

AI-Based Crop Health Monitoring

Using

- Understand vegetation indices (NDVI, EVI, etc.)
- Train Random Forest classification model
- Create spatial stress heatmaps
- Generate drone inspection recommendations

Problem Statement

The Challenge

- Drones capture multispectral images
- Extract vegetation indices (NDVI, EVI, etc.)
- Train AI to classify Healthy vs Stressed
- Generate field-level stress heatmaps

Real-World Use Case

Precision Agriculture Applications

- Agriculture & Farming
- Forestry Management
- Environmental Monitoring
- Vineyard & Orchard Management

Input Data: Vegetation Indices

Multispectral Features Used

Key Concepts (High Level)

Core Technologies

Understanding NDVI

Normalized Difference Vegetation Index

- Healthy plants ABSORB red light (photosynthesis)
- Healthy plants REFLECT NIR light (cell structure)
- Stressed plants reflect more red, less NIR

Solution Pipeline

Step-by-Step Process

Code Logic Summary

Key Implementation

Important Parameters

Model & Split Configuration

- 100 trees: Good balance of accuracy and speed
- max_depth=10: Prevents overfitting
- stratify: Ensures both classes represented in test

Model Performance Results

Evaluation Metrics

- Confusion matrix visualization
- Feature importance rankings
- Field-level stress heatmap
- Drone inspection recommendations

Observations & Insights

Key Findings

Advantages & Limitations

Advantages

- Automated stress detection at scale
- Objective, data-driven decisions
- Spatial visualization for targeted action
- Feature importance for agronomist insight
- Actionable drone recommendations

- Single time snapshot (no temporal trends)
- Geographic specificity (may not generalize)
- No ground truth field validation
- Single crop type assumed
- Label noise in training data possible

Interview Key Takeaways

Top 5 Points to Remember

- Why Random Forest? Robust, interpretable, handles many features
- What is NDVI? Plant health score from light reflection

Conclusion & Next Steps

Summary

- Successfully built crop health classification system
- Achieved ~87% accuracy with Random Forest
- Created spatial stress heatmaps for targeted inspection
- Generated actionable drone recommendations