AI Based Crop Health Capstone Project

AI-Based Crop Health Monitoring Using Drone Multispectral Data:

Dataset:

https://docs.google.com/spreadsheets/d/1wPL7_G65NBY7801PfKhbsM7ujANoID6DIzb2zmcJ1yM/edit?usp=sharing

Capstone Overview

In this capstone, you will build an end-to-end AI pipeline to detect crop stress using multispectral vegetation indices derived from drone imagery. You will train a machine learning model, generate spatial stress maps, and interpret results from an agricultural and drone-operations perspective.

Dataset Provided

You are provided with a dataset containing vegetation indices such as NDVI, GNDVI, SAVI, EVI, red-edge bands, canopy density, and moisture index. Each row represents a spatial observation within a field. Important: This dataset represents processed multispectral outputs obtained after drone analysis. You are not expected to process raw imagery.

Objectives

- Understand vegetation indices used in crop health monitoring
- Apply machine learning to classify crop stress
- Perform spatial aggregation for area-level insights
- Interpret AI outputs for drone-based decision making

Capstone Tasks

Task 1: Data Understanding

Explore the dataset and explain the role of each vegetation index in detecting crop stress.

Task 2: Machine Learning Model

Train a classification model to predict crop stress. Evaluate using precision, recall, F1-score, and ROC-AUC.

Task 3: Spatial Analysis & Visualization

Aggregate predictions into grid cells and generate a field-level stress heatmap.

Task 4: Drone & Agronomy Interpretation

Recommend drone inspection strategies based on stress severity.

Task 5: Reflection

Discuss limitations and propose improvements using real-world data.

Deliverable

- Jupyter Notebook with code and outputs
- Stress maps and visualizations
- Short written explanation(documentation)