Analysis on Daily Public Transport Passenger Journeys by Service Type

The dataset contains daily passenger journey data over approximately 6 years (1918 days), covering transport services including Local Route, Light Rail, Peak Service, Rapid Route, School, and Other categories.

The insights drawn from the dataset are:

- Across all six years, **Rapid Route** consistently registers the highest passenger numbers, highlighting its critical role in public transportation.
- The **Peak Service** category has the lowest passenger counts among the main transport types, suggesting it might be a niche or limited service.
- The **Other** category remains minimal in comparison, indicating limited usage or fewer services categorized here
- **Local Route** usage peaks on weekdays (especially Tuesday and Wednesday) and drops significantly on weekends and holidays.

Technical Report on Facebook Prophet Algorithm

Overview

Facebook Prophet is an open-source time series forecasting tool developed by Meta (formerly Facebook). It is specifically designed for business time series data that exhibit seasonality, holidays, trends, and missing data. Prophet is known for being robust, easy to use, and accurate even with limited data preprocessing.

Model Parameters

1. Growth

growth='linear' (default): Linear trend with changepoints

growth='logistic': Logistic trend with a carrying capacity

Used when demand or values saturate over time

2. Changepoint Parameters

changepoint_prior_scale: Controls flexibility of trend changes

Higher = more flexible; risk of overfitting

Default: 0.05

n_changepoints: Number of potential trend changepoints

Default: 25

3. Seasonality

Prophet automatically detects and models:

Weekly seasonality

Yearly seasonality

Custom seasonalities can be added manually

seasonality_mode: 'additive' or 'multiplicative'

4. Holiday Effects

Custom holidays can be added to capture known spikes/dips

Not used in our current implementation but useful for future models (e.g., school schedules, public holidays)

5. Uncertainty Intervals

interval_width: Default is 0.80 (i.e., 80% confidence interval)

yhat_lower and yhat_upper give the prediction bounds

Conclusion

Facebook Prophet was chosen for its interpretability, ease of use, and capability to handle missing data, outliers, and irregular seasonal patterns. Its parameter flexibility makes it a strong candidate for forecasting transportation trends over short horizons like 7 days. Future enhancements can include holiday effects, weekend/weekday decomposition, and tuning changepoint_prior_scale per route type.