17  
  },  
  {  
    "avg_cloud": 20,  
    "avg_dp": 25.3674,  
    "avg_hum": 63.1181,  
    "avg_pres": 1005.8819,  
    "avg_temp": 33.9353,  
    "avg_uvi": 2.8871,  
    "avg_vis": 10000,  
    "date": "2024-04-26",  
    "rain_percentage": 0  
  },  
  {  
    "avg_cloud": 20.4167,  
    "avg_dp": 27.3244,  
    "avg_hum": 68.0764,  
    "avg_pres": 1005.4375,  
    "avg_temp": 34.4527,  
    "avg_uvi": 2.8321,  
    "avg_vis": 10000,  
    "date": "2024-04-27",  
    "rain_percentage": 4.17  
  },  
  {  
    "avg_cloud": 22.9167,  
    "avg_dp": 27.2421,  
    "avg_hum": 69,  
    "avg_pres": 1006.4861,  
    "avg_temp": 34.1031,  
    "avg_uvi": 2.8087,  
    "avg_vis": 10000,  
    "date": "2024-04-28",  
    "rain_percentage": 14.58  
  }]
```

DATA SHARING API

4. Get/traffic/details

Returns the average acceleration and time spent for every TravelID(ID for each time we travel).

```
[  
  {  
    "avg_acceleration": 1.9357,  
    "endTime": "2024-04-19T18:10:36Z",  
    "startTime": "2024-04-19T17:56:56Z",  
    "time_spent": 13,  
    "travelID": 1  
  },  
  {  
    "avg_acceleration": 5.4665,  
    "endTime": "2024-04-25T13:03:48Z",  
    "startTime": "2024-04-25T12:56:08Z",  
    "time_spent": 7,  
    "travelID": 4  
  },  
  {  
    "avg_acceleration": 2.6593,  
    "endTime": "2024-05-03T12:01:00Z",  
    "startTime": "2024-05-03T11:52:00Z",  
    "time_spent": 9,  
    "travelID": 12  
  },
```

```
{  
  "avg_acceleration": 3.3972,  
  "endTime": "2024-04-25T20:15:04Z",  
  "startTime": "2024-04-25T20:12:24Z",  
  "time_spent": 2,  
  "travelID": 5  
},  
{  
  "avg_acceleration": 8.58,  
  "endTime": "2024-05-03T15:22:43Z",  
  "startTime": "2024-05-03T15:13:43Z",  
  "time_spent": 9,  
  "travelID": 13  
},  
{  
  "avg_acceleration": 2.4656,  
  "endTime": "2024-04-25T20:52:22Z",  
  "startTime": "2024-04-25T20:44:42Z",  
  "time_spent": 7,  
  "travelID": 6  
},
```

DATA SHARING API

5. Get/traffic/details/{travelID}

Returns the average acceleration and time spent form the specified travelID(ID for each time we travel).

```
[  
  {  
    "avg_acceleration": 1.3299,  
    "endTime": "2024-05-01T16:30:03Z",  
    "startTime": "2024-05-01T16:22:43Z",  
    "time_spent": 7,  
    "travelID": 10  
  }  
]
```

DATA SHARING API

6. Get/traffic/{TravelID}

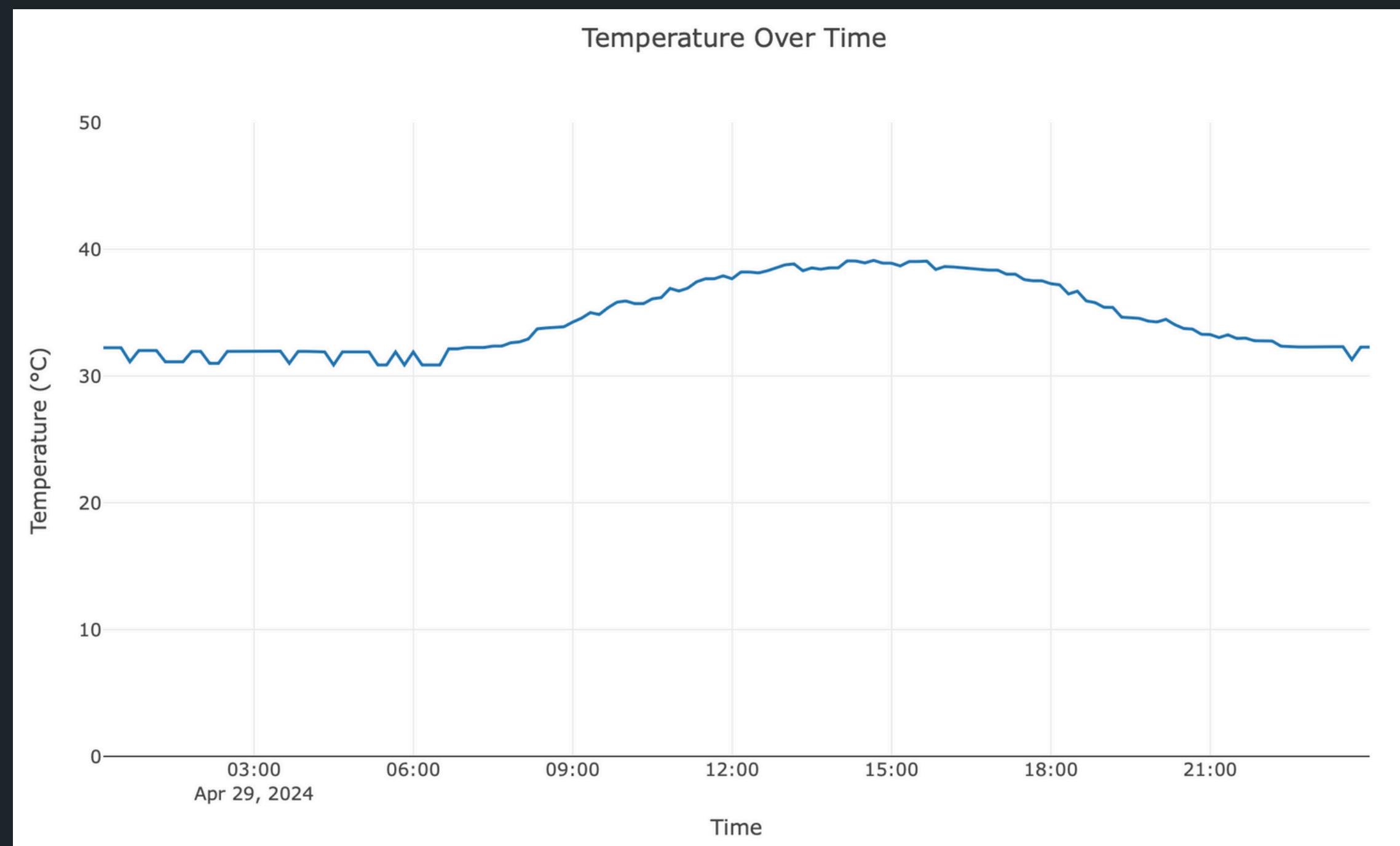
Returns the all traffic statistics for the specified travelID.

```
[  
  {  
    "DeviceID": "6FBF00F7-0101-472D-86EA-42D2B47459F0",  
    "Latitude": 13.8423,  
    "Longitude": 100.572,  
    "Timestamp": "2024-05-01T16:22:43Z",  
    "acceleration": 1.73205  
  },  
  {  
    "DeviceID": "6FBF00F7-0101-472D-86EA-42D2B47459F0",  
    "Latitude": 13.8421,  
    "Longitude": 100.572,  
    "Timestamp": "2024-05-01T16:23:03Z",  
    "acceleration": 3.60555  
  },  
  {  
    "DeviceID": "6FBF00F7-0101-472D-86EA-42D2B47459F0",  
    "Latitude": 13.8412,  
    "Longitude": 100.573,  
    "Timestamp": "2024-05-01T16:23:23Z",  
    "acceleration": 6.78233  
  },  
]
```

Data Visualization

1. Line plot

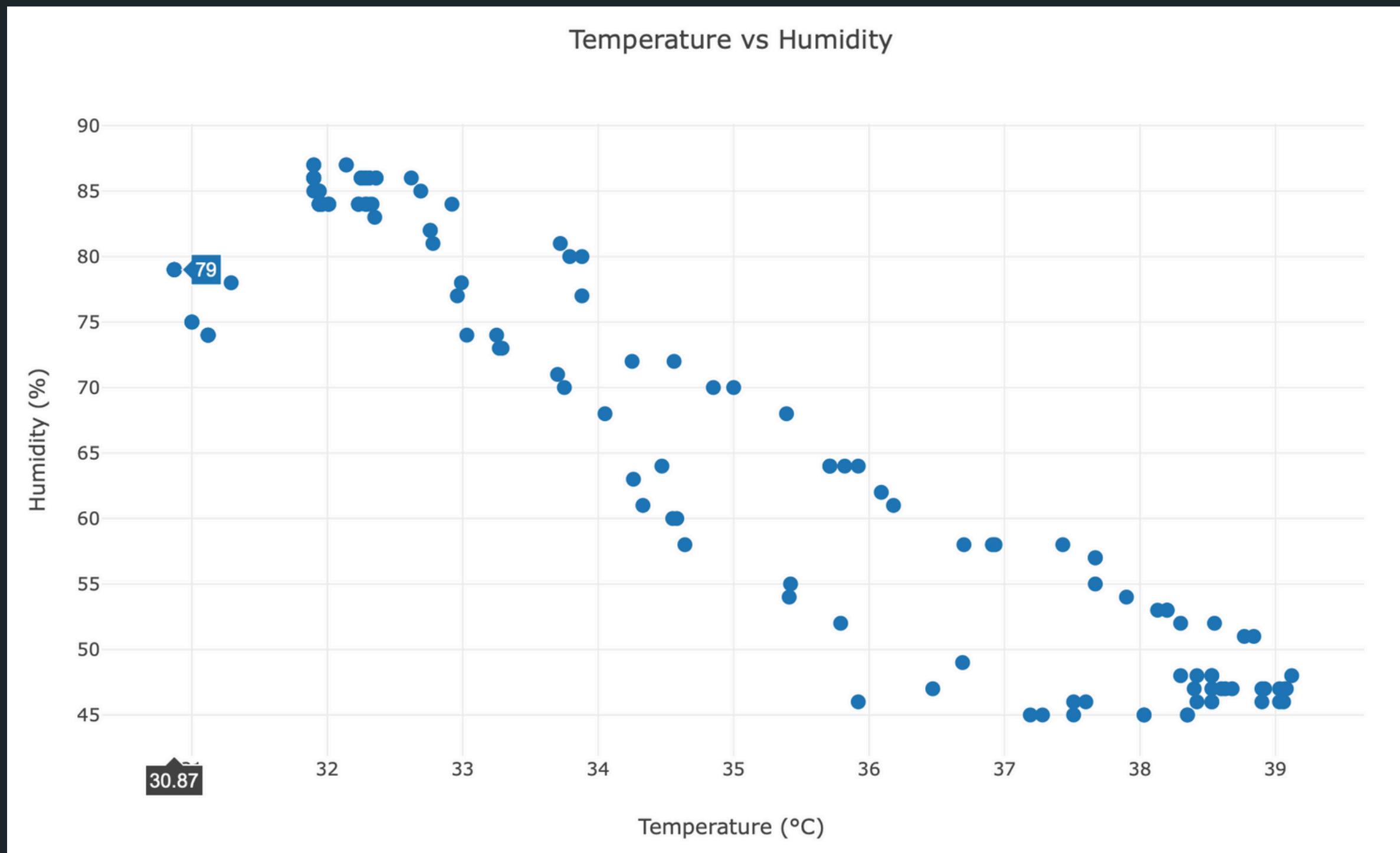
Visualize the trend of data through different time



Data Visualization

2. Scatter plot

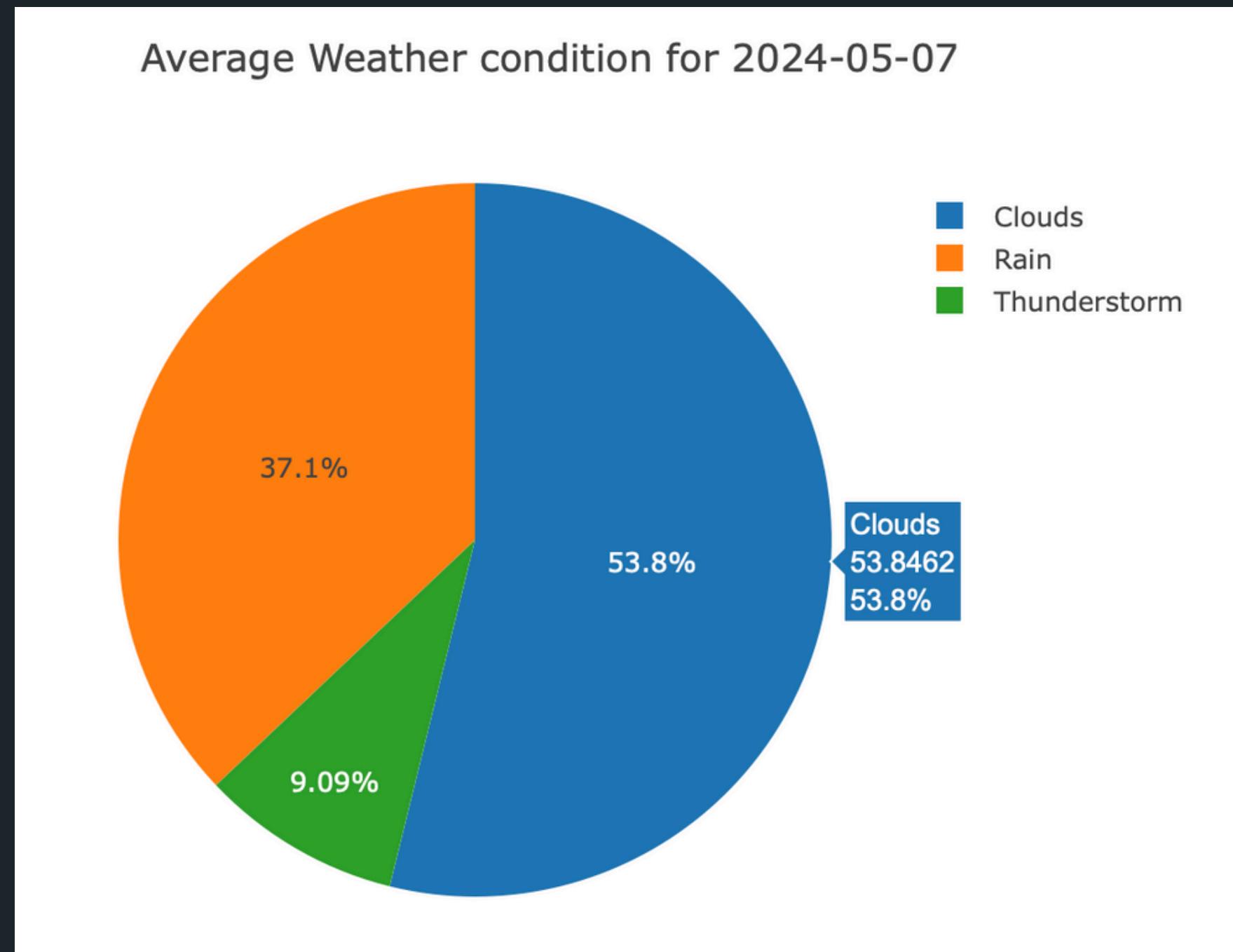
Visualize the relationship of 2 data



Data Visualization

3. Pie plot

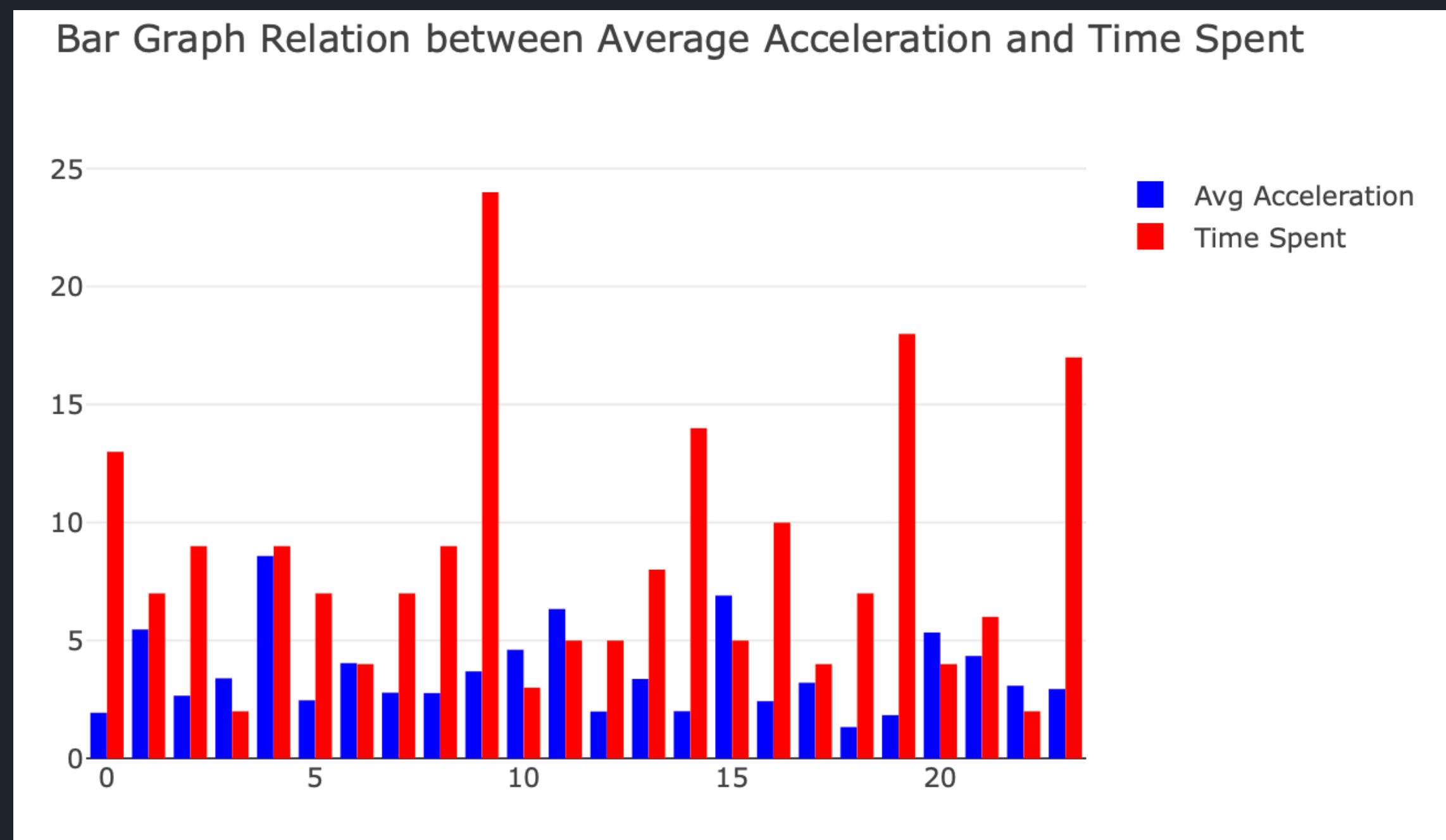
Visualize the ratio of the data



Data Visualization

3. Bar plot

Visualize the relationship between two data





DEMO