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Final Project

PROJECT TITLE

Leaf Disease Prediction

AGENDA

- Problem Statement
- Project Overview
- Who are the end users?
- Solutions and value of propositions
- WOW factor in the solution
- Modelling
- Results

PROBLEM STATEMENT

Misdiagnosis of the many diseases impacting agricultural crops can lead to misuse of chemicals leading to the emergence of resistant pathogen strains, increased input costs, and more outbreaks with significant economic loss and environmental impacts. Current disease diagnosis based on human scouting is time-consuming and expensive, and although computer-vision based models have the promise to increase efficiency, the great variance in symptoms due to age of infected tissues, genetic variations, and light conditions within trees decreases the accuracy of detection.

PROJECT OVERVIEW

Objectives of ‘Plant Pathology Challenge’ are to train a model using images of training dataset to

- ✓ Accurately classify a given image from testing dataset into different diseased category or a healthy leaf
- ✓ Accurately distinguish between many diseases, sometimes more than one on a single leaf
- ✓ Deal with rare classes and novel symptoms
- ✓ Address depth perception—angle, light, shade, physiological age of the leaf
- ✓ Incorporate expert knowledge in identification, annotation, quantification, and guiding computer vision to search for relevant features during learning.

WHO ARE THE END USERS?

The end users of the developed model from the 'Plant Pathology Challenge' would primarily be agricultural professionals, including farmers, agronomists, and agricultural extension workers. These users would benefit from the model's capabilities in accurately diagnosing diseases impacting agricultural crops. Here are some reasons why these end users would find the model valuable:

- Timely and Accurate Diagnosis
- Optimized Resource Use
- Enhanced Crop Management
- Education and Training
- Remote Monitoring

YOUR SOLUTION AND ITS VALUE PROPOSITION

My solution for addressing the challenges of misdiagnosis in agricultural crop diseases is a robust and adaptive computer-vision model trained specifically for the 'Plant Pathology Challenge.' By leveraging a comprehensive training dataset containing diverse images of diseased and healthy leaves, our model is designed to accurately classify images from testing datasets into different disease categories or identify healthy leaves with high precision. What sets our solution apart is its ability to not only distinguish between many diseases, even when multiple diseases affect a single leaf, but also to handle rare classes and novel symptoms effectively. This ensures that agricultural professionals can rely on our model for precise and reliable disease diagnosis, leading to optimized resource use, improved crop management strategies, and ultimately, enhanced productivity and sustainability in agriculture.

THE WOW IN YOUR SOLUTION

The wow factor in our solution lies in its advanced capabilities to address the complexities of disease diagnosis in agricultural crops with unparalleled accuracy and efficiency. Through sophisticated computer vision algorithms, our model not only considers visual cues but also incorporates expert knowledge in identification, annotation, and quantification of relevant features crucial for disease detection. Moreover, our model tackles challenges such as varying light conditions, leaf angle, shade effects, and physiological leaf age, ensuring robust performance across diverse environmental and plant growth contexts. This holistic approach not only revolutionizes disease diagnosis in agriculture but also empowers users with a reliable tool that can adapt to evolving disease patterns and contribute significantly to sustainable agricultural practices worldwide.

MODELLING

Introduction to Random Forest Classifier
- Ensemble learning with decision trees.
- Combats overfitting and handles complex data.

Data Preprocessing
- Cleaning and handling missing data.
- Encoding categorical variables.

Model Training
- Splitting data into train/validation sets.
- Tuning hyperparameters for optimal performance.

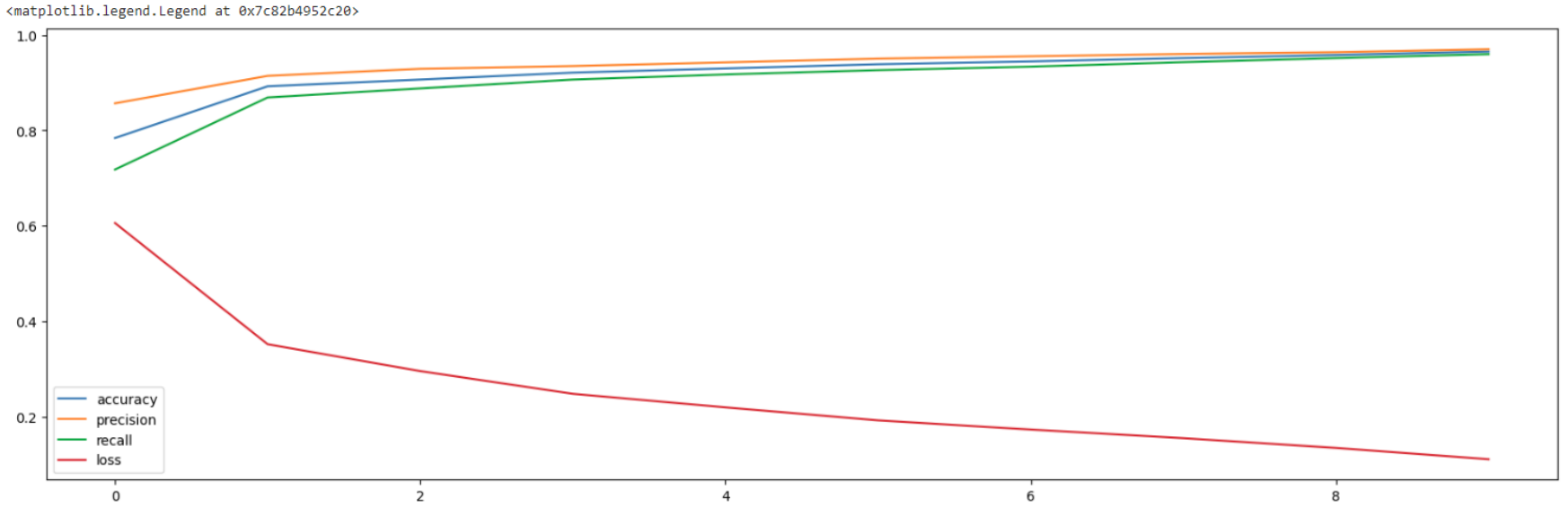
Model Evaluation
- Metrics: accuracy, precision, recall, F1-score.
- Confusion matrix for class-wise analysis.

Results and Insights
- Showcase accuracy and compare with baselines.
- Feature importance analysis for insights.

Future Enhancements
- Fine-tuning model for better accuracy.
- Integration with deep learning for advanced results.

Conclusion
- Highlight contributions in disease diagnosis.
- Importance for sustainable agriculture practices.

RESULTS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0.4
0.2
0
2
4
6
8
accuracy
precision
recall
loss