

# PLANT DISEASE DETECTION

# OUR TEAM

Taanya Rawat - S24CSE0587

Jeevan Prakash Meghwal -S24CSE0672

Gauranvi Mehra - S24CSE0791

# PROBLEM STATEMENT

- **Global Food Security at Risk:** Plant diseases cause an estimated US\$220 billion in annual economic losses, threatening agricultural productivity and global food supply chains.
- **Inefficiency of Traditional Methods:** Current disease identification methods are often slow, reliant on manual scouting by experts, and prone to human error. This leads to delayed interventions and the unchecked spread of pathogens.
- **The Scalability Challenge:** Providing timely and accurate plant disease diagnostics to every farmer, especially in remote areas, is a significant logistical and economic hurdle.

# PROPOSED SOLUTION

- **An AI-Powered Disease Classifier:** Develop a scalable and accessible web/mobile application that uses a Convolutional Neural Network (CNN) to identify plant diseases directly from leaf images.
- **How It Works:**
  - a. **User Uploads** a photo of a plant leaf via a simple interface.
  - b. **AI Model Analyzes** the image in real-time, leveraging transfer learning for high accuracy.
  - c. **Instant Diagnosis** is provided, indicating the likely disease (or health status) along with confidence level and management advice.
- **Core Value:** Democratizes expert-level plant pathology knowledge, enabling early detection and precise action for farmers and gardeners.

# GOALS AND OBJECTIVES

- **Primary Goal:** To create an accurate, user-friendly, and reliable tool for automated plant disease detection.
- **Objectives:**
  - **Accuracy:** Achieve >90% model accuracy on a held-out test set for targeted diseases.
  - **Usability:** Develop an intuitive interface that requires no technical expertise.
  - **Performance:** Ensure a rapid prediction time (<5 seconds per image).
  - **Accessibility:** Build a solution that is cost-effective and deployable on common platforms (web/mobile).
  - **Scalability:** Design a system that can be easily expanded to include new plant species and diseases.

# TECHNOLOGY USED

- **Core AI & Framework:**
  - **Python:** Primary programming language.
  - **TensorFlow & Keras:** Deep learning framework for building and training the CNN model.
  - **PyTorch:** (Alternative framework).
- **Pre-trained Models (Transfer Learning):**
  - **VGG16, ResNet50, or EfficientNet:** For robust feature extraction and high baseline accuracy.
- **Image Processing:**
  - **OpenCV & scikit-image:** For image preprocessing, augmentation, and transformation.
- **Development & Deployment:**
  - **NumPy & Pandas:** For data manipulation.
  - **Streamlit / Flask / FastAPI:** For building the web application backend and interface.
  - **Google Colab / Kaggle:** For cloud-based GPU training.
  - **Hugging Face / Heroku / AWS:** For model deployment and hosting.

# KEY FEATURES

- **Real-Time Image Analysis:** Instant diagnosis upon image upload.
- **Comprehensive Disease Database:** Covers multiple common crops and their major diseases (e.g., Tomato Blight, Apple Scab, Corn Rust).
- **User-Friendly Interface:** Simple, clean design for easy navigation by non-technical users.
- **Detailed Results & Insights:** Provides the disease name, confidence score, and potential treatment/prevention recommendations.
- **Data Augmentation Pipeline:** Ensures model robustness by training on a varied dataset of rotated, flipped, and altered images.
- **Cloud-Based Deployment:** Accessible from anywhere, on any device with a browser.

# FUTURE PROSPECTS

- **Expanded Scope:** Incorporate more plant species, diseases, and pest damage identification.
- **Multimodal Input:** Integrate data beyond images, such as soil conditions, weather data, and location for more holistic crop health assessment.
- **Mobile-First & Offline Capability:** Develop a dedicated mobile app with lightweight models that can function in areas with poor internet connectivity.
- **Large-Scale Agri-Tech Integration:** Partner with agricultural firms to integrate the model into drone and satellite imagery analysis for monitoring large fields.
- **Community & Expert Network:** Build a platform for users to share findings and connect with agricultural experts for verified advice.

**THANK  
YOU**