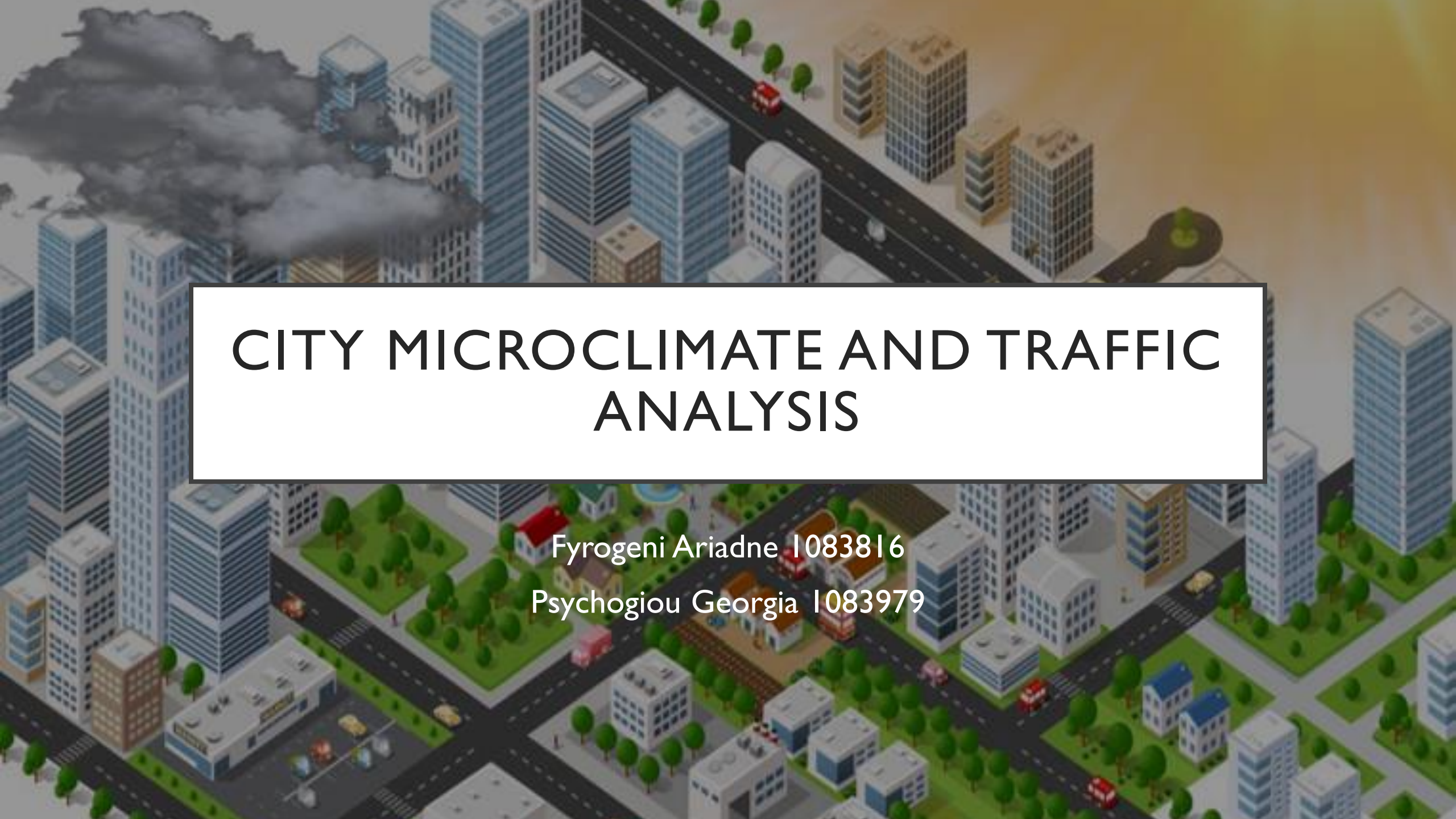

CITY MICROCLIMATE AND TRAFFIC ANALYSIS

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Psychogiou Georgia 1083979

OPERATIONS

Accurate microclimate forecasts and predictions by combining meteorological data from open APIs with real and virtual local weather data from sensors.

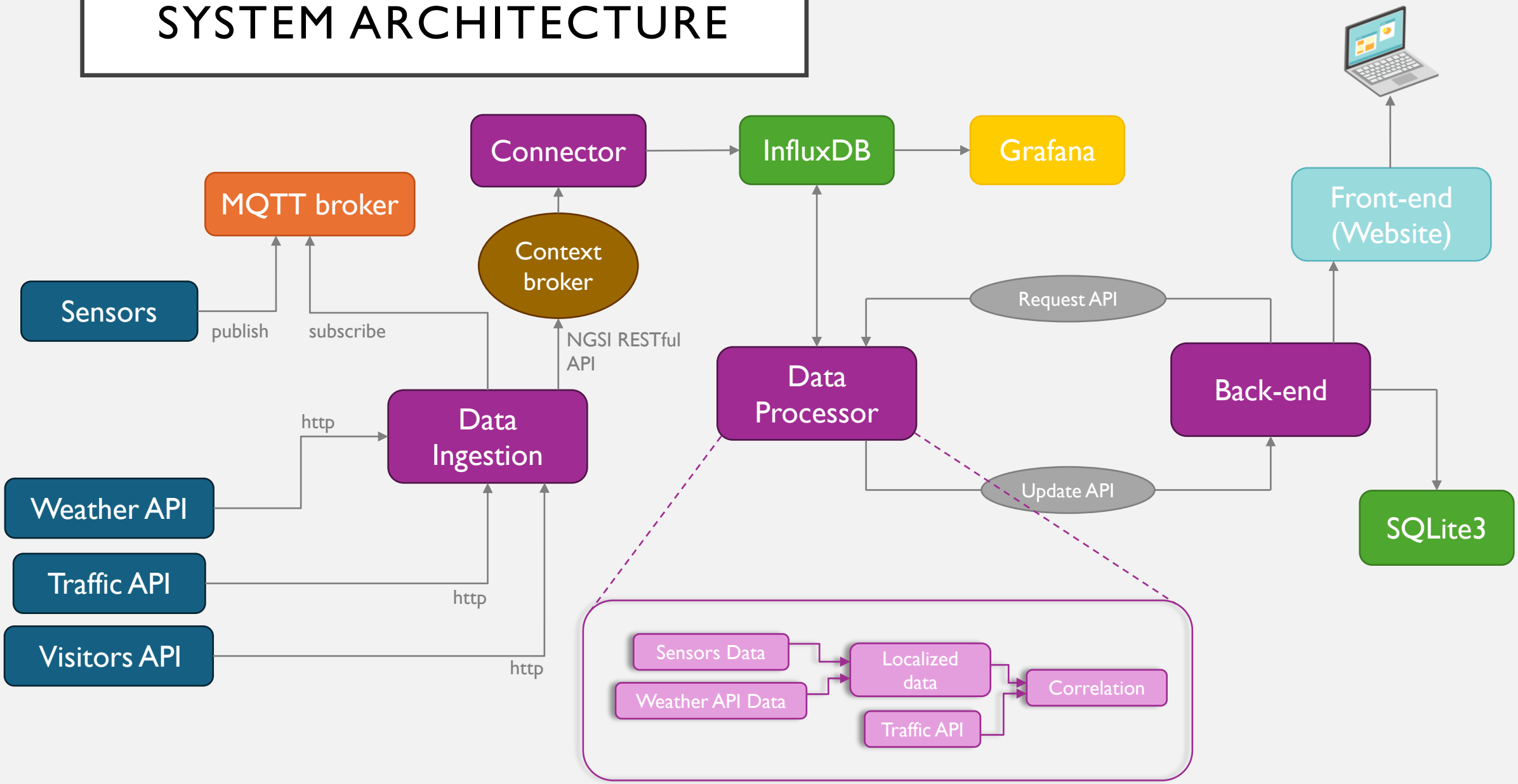
Calculation of the correlation index between traffic data and various microclimate parameters (such as wind, rain amount and temperature) depending on the point of interest under study.

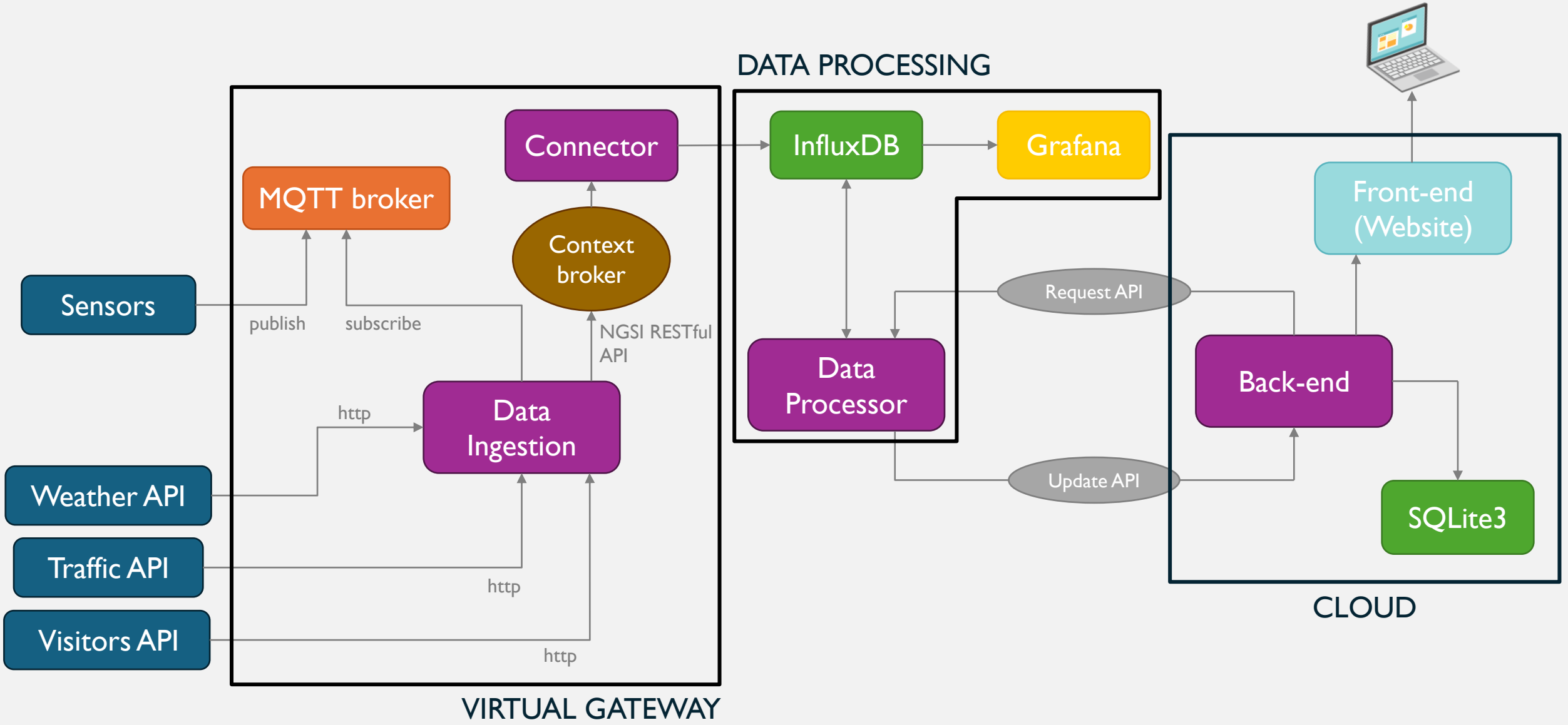
UI visualization of heatmaps and graphs indicating the progression of traffic versus key microclimate parameters' alternations.

Alerts and warning reports concerning slippery roundabouts caused by severe rainfall, dangerously windy bridges, road closures due to flood or fallen trees and frozen roads because of snow.

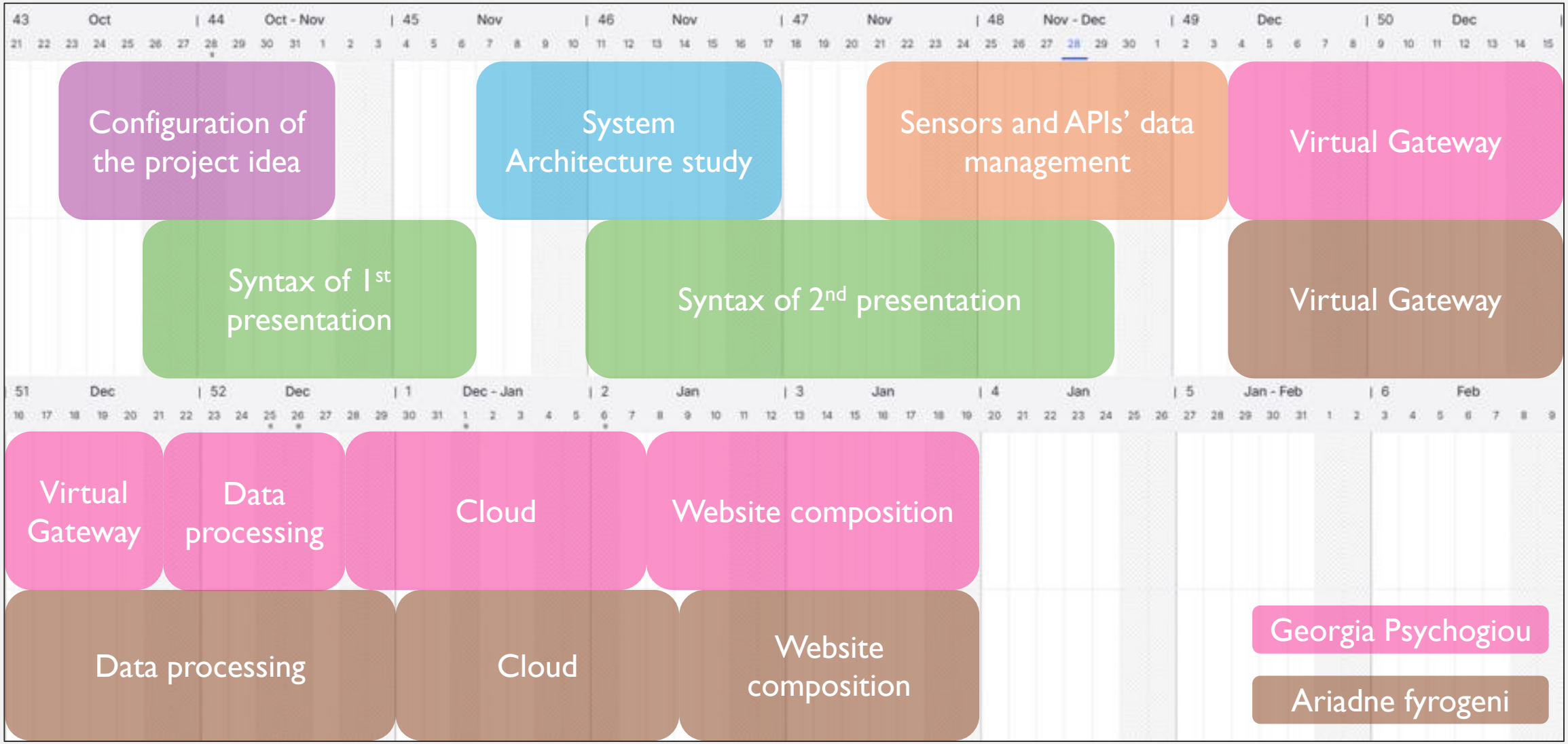
Requirements	Resources
Accurate microclimate data in specific locations	Numerous environmental sensors, sparsely located
Data ingestion	MQTT, HTTP
Historical environmental and traffic data	Data Bases
High availability of collected data and system future scalability	FIWARE context broker

SYSTEM ARCHITECTURE




DATA PROCESSING
Connector
InfluxDB
Grafana
MQTT broker
Context broker
Front-end (Website)
Sensors
publish
subscribe
NGSI RESTful API
Request API
Data Processor
Back-end
http
Data Ingestion
Weather API
Traffic API
Visitors API
http
http
Update API
SQLite3
CLOUD
VIRTUAL GATEWAY

WORK SCHEDULE

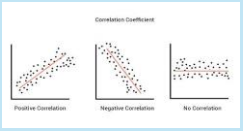


TECHNOLOGIES - TOOLS

Python

JavaScript

Pearson Correlation



Open Weather Map

Tom Tom

Fiware

Grafana

GitHub

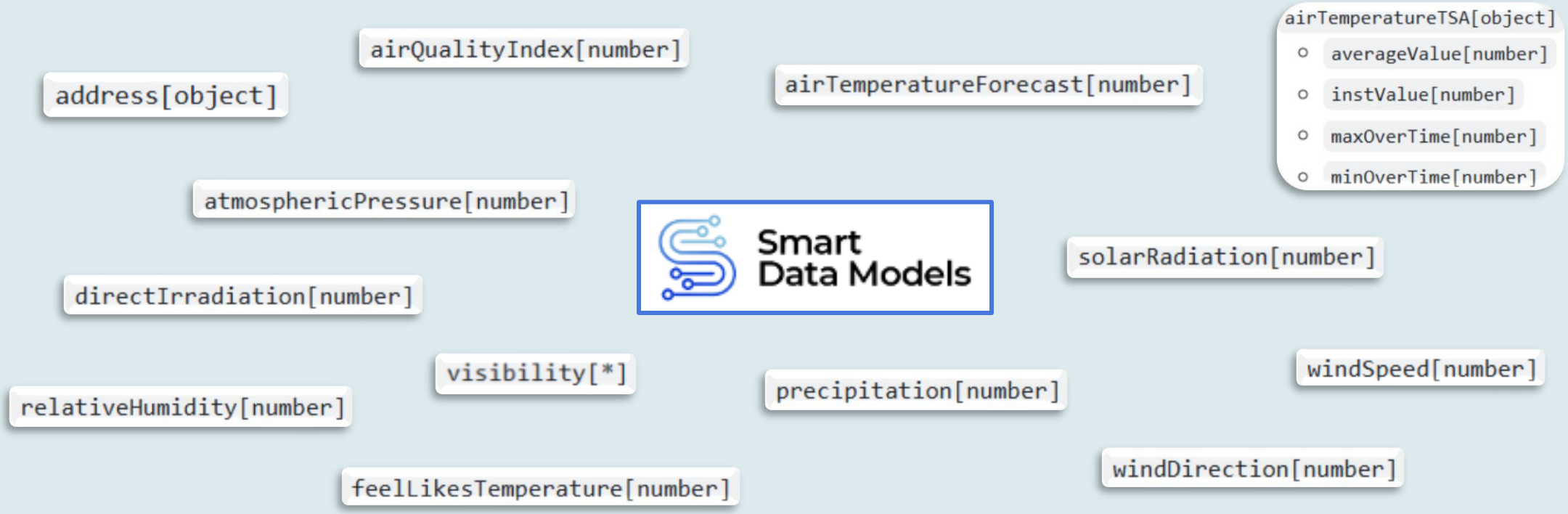
Figma

TOM-TOM API

$$Traffic\ Percentage = \frac{Free\ Flow\ Speed - Current\ Speed}{Free\ Flow\ Speed}$$

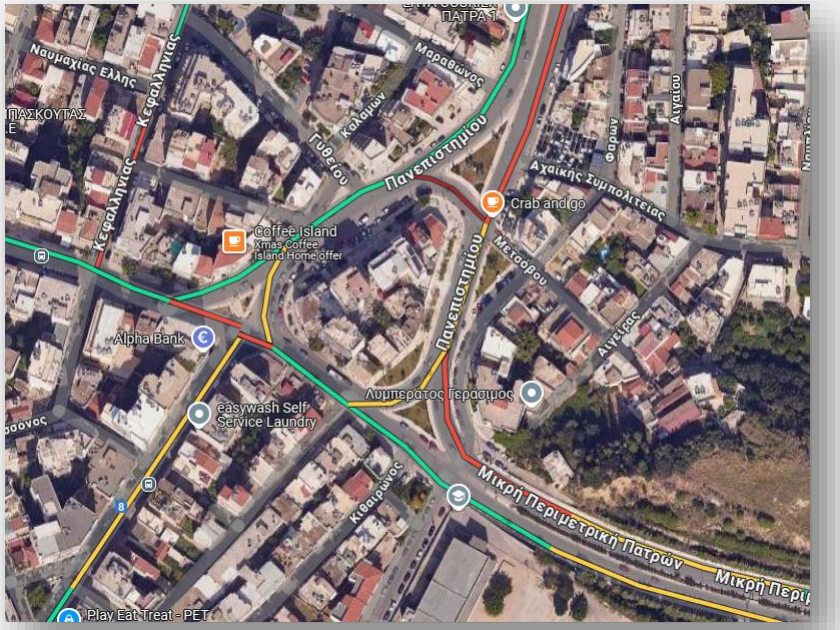
```
# Run the functions to fetch and save data
fetch_traffic_flow()
fetch_traffic_incidents()
```

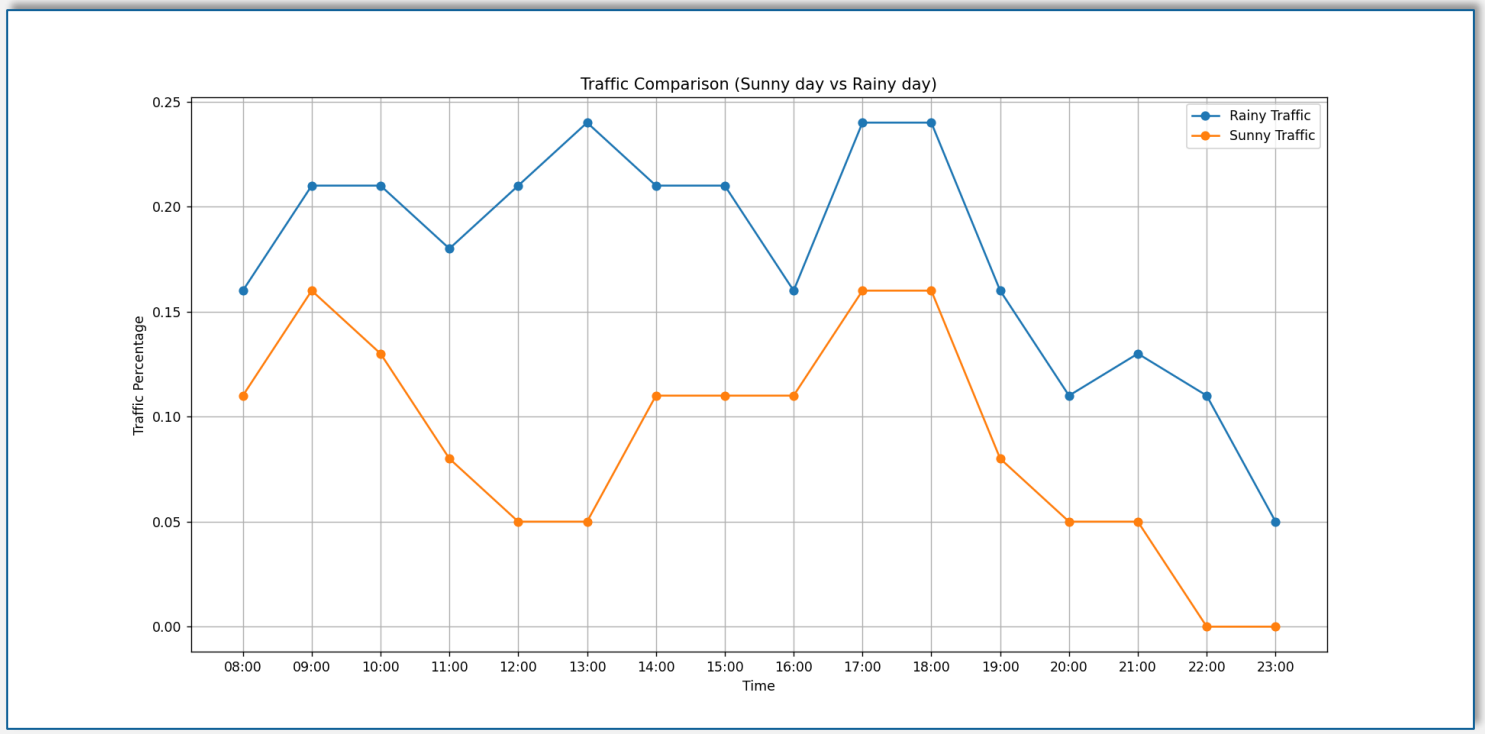
SMART DATA MODEL

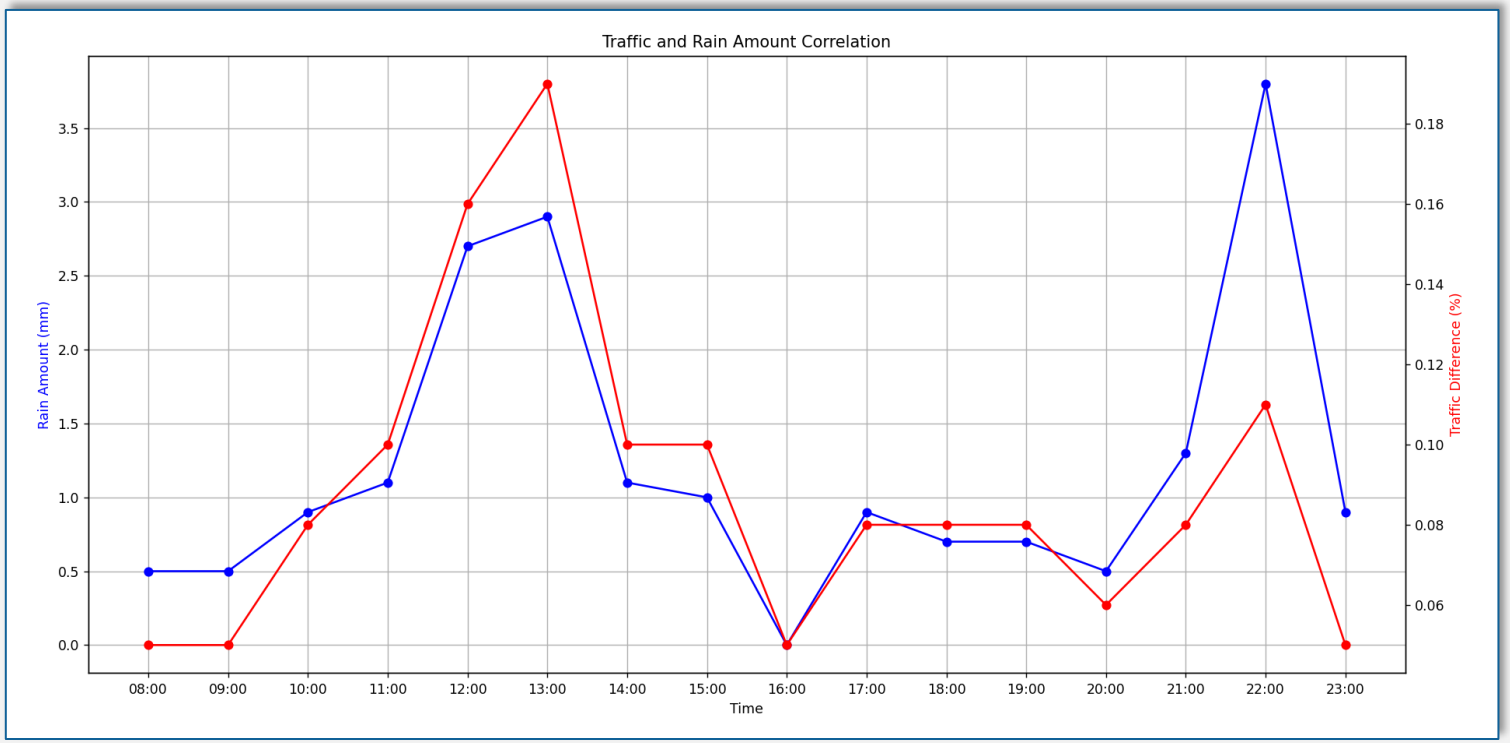


https://github.com/smart-data-models/dataModel.Weather/blob/master/WeatherObserved/doc/spec.md

DEMO


Ναυμαχίας Ελλης
Κεφαλληνίας
Μαραθώνος
Καλαμών
Γυθείου
Πανεπιστημίου
Αχαϊκής Συμπολιτείας
Φαρών
Αιγαίου
Crab and go
Coffee Island
Xmas coffee
Island Home offer
Μετσόβου
Alpha Bank
Ανεξαρτ
easywash Self
Service Laundry
Λυμπεράτος Γερασιμος
Μικρή Περιμετρική Πατρών
Play Eat Treat - PET


Traffic Comparison (Sunny day vs Rainy day)
Rainy Traffic
Sunny Traffic
Traffic Percentage
0.25
0.20
0.15
0.10
0.05
0.00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time



MICROCLIMATE AND TRAFFIC CORRELATION

```
44  # Correlation calculation
45  def calculate_correlation(list1, list2):
46      if len(list1) != len(list2):
47          raise ValueError("Lists must have the same length for correlation calculation.")
48      correlation, p_value = pearsonr(list1, list2)
49      return correlation, p_value
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
Correlation index between rain and traffic: 0.79
P-value: 3.05e-04
```

THANK YOU!

Any questions?