INFOSYS SPRINGBOARD

AI-DRIVEN SUPPLY CHAIN DISRUPTION PREDICTOR AND INVENTORY OPTIMIZATION SYSTEM GROUP 2

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Introduction – Supply Chain Management (SCM) for Tea Industry

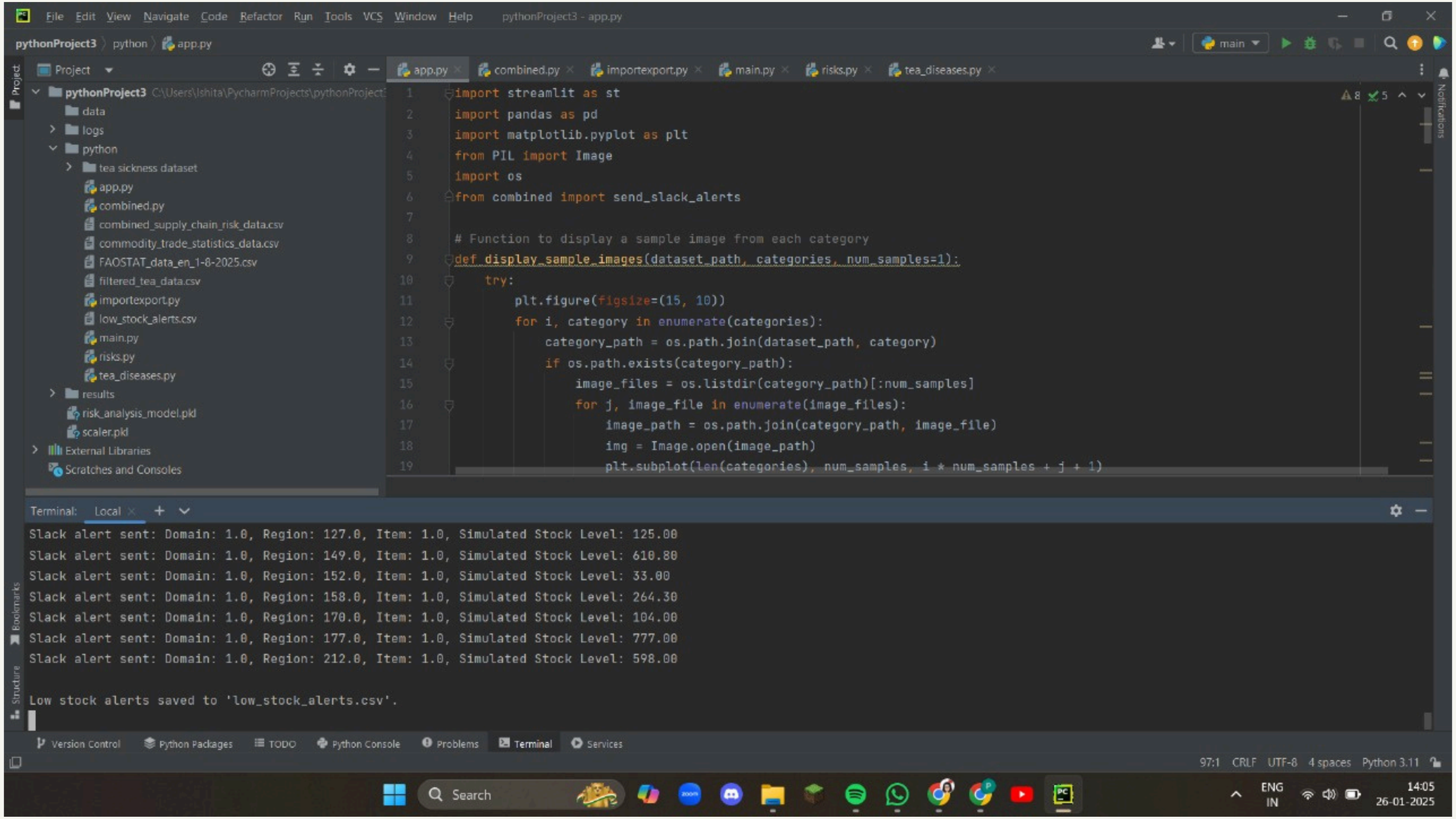
Efficient supply chain management is crucial for maintaining smooth operations, minimizing delays, and optimizing resources. This Supply Chain Tea Project leverages machine learning and automation to enhance inventory tracking, demand forecasting, and real-time decision-making.

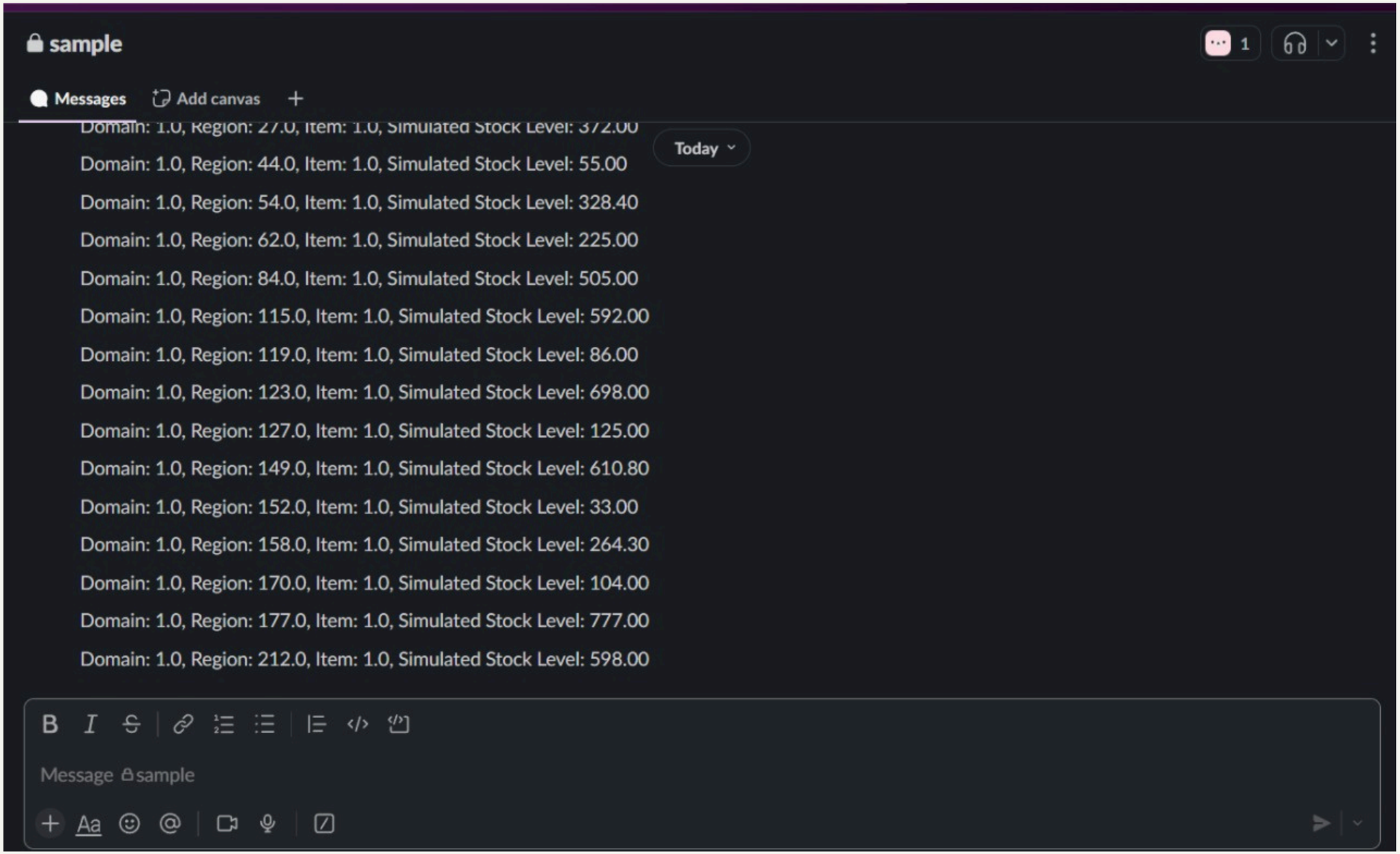
About the project:

- **Supply Chain Tracking:** The project tracks and visualizes the tea supply chain from farm to consumer, ensuring transparency and operational efficiency.
- **LightGBM Model:** Utilizes LightGBM to predict supply chain outcomes, such as demand forecasting and inventory optimization, aiding in smarter decision-making.
- **Streamlit Dashboard:** Features an interactive Streamlit dashboard for users to visualize and interact with supply chain data, including real-time insights and predictions.
- **Real-Time Monitoring & Notifications:** Enables stakeholders to monitor tea production, distribution, and sales in real-time, with notifications sent directly to Slack for immediate alerts and updates.

Technology Stack

- **LightGBM**: A gradient boosting framework used to build predictive models for demand forecasting and inventory optimization.
- **Streamlit:** A framework for creating interactive dashboards that allows users to visualize supply chain data in real-time.
- **Slack API:** Used to send automated notifications about key events in the supply chain, such as stock shortages or inventory updates.
- **Python:** The main programming language used for data processing, model training, and creating the dashboard.
- **Pandas/NumPy:** Libraries used for data manipulation and analysis.


File Edit View Navigate Code Refactor Run Tools VCS Window Help
pythonProject3 - app.py
pythonProject3 python app.py
main
Project
pythonProject3 C:\Users\Ishita\PycharmProjects\pythonProject3
data
logs
python
tea sickness dataset
app.py
combined.py
combined_supply_chain_risk_data.csv
commodity_trade_statistics_data.csv
FAOSTAT_data_en_1-8-2025.csv
filtered_tea_data.csv
importexport.py
low_stock_alerts.csv
main.py
risks.py
tea_diseases.py
results
risk_analysis_model.pkl
scaler.pkl
External Libraries
Scratches and Consoles
app.py
combined.py
importexport.py
main.py
risks.py
tea_diseases.py
import streamlit as st
import pandas as pd
import matplotlib.pyplot as plt
from PIL import Image
import os
from combined import send_slack_alerts
# Function to display a sample image from each category
def display_sample_images(dataset_path, categories, num_samples=1):
try:
plt.figure(figsize=(15, 10))
for i, category in enumerate(categories):
category_path = os.path.join(dataset_path, category)
if os.path.exists(category_path):
image_files = os.listdir(category_path)[:num_samples]
for j, image_file in enumerate(image_files):
image_path = os.path.join(category_path, image_file)
img = Image.open(image_path)
plt.subplot(len(categories), num_samples, i * num_samples + j + 1)
Terminal: Local
Slack alert sent: Domain: 1.0, Region: 127.0, Item: 1.0, Simulated Stock Level: 125.00
Slack alert sent: Domain: 1.0, Region: 149.0, Item: 1.0, Simulated Stock Level: 610.80
Slack alert sent: Domain: 1.0, Region: 152.0, Item: 1.0, Simulated Stock Level: 33.00
Slack alert sent: Domain: 1.0, Region: 158.0, Item: 1.0, Simulated Stock Level: 264.30
Slack alert sent: Domain: 1.0, Region: 170.0, Item: 1.0, Simulated Stock Level: 104.00
Slack alert sent: Domain: 1.0, Region: 177.0, Item: 1.0, Simulated Stock Level: 777.00
Slack alert sent: Domain: 1.0, Region: 212.0, Item: 1.0, Simulated Stock Level: 598.00
Low stock alerts saved to 'low_stock_alerts.csv'.
Version Control
Python Packages
TODO
Python Console
Problems
Terminal
Services
97:1 CRLF UTF-8 4 spaces Python 3.11
Search
ENG IN
14:05 26-01-2025


sample
1
Messages
Add canvas
Domain: 1.0, Region: 27.0, Item: 1.0, Simulated Stock Level: 372.00
Today
Domain: 1.0, Region: 44.0, Item: 1.0, Simulated Stock Level: 55.00
Domain: 1.0, Region: 54.0, Item: 1.0, Simulated Stock Level: 328.40
Domain: 1.0, Region: 62.0, Item: 1.0, Simulated Stock Level: 225.00
Domain: 1.0, Region: 84.0, Item: 1.0, Simulated Stock Level: 505.00
Domain: 1.0, Region: 115.0, Item: 1.0, Simulated Stock Level: 592.00
Domain: 1.0, Region: 119.0, Item: 1.0, Simulated Stock Level: 86.00
Domain: 1.0, Region: 123.0, Item: 1.0, Simulated Stock Level: 698.00
Domain: 1.0, Region: 127.0, Item: 1.0, Simulated Stock Level: 125.00
Domain: 1.0, Region: 149.0, Item: 1.0, Simulated Stock Level: 610.80
Domain: 1.0, Region: 152.0, Item: 1.0, Simulated Stock Level: 33.00
Domain: 1.0, Region: 158.0, Item: 1.0, Simulated Stock Level: 264.30
Domain: 1.0, Region: 170.0, Item: 1.0, Simulated Stock Level: 104.00
Domain: 1.0, Region: 177.0, Item: 1.0, Simulated Stock Level: 777.00
Domain: 1.0, Region: 212.0, Item: 1.0, Simulated Stock Level: 598.00
Message sample

app

localhost:8501/#1ac9efaa

Gmail YouTube Maps Classes

Deploy

Notification Settings ✨

Choose notification method:

Slack

Enter Slack Webhook URL:

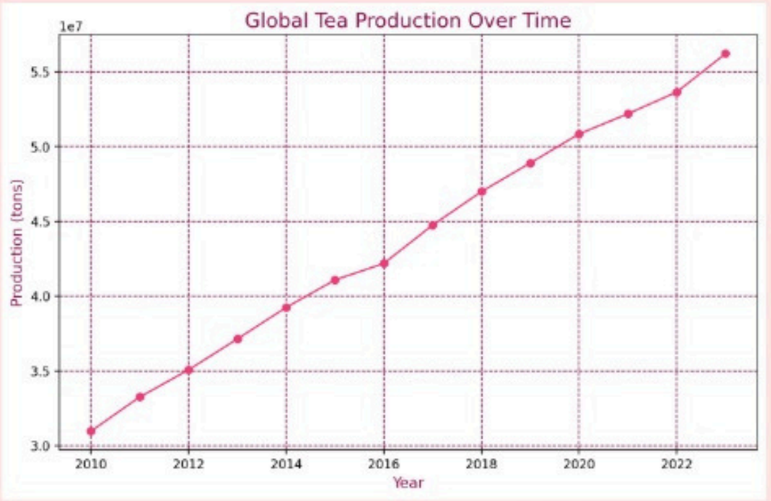
https://hooks.slack.com/services/T0841

Supply Chain Dashboard

A dashboard to monitor stock levels, view tea production trends, and send alerts 🌿✨

Run Tea Production Trend Analysis 🌿

Global Tea Production Trends



Search

ENG
IN

14:03
26-01-2025

app

localhost:8501/#1ac9efaa

Gmail YouTube Maps Classes

Deploy

Notification Settings ✨

Choose notification method:

Slack

Enter Slack Webhook URL:

https://hooks.slack.com/services/T0841...

Run Tea Disease Identification 🌿 ✨

Tea Disease Identification

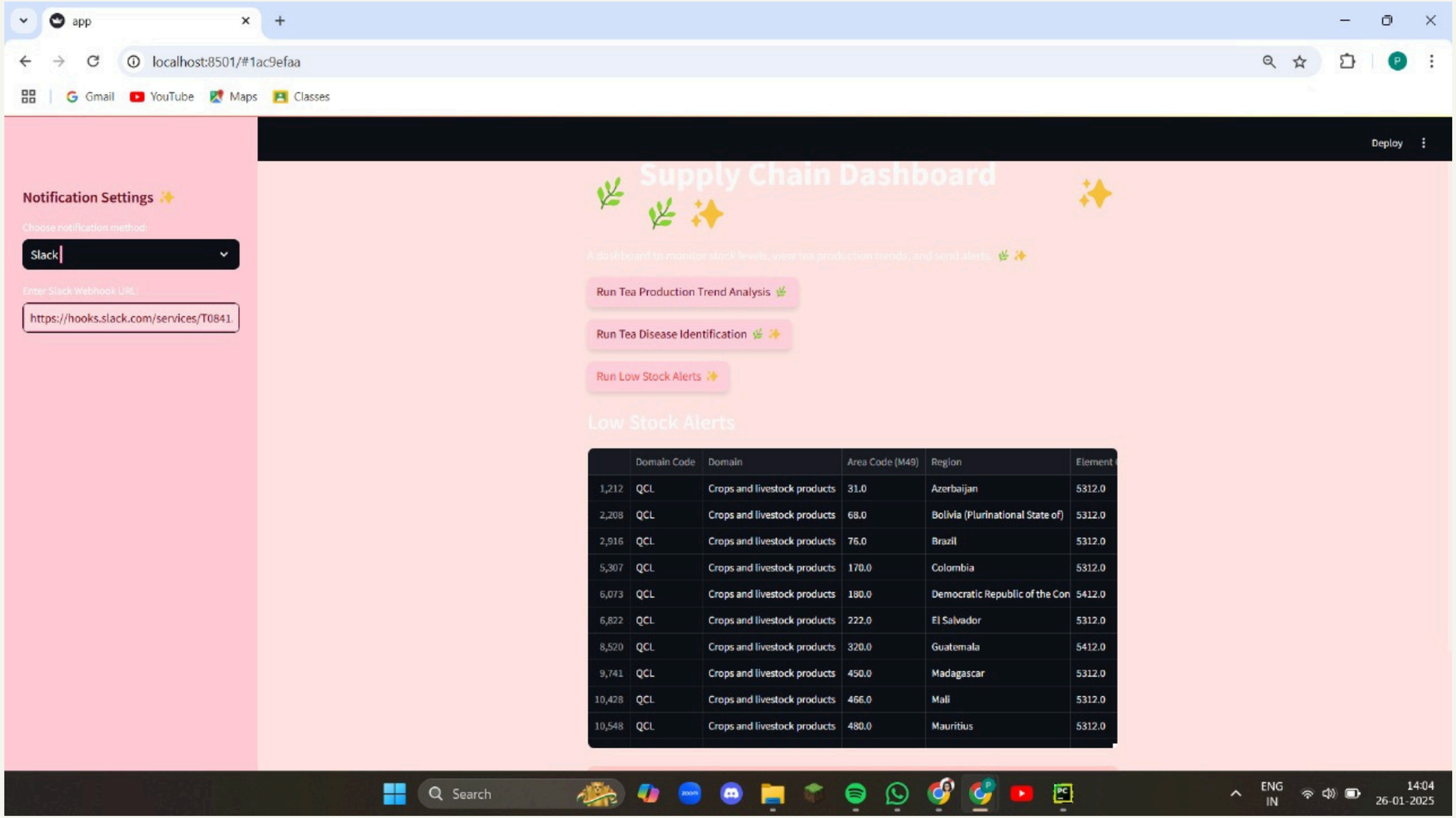
algal leaf - Sample 1

Anthracnose - Sample 1

Search

ENG IN

14:04 26-01-2025



	Domain Code	Domain	Area Code (M49)	Region	Element
1,212	QCL	Crops and livestock products	31.0	Azerbaijan	5312.0
2,208	QCL	Crops and livestock products	68.0	Bolivia (Plurinational State of)	5312.0
2,916	QCL	Crops and livestock products	76.0	Brazil	5312.0
5,307	QCL	Crops and livestock products	170.0	Colombia	5312.0
6,073	QCL	Crops and livestock products	180.0	Democratic Republic of the Con	5412.0
6,822	QCL	Crops and livestock products	222.0	El Salvador	5312.0
8,520	QCL	Crops and livestock products	320.0	Guatemala	5412.0
9,741	QCL	Crops and livestock products	450.0	Madagascar	5312.0
10,428	QCL	Crops and livestock products	466.0	Mali	5312.0
10,548	QCL	Crops and livestock products	480.0	Mauritius	5312.0

Challenges & Solutions

- **Inconsistent data from multiple sources.**

Solution: Data cleaning and preprocessing techniques like handling missing values, outlier detection, and normalization.

- **Model accuracy and overfitting.**

Solution: Tuning hyperparameters and regularization to improve the model's generalization.

- **Real-time data integration.**

Solution: Using APIs and setting up real-time data pipelines to ensure accurate, up-to-date information.

Future Improvements

- Additional Data Sources
- Model Enhancements
- Expanded Notification System
- Integration with Supply Chain Software

Thank You!