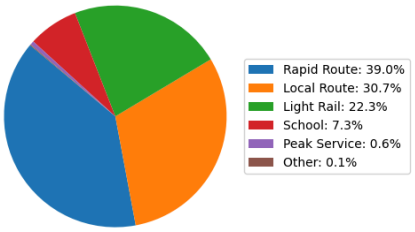
Public Transport Patronage Analysis and Short-Term Forecasting

Insight



1.Rapid Route has the most riders at 39%, followed by Local Route (31%) and Light Rail (22%), showing they are the main public transport services.

2.Transport usage peaks during **Australian winter,**driven by school terms and increased work commuting.

3.Weekday ridership peaks mid-week, especially **Wednesdays (~41,836 journeys),** and drops significantly on **Sundays (~10,851),** reflecting typical workweek travel patterns.

4.Peak Service usage is concentrated on weekdays, especially **Tuesdays and Wednesdays (~282 journeys/day),** with no weekend service, while Rapid Route maintains strong usage on non-peak days.

Objective

The aim of this study is to forecast the number of journeys for different public transport service types — *Local Route, Light Rail, Peak Service, Rapid Route,* and *School* — over the next 7 days using historical data.

Chosen Algorithm: Facebook Prophet

Prophet is an open-source forecasting tool developed by Facebook, specifically designed for time series data with strong seasonal effects and missing data. It's robust to outliers and supports both linear and logistic growth models.

Model Overview

- **Input Data**: Daily time series data with service-wise passenger counts.
- **Preprocessing**:
    - Converted 'Date' column to `datetime` format.
    - Renamed columns to Prophet's format: `ds` (date), `y` (value to forecast).
    - Dropped missing values.

Model Configuration and Parameters

Parameter	Value	Purpose
`daily_seasonality`	`True`	Captures daily ridership patterns
`weekly_seasonality`	`True`	Captures weekly commuting trends
`yearly_seasonality`	`True`	Captures seasonal trends (e.g., winter/summer variations)
`periods`	`7`	Forecast horizon: 7 days ahead

Forecasting Steps

1. **Model Training**: A separate Prophet model was trained for each service using historical data.
2. **Forecasting**: Future data frames were created for 7 days. Forecasts were generated using `.predict()`.
3. **Visualization**: Forecasts were visualized for each transport type.
4. **Trend Analysis**: Compared recent 7-day average to historical average to detect demand trend.