**Insights** on Analysing the given dataset :

[Daily Public Transport Passenger Journeys by Service Type](https://www.data.act.gov.au/Transport/Daily-Public-Transport-Passenger-Journeys-by-Servi/nkxy-abdj/about_data)

1. The busiest travel day was March 7, 2023, with the highest total number of passengers across all services.
2. A major spike in School transport usage happened on March 1, 2023, possibly due to school reopening or a major event involving students.
3. On certain days, Light Rail was more used than Local Route, showing a shift in preference or better convenience.
4. Local Route and Peak Service show strong positive correlation — when one goes up, the other often does too, likely due to shared peak-hour usage.
5. The trend plot shows that most services rise and fall together, with School service showing the most variation.

**Forcasting** the next 7 days of passenger journeys for 5 public transport service types:

Given dataset : [Daily Public Transport Passenger Journeys by Service Type](https://www.data.act.gov.au/Transport/Daily-Public-Transport-Passenger-Journeys-by-Servi/nkxy-abdj/about_data)

* Local Route
* Light Rail
* Peak Service
* Rapid Route
* School

using time series forecasting algorithms.

**1. ARIMA (AutoRegressive Integrated Moving Average)**

* **Purpose:** Linear, statistical time series forecasting
* **Model Parameters (p, d, q):**
  + p: Autoregressive order = 5
  + d: Differencing order = 1
  + q: Moving average order = 2
* **Strengths:**
  + Effective for short-term forecasting with trend
  + Requires minimal preprocessing
* **Limitations:**
  + Assumes linearity, struggles with complex seasonality

**2. XGBoost Regressor**

* **Purpose:** Gradient boosting on decision trees with lag features
* **Feature Engineering:**
  + Lag window: 7 previous days
* **Model Parameters:**
  + Objective: reg:squarederror
  + Estimators: 100
  + Booster: gbtree (default)
* **Strengths:**
  + Fast training and evaluation
  + Robust to missing data and noise
* **Limitations:**
  + Requires manual lag feature creation
  + Cannot capture temporal order beyond input window

**Evaluation Metric:**

* **Root Mean Square Error (RMSE)** used to evaluate prediction accuracy for each model across all service types.