Project ID : 24-25J-303

Topic : AI-Enhanced Supply Chain Management System for Tea Leaves

Overview of the project:

The project to enhance the tea supply chain at Watawala Tea Factory aims to improve key processes using data-driven strategies. By applying advanced tools like data analysis, machine learning, and predictive models, the focus is on optimizing tea demand predictions, managing inventory efficiently, ensuring sufficient labor availability, and streamlining logistics. The objective is to create a more efficient operation that reduces costs, boosts productivity, and improves the overall delivery and production process for tea.

Project Components:

Weather-Based Demand Forecasting: By analyzing past weather patterns and their connection to tea sales, we can predict monthly demand. This helps with more accurate production planning.

Inventory Management: Using monthly demand forecasts, we'll estimate the weekly need for raw materials like tea leaves. An automated system will maintain just the right inventory levels, minimizing waste and ensuring consistent supply.

Managing Supply Chain Risks: To avoid labor shortages, we'll predict weekly staffing needs for different regions (Kollupitiya, Kaluthara, Nittabuwa). This allows us to address potential shortages in advance and keep operations running smoothly.

Optimizing Logistics: By analyzing historical traffic data, we'll forecast traffic conditions and adjust delivery schedules. This will help avoid delays, save time, and reduce transportation costs.

Architectural Diagram:

![image](https://github.com/user-attachments/assets/81fbb283-58e3-4922-a9fc-4b3966ffef5c)

Dependencies:

Data Manipulation and Analysis:

1. Pandas - For data cleaning, manipulation, and analysis.

2. Numpy - For numerical computations and handling arrays.

Data Visualization:

1. Matplotlib - For creating visualizations like line charts and bar plots.

2. Seaborn - For advanced statistical visualizations.

Machine Learning and Deep Learning:

1. Scikit-Learn (sklearn) - For preprocessing, training, and evaluating machine learning models.

2. TensorFlow - For building and training the LSTM model.

3. PyTorch (Torch) - An alternative deep learning framework if preferred over TensorFlow.

Model Type:

LSTM (Long Short-Term Memory) - A type of neural network architecture suitable for sequential data.