ByteForce Crop Disease Detection System

AI-powered plant disease identification and treatment solution for sustainable farming.

OUR TEAM

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Crop Diseases: A Global Challenge

$220B+

Annual Losses

Worldwide crop damage

1B+

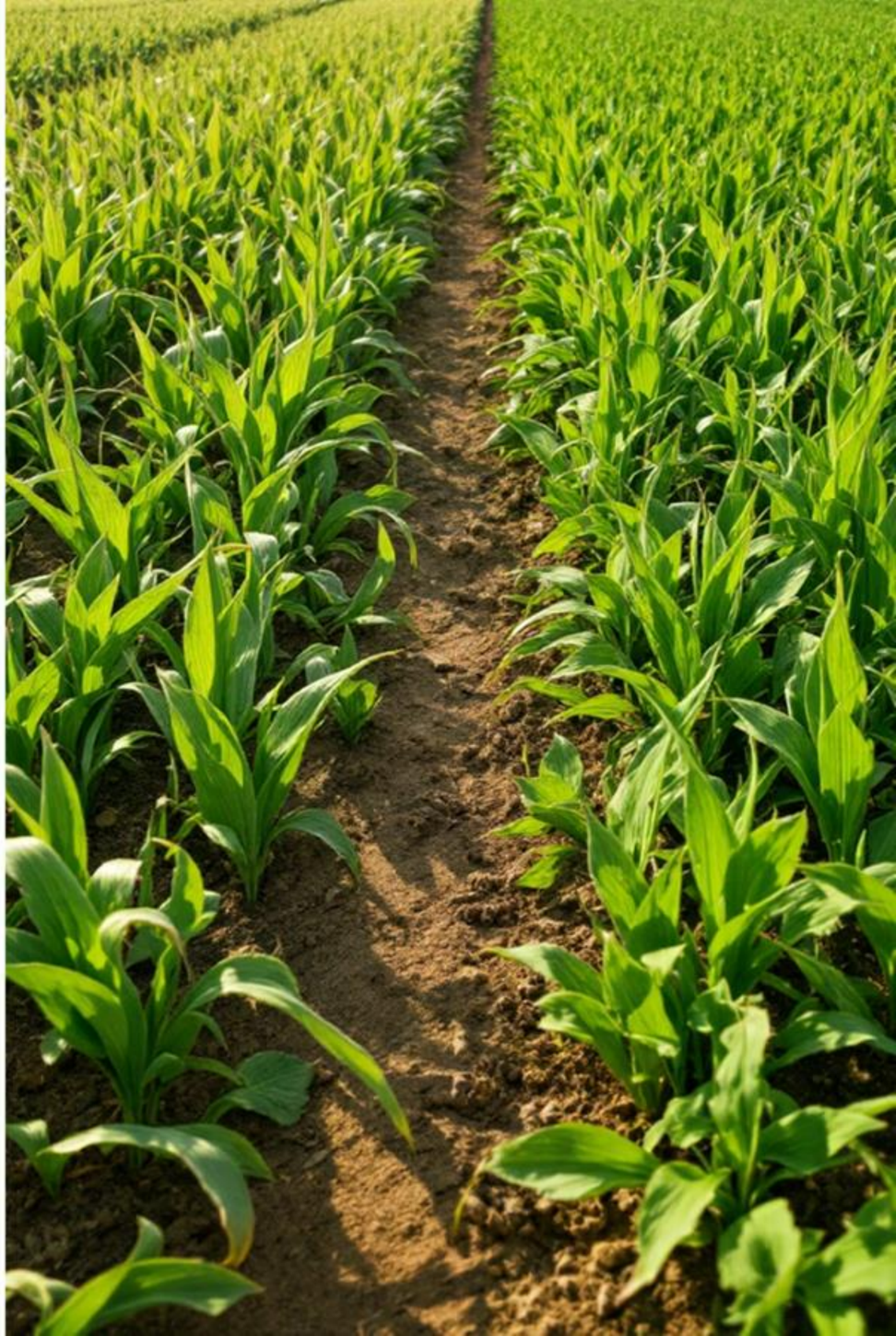
People Affected

Food security threatened

30%

Preventable

With early detection



Current Process

Visual Inspection

Farmers walk through fields, manually checking leaves for discoloration, spots, wilting, or insect damage.

Guesswork / Experience-Based Diagnosis

Rely on personal experience or consult with neighboring farmers or agronomists to diagnose the issue

Extension Office or Lab Testing

In some cases, leaves are collected and sent to local university labs or ag extension services for testing, with a 3-7 day turnaround time.

Our Solution

AI-powered analysis

Instant disease identification

Specialized detection

Iowa Specific crops

Weather integration

Optimal treatment timing

Sustainable practices

Long-term crop health

What Makes Us Unique?

Localized to Iowa & Midwest

Tailored to the crop types, and common diseases in Iowa and surrounding Midwest regions, unlike one-size-fits-all solutions.

Integrated Weather-Aware Recommendations

Provides weather-informed treatment schedules, enhancing the timing and effectiveness of interventions.

Impact

Time Savings

Reduces manual disease time by over 70%

Cost Efficiency

Reduces unnecessary pesticide usage and crop health consulting fee

Yield Protection

Helps prevent up to 30% crop loss with early detection

Farmer Empowerment

Provides accessible diagnostics

Datasets

Dataset	Brief Description
20K Dataset	20,000+ images of wheat, maize, cotton, sugarcane, and rice diseases from Kaggle, web scraping, and field data.
New Plant Disease	87K images in 38 classes (healthy + diseased), based on PlantVillage with offline augmentation.
Sorghum Disease	7167 images covering 5 sorghum diseases (e.g., Smuts, Rust), used for plant pathology and ML training.
Corn Leaf	4-class dataset (Common Rust, Gray Leaf Spot, Blight, Healthy), curated from Plant Village + PlantDoc.
Soybean	Dataset of 7 soybean diseases + healthy, collected and shared via Kaggle.
Cassava	Images of 5 disease types affecting cassava, used in African agricultural disease detection challenges.
Apple	Classifies leaves as Healthy, Rust, Scab, or multiple diseases; includes metadata and image folders.
Tomato	Tomato disease dataset from PlantVillage, used widely for leaf disease detection research.

Plant Disease Detection Models

General Detection Model:

1. American Bollworm on Cotton
2. Anthracnose on Cotton
3. Army Worm
4. Bacterial Blight in Cotton
5. Bacterial Blight in Rice
6. Boll Rot on Cotton
7. Bollworm on Cotton
8. Brown Spot
9. Common Rust
10. Cotton Aphid
11. Cotton Mealy Bug
12. Cotton Whitefly
13. Flag Smut
14. Gray Leaf Spot
15. Leaf Curl
16. Leaf Smut
17. Maize Ear Rot
18. Maize Fall Armyworm
19. Maize Stem Borer
20. Mosaic Sugarcane
21. Pink Bollworm in Cotton
22. Red Cotton Bug
23. Red Rot in Sugarcane
24. Red Rust in Sugarcane
25. Rice Blast
26. Thrips on Cotton
27. Tungro
28. Anthracnose and Red Rot
29. Cereal Grain Molds
30. Covered Kernel Smut
31. Head Smut
32. Loose Smut
33. Powdery Mildew on Squash
34. Leaf Scorch on Strawberry
35. Bacterial Spot on Tomato
36. Early Blight on Tomato
37. Late Blight on Tomato
38. Leaf Mold on Tomato
39. Septoria Leaf Spot on Tomato
40. Spider Mites on Tomato
41. Target Spot on Tomato
42. Tomato Mosaic Virus
43. Tomato Yellow Leaf Curl Virus
44. Apple Scab
45. Black Rot on Apple
46. Cedar Apple Rust
47. Powdery Mildew on Cherry
48. Cercospora & Gray Leaf Spot on Corn
49. Common Rust on Corn
50. Northern Leaf Blight on Corn
51. Black Rot on Grape
52. Esca on Grape
53. Leaf Blight on Grape
54. Citrus Greening on Orange
55. Bacterial Spot on Peach
56. Bacterial Spot on Bell Pepper
57. Early Blight on Potato
58. Late Blight on Potato
59. Wheat Aphid
60. Wheat Black Rust
61. Wheat Brown Leaf Rust
62. Wheat Leaf Blight
63. Wheat Mite
64. Wheat Powdery Mildew
65. Wheat Scab
66. Wheat Stem Fly
67. Yellow Rust on Wheat
68. Wilt
69. Yellow Rust on Sugarcane

Tomato Specialized Model:

1. Bacterial Spot
2. Early Blight
3. Late Blight
4. Leaf Mold
5. Septoria Leaf Spot
6. Spider Mites
7. Target Spot
8. Tomato Yellow Leaf Curl Virus
9. Tomato Mosaic Virus

Cassava Specialized Model:

1. Bacterial Blight
2. Brown Streak Disease
3. Green Mottle
4. Mosaic Disease

Soybean Specialized Model:

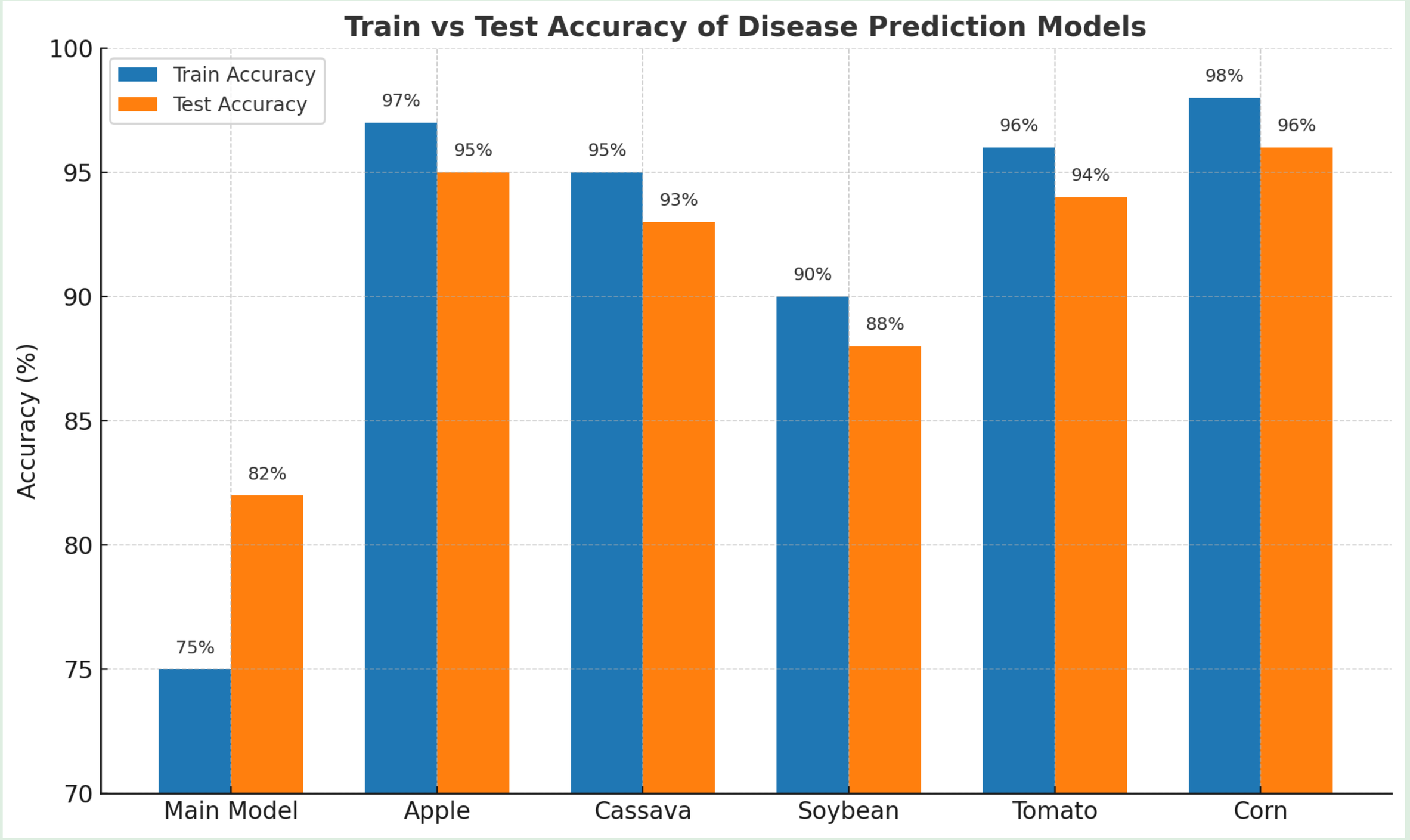
1. Bacterial Pustule
2. Frogeye Leaf Spot
3. Rust
4. Sudden Death Syndrome
5. Target Leaf Spot
6. Yellow Mosaic

Apple Specialized Model:

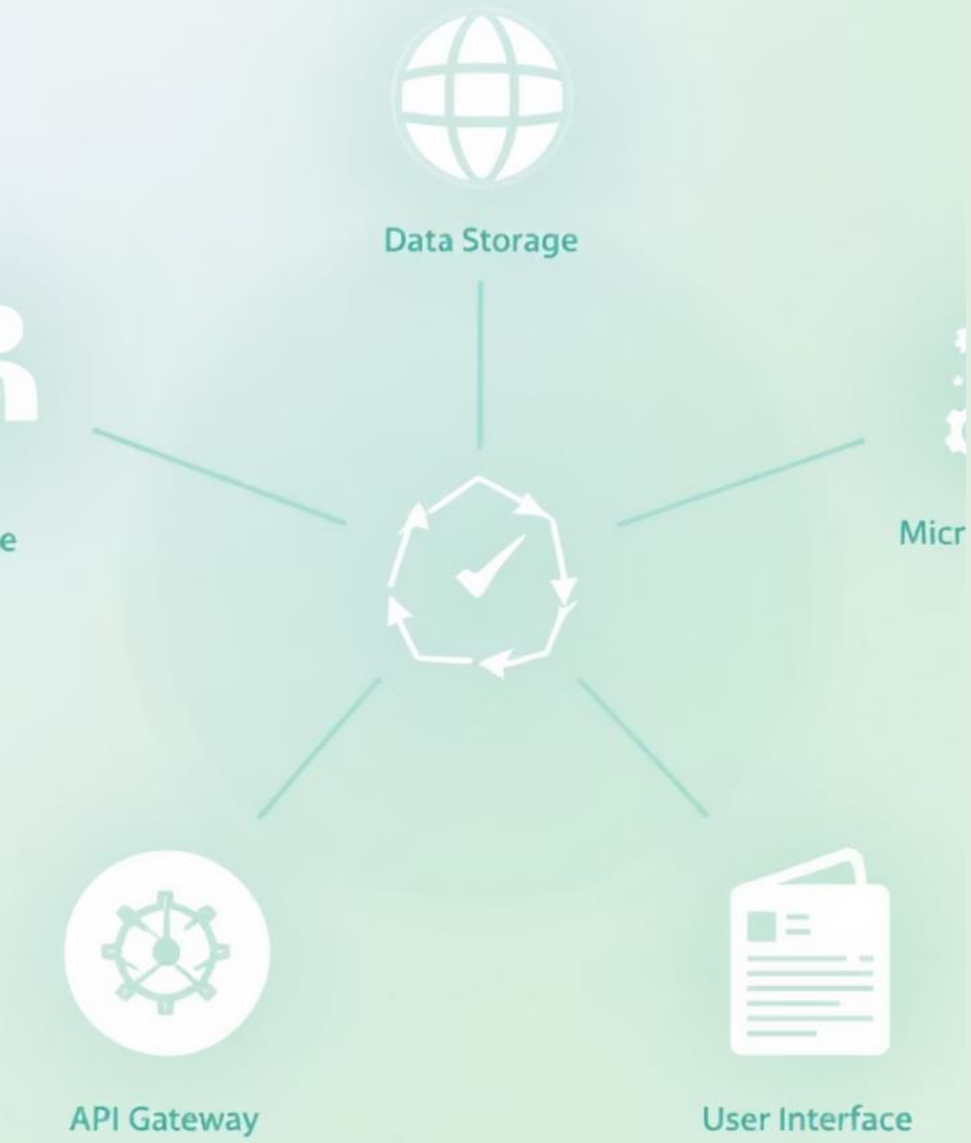
1. Black Rot
2. Cedar Apple Rust
3. Apple Scab

Corn Specialized Model:

1. Common Rust
2. Gray Leaf Spot
3. Northern Leaf Blight


Train vs Test Accuracy of Disease Prediction Models
Train Accuracy
Test Accuracy
Accuracy (%)
100
95
90
85
80
75
70
75%
82%
97%
95%
95%
93%
90%
88%
96%
94%
98%
96%
Main Model
Apple
Cassava
Soybean
Tomato
Corn

System Architecture



User Interface

React.js frontend

Backend

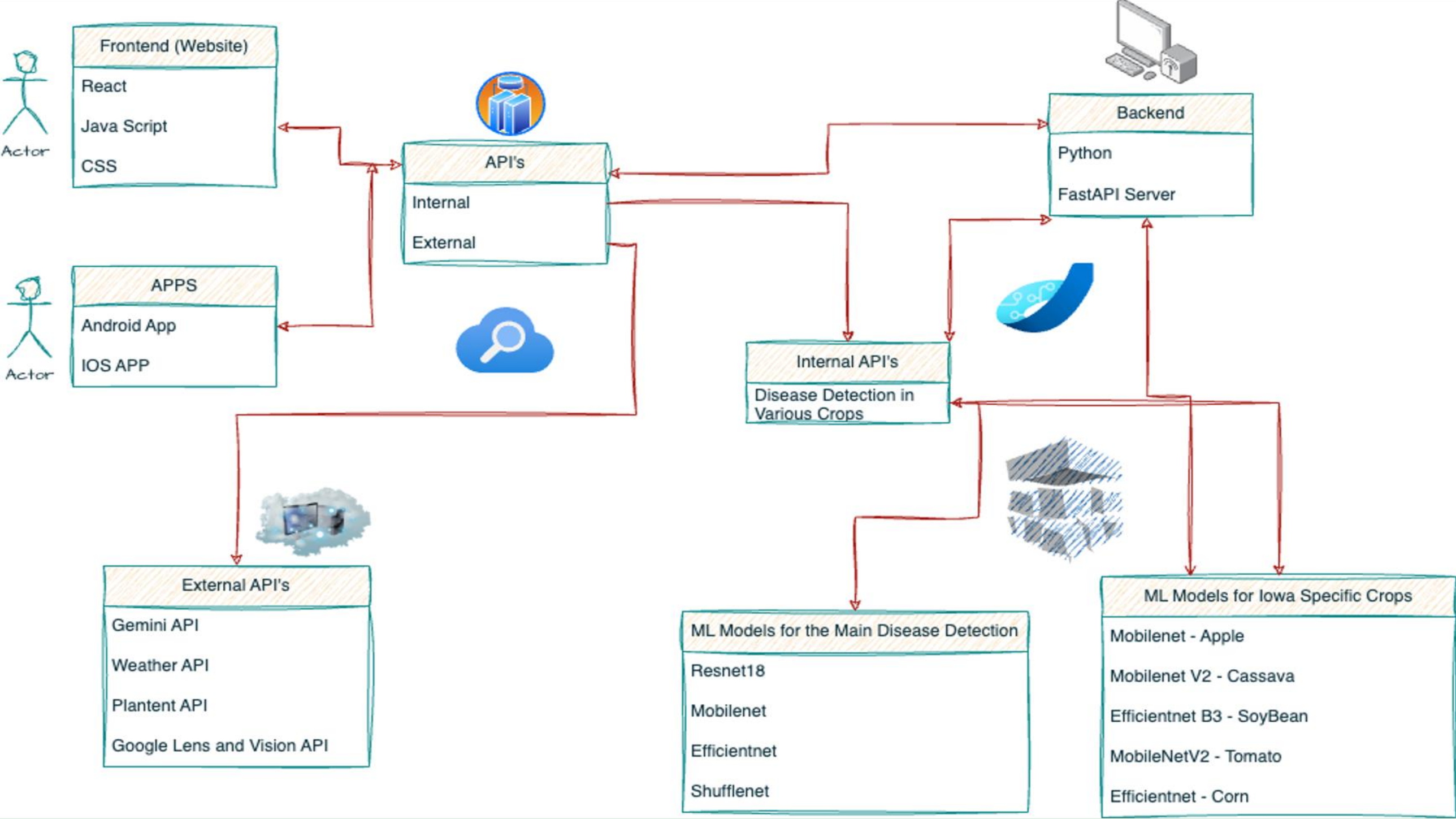
FastAPI services

ML Models

Deep learning ensemble

External APIs

Weather and plant data


Frontend (Website)
React
Java Script
CSS
Actor
API's
Internal
External
Backend
Python
FastAPI Server
APPS
Android App
IOS APP
Actor
Internal API's
Disease Detection in Various Crops
External API's
Gemini API
Weather API
Plantent API
Google Lens and Vision API
ML Models for the Main Disease Detection
Resnet18
Mobilenet
Efficientnet
Shufflenet
ML Models for Iowa Specific Crops
Mobilenet - Apple
Mobilenet V2 - Cassava
Efficientnet B3 - SoyBean
MobileNetV2 - Tomato
Efficientnet - Corn

External Integrations

PlantNet API

Image-based plant identification

Weather Data

Real-time environmental conditions

Gemini API

Treatment recommendations

Gemini

Pl@ntNet

OpenWeather

Getting Started

Clone repository

git clone from GitHub

Start backend

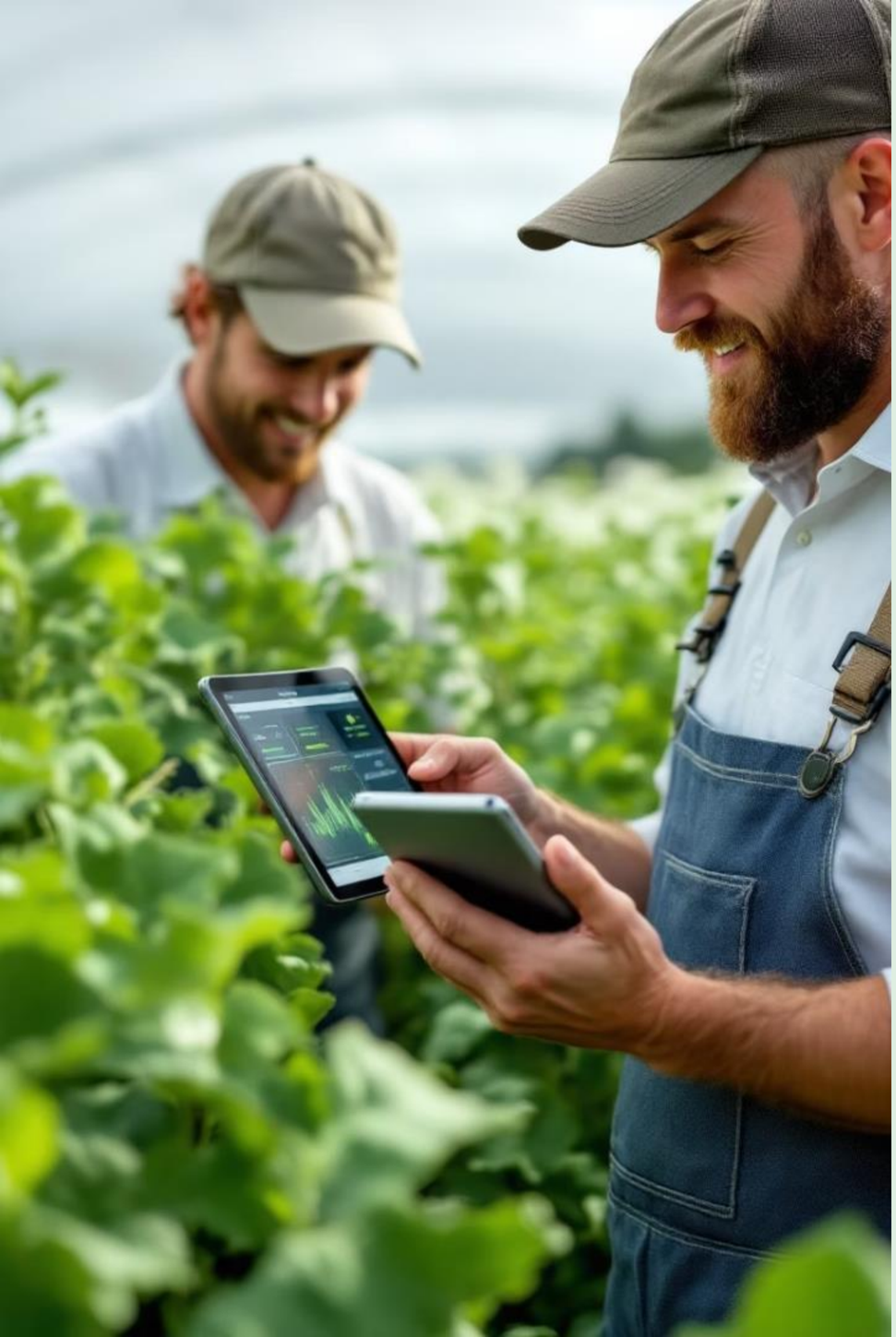
Install requirements and run api_server.py

Launch frontend

npm install and npm start

Access application

Visit localhost:3000



System Demo

Image Upload

Simple drag-drop interface

Disease Detection

Real-time analysis results

Treatment Plan

Customized recommendations

Analytics Review

Historical data insights

Actionable Recommendations

Treatment options

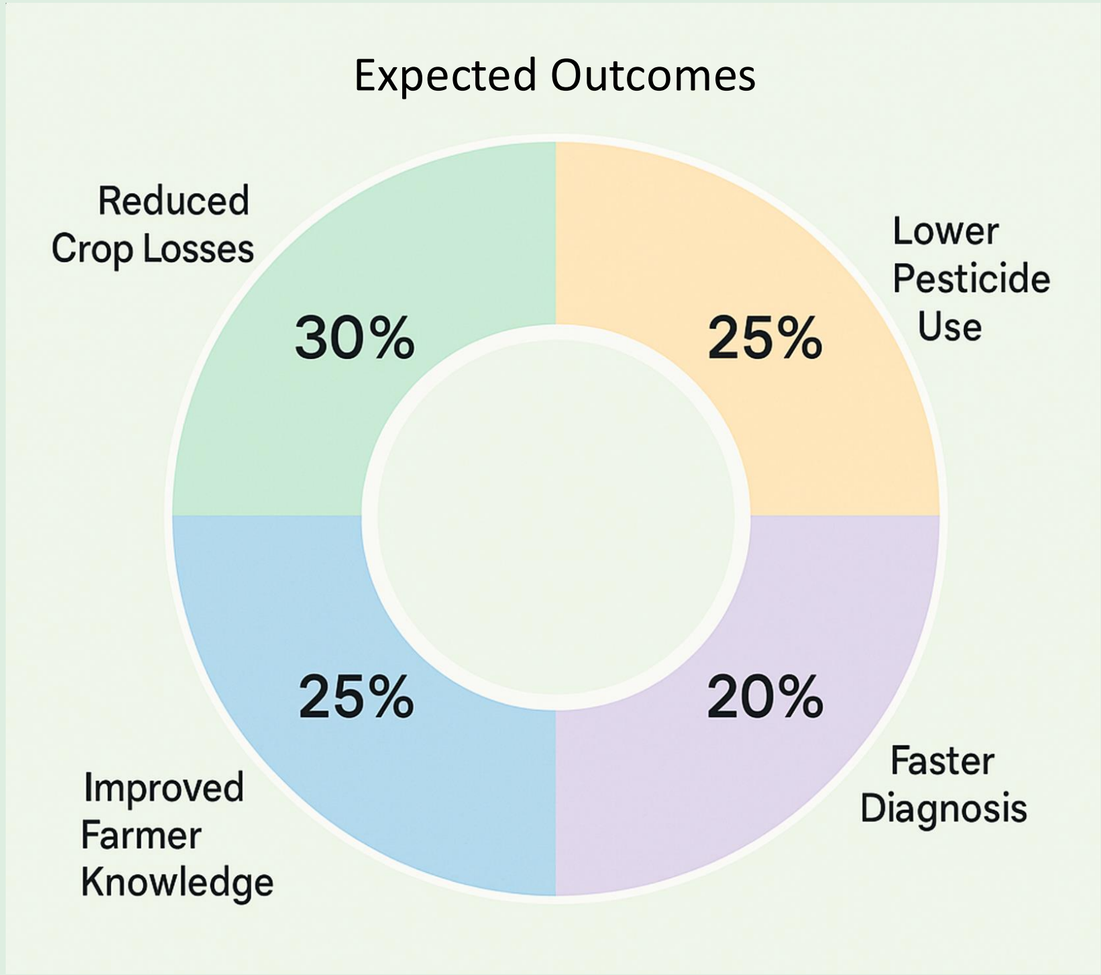
Chemical and organic solutions

Sustainable practices

Environmental impact focus

Ethical considerations

Farmer welfare and informed consent



Computational Resources

GPU

CUDA-capable, 8+ GB VRAM

RAM

16+ GB for preprocessing

Storage

100k+ images for models to train on

Training Time

8-20 hours per model

Current Limitations

1

Image Quality

Requires good-quality images.

2

Offline

No offline functionality for certain functionalities.

3

Accuracy

Lower Accuracy for general model.

Future Roadmap

Mobile app version

On-the-go disease detection + Live Image Analysis

Expand crop database

Cover more crop varieties

Drone/sensor integration

Automated field monitoring

Local partnerships

Co-ops and ISU Extension

Thank You

Together, let's empower sustainable agriculture with AI.

Your feedback, questions, and ideas are always welcome.