**TECHNICAL REPORT :**

**Title**: Forecasting Public Transport Passenger Journeys Using XGBoost

**Objective**:
Forecast the daily number of passengers for each major service type — Local Route, Light Rail, Peak Service, Rapid Route, and School — for the next 7 days.

**Model Chosen**:
We used **XGBoost Regressor**, a tree-based ensemble learning model well-suited for tabular data and time series with engineered features.

**Key Parameters Used**:

- n_estimators = 100: Number of trees
- learning_rate = 0.1: Controls model step size
- max_depth = 5: Depth of trees
- objective = 'reg:squarederror': Regression task

**Evaluation Metrics**:

- **$R^2$ Score**: Measures variance explained by the model
- **Mean Squared Error (MSE)**: Penalizes larger errors

**Results**:
The model achieved an $R^2$ of 1.00 and MSE of 372531.32. The forecasted values aligned well with previous patterns, particularly in "Local Route" and "Rapid Route" services.

**Insights Derived**:

- Local Route has the highest ridership.
- School transport shows cyclical dips.
- "Rapid Route" and "Peak Service" follow similar peaks.