INVESTIGATING THE IMPACT OF WEATHER CONDITIONS ON TRAFFIC FLOW IN DUBLIN

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1. Introduction:

This study aims to investigate the correlation between weather parameters (such as temperature, rainfall, humidity, and wind speed) and traffic patterns in Dublin.
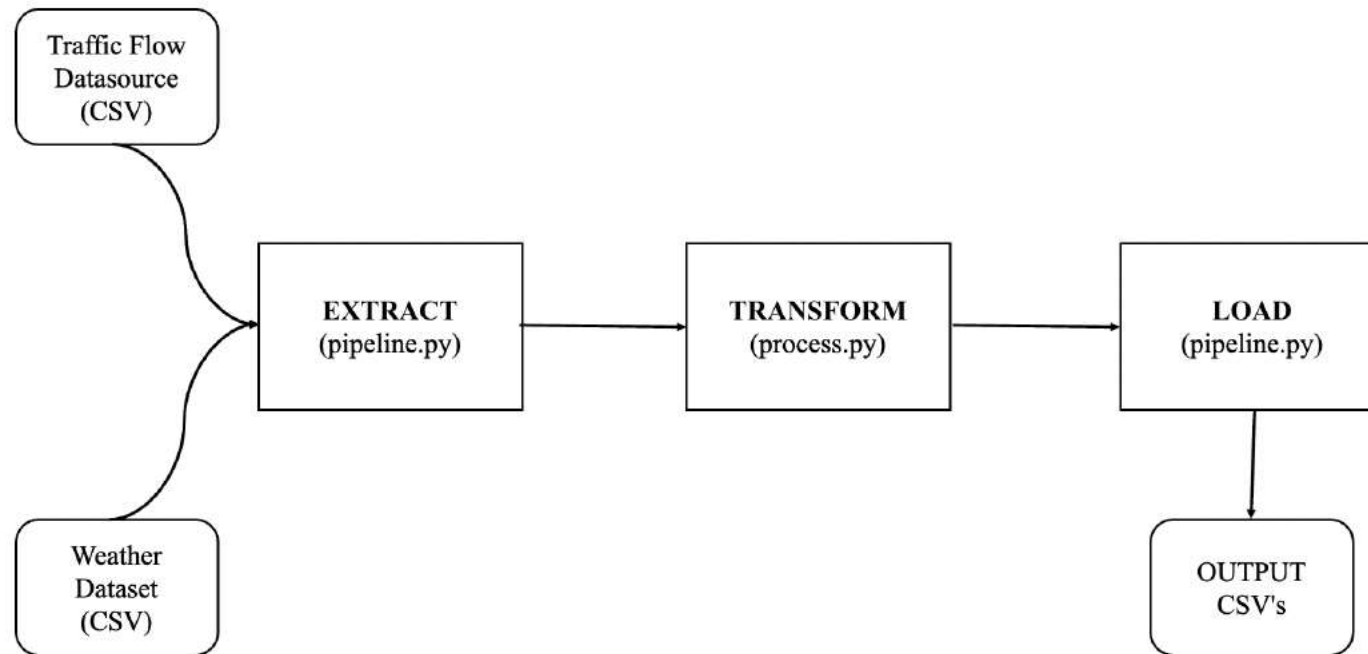
2. Data Sources:

Datasource1: Traffic Congestion Saturation Flow Data
- Data Type: CSV
- This file contains South Dublin County Council(SDCC) Traffic Congestion Saturation Flow Data for January to June 2021.

Datasource2: Weather data
- Data Type: CSV
- This file contains temperature, humidity and other weather-related data for January to June 2021.

3. ETL Pipeline:

4. Analysis:

- Data Integration: Combining the traffic flow data and weather data based on the date. This involved standardizing date formats and merging the datasets to create a unified dataset that included daily traffic flow and corresponding weather parameters (temperature, humidity, precipitation, wind speed, and visibility).

- Descriptive Statistics: Calculating basic descriptive statistics to understand the distributions and summary metrics of the traffic flow and weather data. This step helped in identifying any anomalies or patterns within the dataset.

Correlation Matrix Heatmap
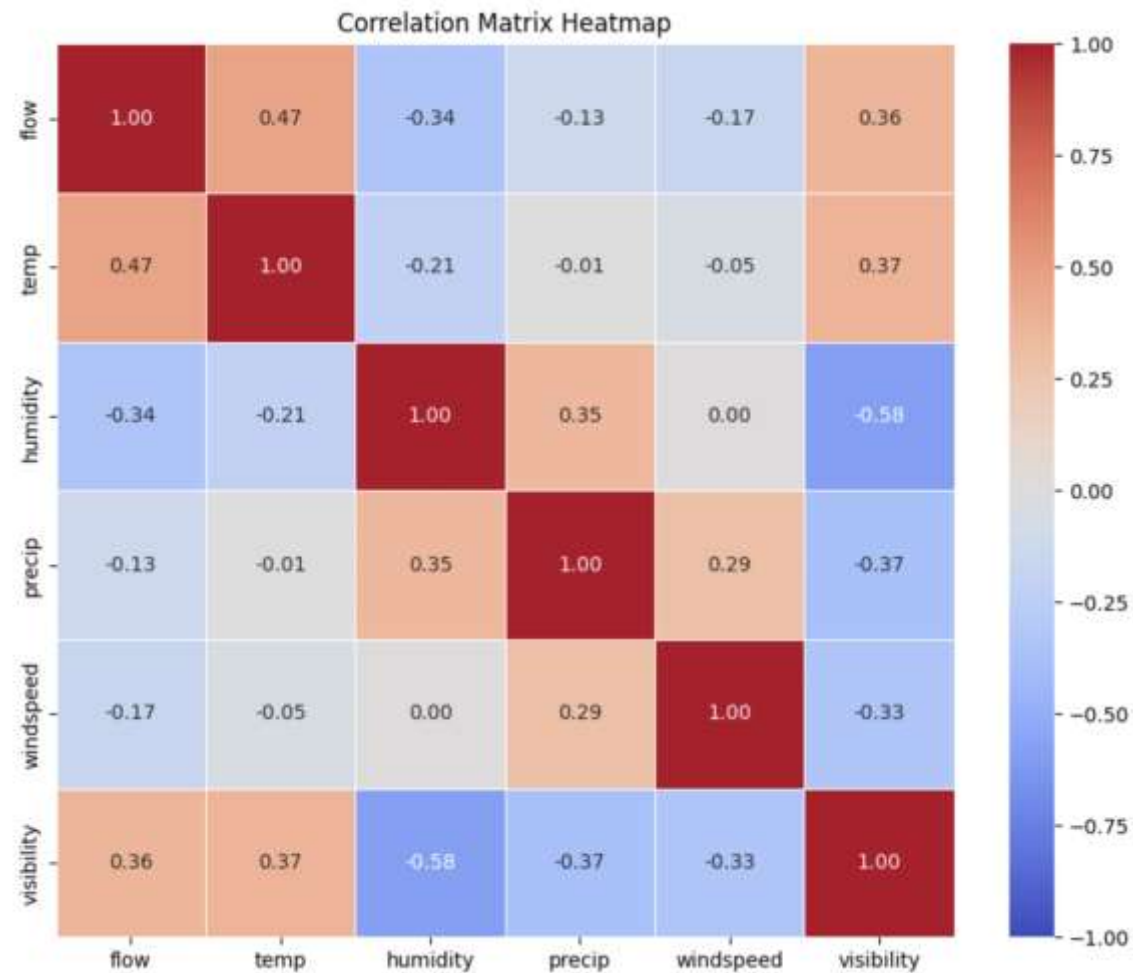
Computing the correlation matrix to quantify the strength and direction of relationships between weather parameters and traffic flow as seen in the above heatmap. The correlation coefficient ranges from -1 to 1, where values close to '1' indicate a strong positive correlation, values close to -1 indicate a strong negative correlation, and values around '0' indicate no correlation.

5. Results:
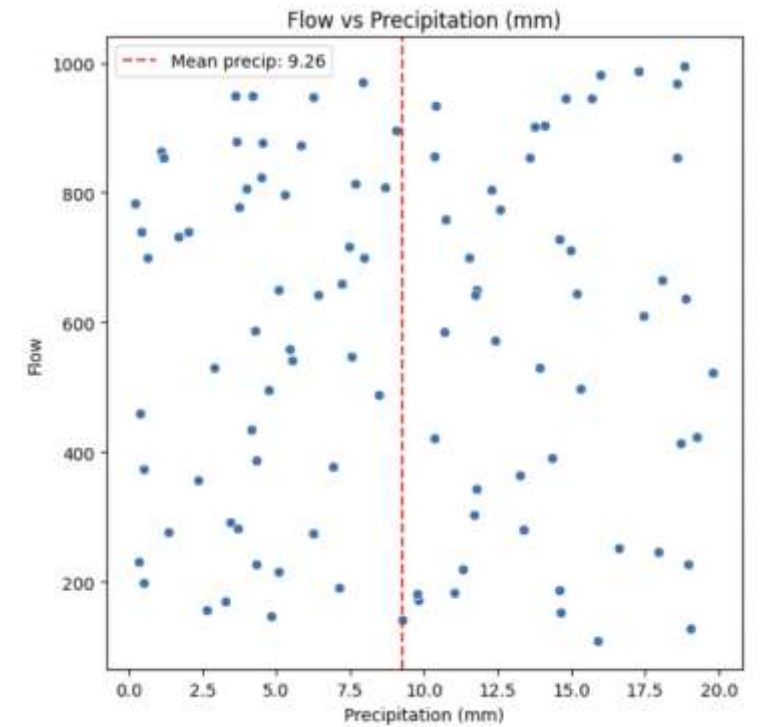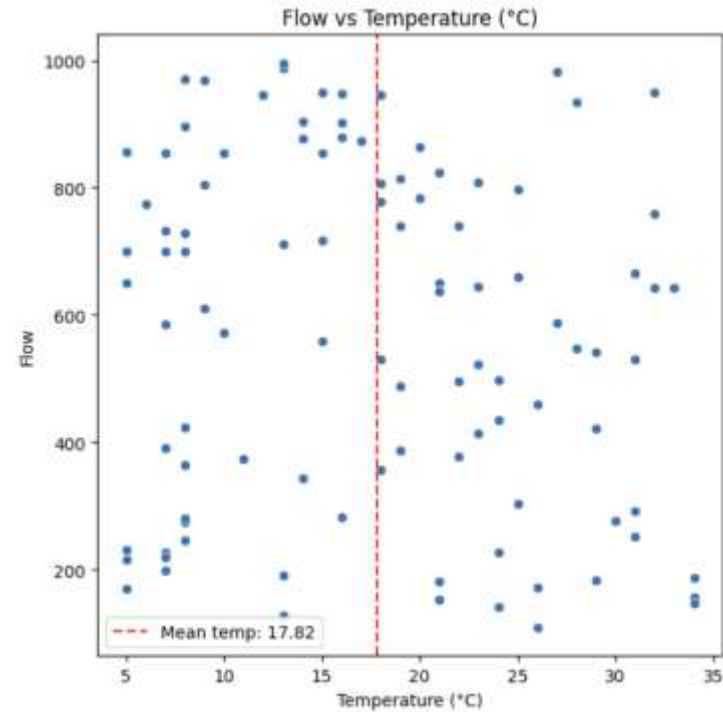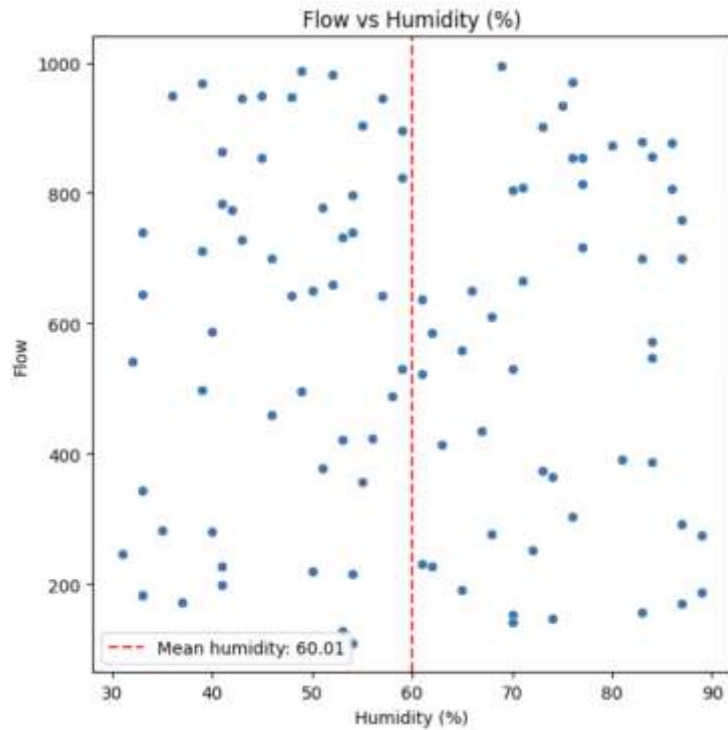
6. Interpretation:

- The positive correlation between temperature and traffic flow suggests that traffic volumes are higher on warmer days, likely due to increased outdoor activities and travel.

- Conversely, the negative correlations with humidity and precipitation indicate that adverse weather conditions, such as rain and high humidity, lead to reduced traffic volumes.

- For instance, on days with forecasted heavy rain or high humidity, authorities can implement measures to manage traffic flow more efficiently, such as adjusting traffic signal timings or promoting the use of public transportation.

- Furthermore, the weaker correlations with wind speed and visibility suggest that while these factors do impact traffic flow, their effects are less pronounced compared to temperature, humidity, and precipitation.

7. Limitations:

- **Correlation vs. Causation**: The analysis establishes correlations but does not confirm causation. While there is a relationship between weather conditions and traffic flow, it is not definitive that weather changes cause changes in traffic patterns.

- **Time of Day Effects**: The analysis does not differentiate between traffic flow at different times of the day. Traffic patterns can vary significantly between peak and off-peak hours, and weather impacts may also differ accordingly.

- **Public Transportation Data**: The study does not include data on public transportation usage, which could provide a more comprehensive understanding of how weather conditions affect overall urban mobility.

- **Behavioral Factors**: The study does not account for human behavioral factors such as changes in driver behavior during adverse weather conditions or decisions to work from home, which can influence traffic flow.