



# AI-Driven Web Application for Automated Disease Detection in Rice and Pulse Crops

An Infosys Springboard Virtual Internship 6.0 project, empowering farmers with AI for healthier harvests.

**Mentor & Coordinator**

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# Project Overview: AI-Driven Disease Detection

Leveraging deep learning and a user-friendly web interface to detect and diagnose crop diseases from leaf images.

1

## Primary Objective

Build a production-ready Streamlit web app with CNN for accurate leaf disease classification in rice and pulse crops.

2

## Key Highlights

Custom CNN, Streamlit UI, 3 disease classes, PDF reports, AI Chatbot, Secure Auth.

3

## Target Users

Farmers, Agricultural Extension Officers, Agronomists, Research Institutions.

# Problem Statement: Agricultural Losses

## Problem Statement

Crop diseases pose a significant threat to global food security and farmer livelihoods. Our project directly addresses these pressing issues.

- Time-Consuming & Error-Prone
- Costly Laboratory Testing
- Limited Expert Access
- Reduced Yield and Income



# Project Purpose: Smart & User-Friendly AI

1

## Project Objective

Identify rice and pulse crop diseases using AI-powered image analysis for timely farmer intervention.

2

## Specific Objectives

Robust CNN design, secure authentication, real-time predictions, SOLID principles, comprehensive testing.

3

## Expected Outcomes

Intuitive tool, accessible interface, early detection, targeted treatments, comprehensive documentation.

## Real-World Impact

Early detection, web-based accessibility, cloud scalability, and data-driven decisions reduce crop loss and pesticide misuse.

# Dataset & Preprocessing for AI Accuracy

## Dataset Overview

- **Total Images:** 300+ collected
- **Image Size:** Standardized to 224×224 pixels
- **Format:** JPEG, JPG, PNG
- **Organization:** Structured folders per class
- **Validation:** Manual to remove corrupt samples

## Disease Classes (3 Total)

Includes Bacterial Leaf Blight, Brown Spot, Leaf Scald.

## Preprocessing & Augmentation

Input Image → Resize(224\*224) → RGB Conversion → Convert to Tensor → Normalization(ImageNet mean & Std).

Data Augmentation Techniques like random horizontal flip, rotation, color jitter, are used.



# Seamless Workflow for Rapid Diagnosis



## User Login

Secure access to the platform via personalized accounts.



## Upload Leaf Image

Simple, intuitive interface for submitting crop leaf photos.



## AI Model Prediction

Deep learning algorithms swiftly analyze the uploaded image.



## Disease Identified

Instant diagnosis of specific crop diseases with high accuracy.



## Cure Suggestions

Receive recommended treatments and essential care instructions.



## PDF Report Generated

Download a comprehensive, detailed report for future reference.



# How Disease Detection Works: The 6-Phase Pipeline

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## 1 Image Acquisition

User uploads clear leaf image (JPEG/JPG/PNG, max 5MB) with format/size validation.

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## 3 Feature Extraction

CNN backbone extracts visual features, detecting patterns like spots and lesions.

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## 5 Confidence Scoring

Highest probability class selected; 60% threshold ensures reliable predictions.

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## 2 Preprocessing

Resize to 224×224, normalize with ImageNet stats, convert to PyTorch tensor.

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## 4 Classification

Fully connected layers map features to 3 classes; Softmax produces probability distribution.

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## 6 Result Presentation

Disease name, confidence, description, symptoms, recommendations, and downloadable PDF report.

# Tools and Technologies Used

Our project leverages a robust stack of cutting-edge tools and frameworks to ensure efficiency, scalability, and performance.

## Deep Learning

PyTorch  
Torchvision  
NumPy  
Matplotlib

## Web & UI

Streamlit



## Programming Languages

Python  
CSS3

## Backend & Database

SQLite  
ReportLab PDF Engine



## Security & Testing

PyTest  
BCrypt

## DevOps

Git  
GitHub  
VS Code



# Outcomes

## AI-Powered Detection

CNN classifies 3 disease classes with confidence scores.



## Web Application

Streamlit-based platform accessible via any browser.



## PDF Reports

Downloadable diagnosis reports with recommendations.



## Secure Authentication

bcrypt (12 rounds) + SQLite user management.





# Future Scope: Expanding Horizons

Our vision extends beyond current capabilities to create a truly comprehensive and globally impactful solution for agricultural disease detection.

## Expansion

- More diseases (20+ for diverse crops)
- Mobile application for on-the-go diagnosis
- Offline mode for remote farming areas

## Integration

- GPS for precise location-based insights
- Real-time weather data for predictive analysis
- Detailed, localized treatment guidance

## Support & Accessibility

- Multi-language support for global adoption
- Expert connect features for personalized advice
- Community forums for peer-to-peer knowledge sharing

# Thank You

We appreciate your time and interest in our AI-driven solution for crop disease detection. Together, we can build a more resilient and sustainable future for agriculture.

## Questions?



Get in Touch



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