Daily Public Transport Passenger Journeys by Service Type

1.Key Insights:

- Distinct Weekly Seasonality in School and Peak Services
- Rapid Route is the Backbone of the Network
- Light Rail Usage Shows Gradual Growth Trend
- Nonzero 'School' Values Found on Weekends Occasionally
- Rapid Route and Local Route Show Parallel Trends

2.Technical report: Forecasting Passenger Journeys Using Facebook Prophet

Objective:

The aim of this project is to analyze and forecast public transport passenger journeys across various service types using time-series modeling. The chosen algorithm for forecasting is Facebook Prophet, an open-source forecasting tool developed by Meta**.**

Algorithm Overview: Facebook Prophet

Prophet is a robust and scalable time-series forecasting model designed for daily, weekly, or monthly observations with strong seasonal effects. It is particularly useful for business time series where data may contain missing values and outliers.

Prophet decomposes time series into three main components:

- Trend (g(t)) – Non-periodic changes in the value of the time series.
- Seasonality (s(t)) – Periodic changes (daily, weekly, yearly).
- Holidays (h(t)) – Effects of known events (optional).

The general form:

$y(t) = g(t) + s(t) + h(t) + \varepsilon_t$

Model Parameters Used

In this implementation, Prophet was configured with the following key parameters:

- daily_seasonality=True
  Activates daily seasonal patterns, helpful for datasets with intra-week or day-level variability.
- weekly_seasonality=True
  Enables modeling of weekly trends in public transport demand, capturing regular weekly commuter behavior.
- periods=7
  Extends the forecast by 7 days beyond the available data. This is suitable for short-term operational planning.