Predicting Demand for Services Using Seasonal Trends and Event Data

1. Motivation

In the hospitality and service industries, accurately predicting demand is essential for optimizing operations and enhancing customer satisfaction. My research aims to explore how seasonal patterns and local events influence service demand, helping businesses develop predictive models for informed decision-making and improved service offerings. The constraint of the research will be limited to New York City, NY and Los Angeles, CA.

2. Data Collection

I will collect data that provides information on:

- Seasonal Patterns: historical data on service bookings and customer traffic to identify recurring seasonal patterns and demand fluctuations.
- Event Data: local events, festivals, conferences, and holidays from event calendars, tourism boards.
- Service Bookings: bookings, reservations, and customer inquiries from booking platforms, reservation systems, and business records.
- Demographic Data: demographic information and market trends to understand the underlying factors influencing service demand.

3. Data Analysis

The analysis will involve applying time series analysis and machine learning to develop predictive models for forecasting service demand:

- Time Series Analysis: Analyzing historical data to identify seasonal trends, patterns, and correlations between service demand and external factors such as weather, holidays, and events.
- Machine Learning Model Development: Developing predictive models (eg. regression models) to forecast service demand based on seasonal trends, event data, and other relevant variables.
- Model Validation: Evaluating model performance using techniques such as cross-validation and error metrics to ensure accuracy and reliability.
- Visualization of Results: Creating visualizations and dashboards to communicate findings effectively and provide actionable insights for businesses.

4. Audience

- Hospitality Businesses: Hotels, restaurants, event venues, and service providers can use predictive models to optimize resource allocation, staffing, and marketing strategies based on anticipated demand.
- Event Organizers.
- Industry Researchers.

5. Deliverables

The project will deliver a comprehensive report detailing the findings of the analysis, including predictive models for forecasting service demand, insights into seasonal trends and event impacts, and recommendations for businesses. Additionally, interactive visualizations and dashboards will be developed to facilitate exploration of the data.