

AgriGuard

A Tool to Identify Crop Diseases Instantly

Developed under the **Collaborative Framework for Smart Agriculture (COISA)**

Developed by the **AgriGuard team**

Presented by **Chiuzbăian Rareș**



The Challenge: Protecting Our Food Supply

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The Challenge: Protecting Our Food Supply

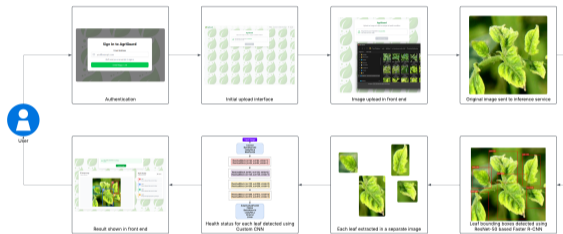
- **Food at Risk:** Plant diseases destroy up to 40% of crops worldwide, hurting farmers and raising food prices for everyone.
- **Experts Are Hard to Find:** Getting a specialist to visit your farm is slow, costly, and simply not available to most farmers.
- **AI Was Untrustworthy:** Previous machine learning models would confidently give wrong answers - they couldn't tell the difference between a healthy leaf, a rock, or just dirt.



How AgriGuard Works: Three Simple Steps

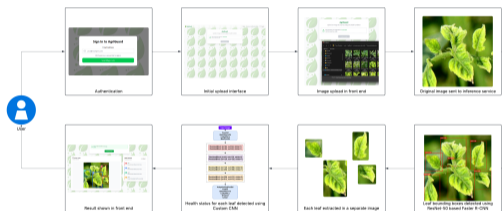
Take a photo of your crop, and AgriGuard does the rest:

- Step 1 - Find the Leaves:** The tool automatically locates every leaf in your photo, even in a busy field shot.
- Step 2 - Weed Out Mistakes:** It ignores dirt, rocks, branches, and weeds - only actual leaves move forward.
- Step 3 - Diagnose the Problem:** Each leaf is checked for disease, and the tool tells you how confident it is in the answer.



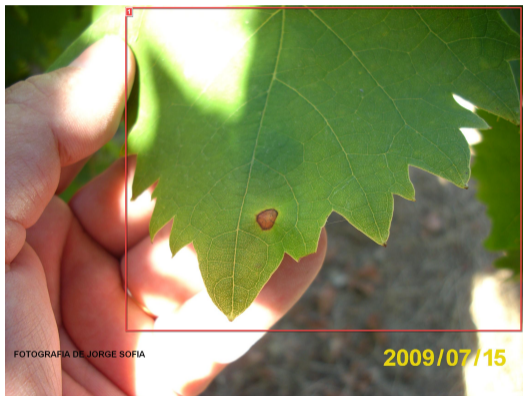
Step 1: Finding Every Leaf in the Photo

- **Snap a Photo, Any Photo:** You don't need to carefully frame one leaf - just take a picture of the plant or field as you see it.
- **Automatic Detection:** The tool instantly draws boxes around every leaf it finds, even if there are many leaves overlapping.
- **One Leaf at a Time:** Each leaf is then cropped out and analyzed separately, so every plant gets individual attention.



Step 2: Ignoring Everything That Isn't a Leaf

- **Real Fields Are Messy:** Your photos will have soil, shoes, shadows, weeds, and other things that aren't crop leaves.
- **Smart Filtering:** AgriGuard has been trained to recognize what a real crop leaf looks like and will discard anything else.
- **Better Safe Than Sorry:** If the tool isn't sure something is a leaf, it marks it as "*Unknown*" rather than guessing a disease.



Step 3: Diagnosing the Disease

- **Looks Where It Matters:** The tool focuses on spots, discoloration, and lesions on the leaf - just like a trained expert would.
- **Trained on Thousands of Examples:** It has learned from a huge collection of both healthy and diseased leaves to learn the difference.
- **Handles Rare Diseases Too:** Even diseases that don't appear often get fair attention, so uncommon problems aren't missed.



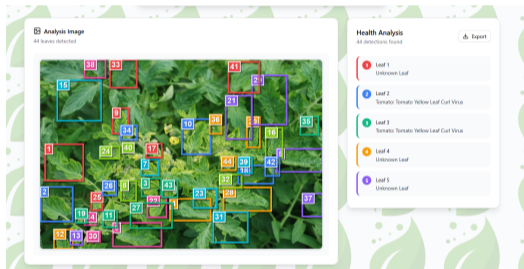
Knowing When to Trust the Answer

- **Double-Checking Its Work:** Instead of looking at the photo just once, AgriGuard examines it **10 separate times** (when training the model) from slightly different angles.
- **Measuring Agreement:** If all 10 looks give the same answer, the tool is very confident. If the answers vary, it knows it's unsure.
- **Confidence You Can See:** Gives the farmer a confidence percentage. If the AI is unsure, it flags the sample for manual expert check.

Class	Precision	Recall	F1 Score	Accuracy
Tomato Bacterial spot	97.52	98.75	98.13	98.75
Tomato Early blight	97.53	98.61	98.07	98.61
Tomato Late blight	98.82	97.11	97.96	97.11
Tomato Leaf Mold	99.72	99.72	99.72	99.72
Tomato Septoria leaf spot	98.19	99.69	98.94	99.69
Tomato Spider mites	96.74	100.00	98.34	100.00
Tomato Target Spot	99.33	95.16	97.20	95.16
Tomato Yellow Leaf Curl Virus	99.72	98.10	98.90	98.10
Tomato mosaic virus	99.64	100.00	99.82	100.00
Tomato healthy	99.70	99.70	99.70	99.70
Overall average values	98.69	98.68	98.68	98.67

AgriGuard in Action: Real-Time Diagnostic App

- **Works Like an App:** Open it on your phone, snap a photo, and get results in seconds - no technical knowledge needed.
- **Instant Results:** As soon as you take a picture, the diagnosis appears on screen with highlighted problem areas.
- **Track Your Farm's Health:** The app keeps a history of all your scans, so you can see if a disease is spreading and when it first appeared.



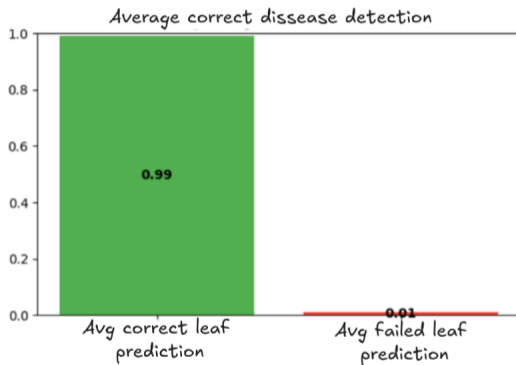
Demo In the Field: See AgriGuard at Work



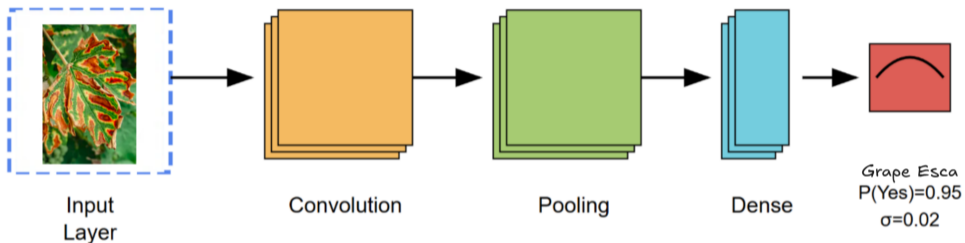
Leaf detection

Proven Results You Can Count On

- **Enormous Training:** AgriGuard has learned from over **130,000 images** covering **59 different crop diseases**.
- **Near-Perfect Accuracy:** Across all tests, the tool correctly identifies the disease **99.9% of the time**.
- **Works in Real Conditions:** Tested under different lighting, angles, blurry photos, and weather - it stays reliable when conditions aren't perfect.



How the AI Model Detects the Disease

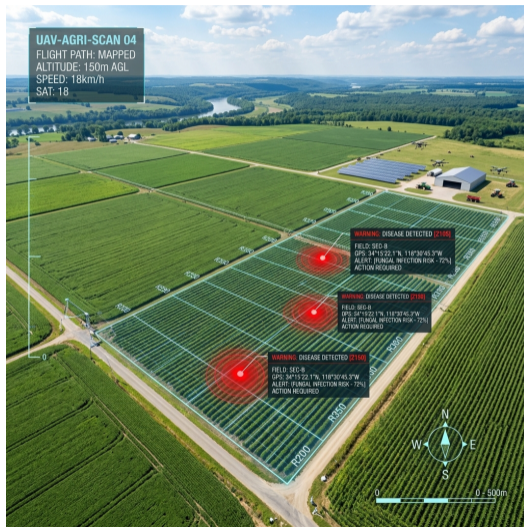


- **Learns the Visual Signatures**
- **Checks for Similarities**

- **Multi-Perspective Validation**
- **Rejects Unknowns**

What's Next: Drones and Farm Mapping

- **Eyes in the Sky:** Flying a drone over your fields and letting AgriGuard scan the footage for sick plants automatically.
- **Covering More Ground:** Instead of walking every row, a short drone flight can check an entire plantation in minutes.
- **Pinpointing the Problem:** See exactly **which plants** are affected and **where they are** on a map of your farm, so you can treat only what's needed.



Thank You!

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AgriGuard. Smart Crop Protection for Everyone