Captone Project Proposal

Description of the problem -

As the population of cities grow, traffic congestion has become a critical challenge to city infrastructure. Excessive traffic leads to increased commute times, higher fuel consumption, and greater environmental pollution. The goal for this project is to create a model that would predict traffic congestion patterns and suggest optimized routes for drivers to reduce commute times and congestion. The project will utilize data from the Austin open data portal to create a predictive model that can adapt to changing traffic patterns. A successful model could allow applications that would help drivers make informed route choices and reduce congestion across certain areas.

Description of the dataset -

data.austintexas.gov/Transportation-and-Mobility/Traffic-Detectors/qpuw-8eeb/about\_data

The dataset is from the City of Austin open data portal and contains information about the city’s traffic detectors at intersections in Austin. There are 15 columns of variables and 5,352 rows of detector records.

Key variables:

* Detector\_id, detector\_type, detector\_status: identifiers and status information on each traffic detector
* Detector\_direction, detector\_movement: traffic direction and type of movement detected
* Location\_name, atd\_location\_id, signal\_id: specific location identifiers
* Created\_date, modified\_date: timestamps that can be used for time series analysis
* Location: coordinates in a point format, useful for spatial analysis

Description of the techniques used -

Time series analysis (LSTM models) - using the columns detector\_status, created\_date, modified\_date, and detector\_direction, using the timestamps and operational status, a predictive model could be developed to identify traffic congestion patterns based on historical detector activity.

Spatial analysis for route optimization (geographical visualization, CNN for grid-based analysis) – using detector\_direction, detector\_movement, and Location, location data could map out high-traffic areas and traffic flow patterns based on detector movement data. Spatial insight can assist in optimizing routes and advising on alternative paths for drivers.

Classification algorithms (decision trees, random forest, or neural networks) – real time monitoring and status classification of detectors