

Fruit Quality Detector using Azure Custom Vision

Project Overview

In this project, I developed a fruit quality detector using Azure Custom Vision to classify images of various fruits (apple, banana, mango, tomato) into ripe and unripe categories. The solution is based on machine learning and runs on the Azure AI platform, utilizing Custom Vision training and prediction resources.

The model is trained on multiple fruit categories and tested using the built-in Quick Test tool to evaluate classification performance in real-time.

Tasks Completed and Rubric Criteria

1. Configure Custom Vision Services

- Create a Resource Group named: fruit-quality-detector.
- Deployed two Custom Vision resources:
 - + fruit-quality-detector-training (CustomVision.Training)
 - + fruit-quality-detector-prediction (CustomVision.Prediction)

The screenshot shows the Microsoft Azure portal interface for the 'fruit-quality-detector' resource group. At the top, there's a navigation bar with 'Microsoft Azure', a search bar, and various icons. Below the bar, the resource group name 'fruit-quality-detector' is displayed along with its status as a 'Resource group'. The main area is titled 'Overview' and contains sections for 'Essentials' and 'Resources'. In the 'Essentials' section, it shows the subscription (Azure_subscription_1), location (East US), and deployment status (1 Failed, 2 Succeeded). The 'Resources' section lists 16 items, including 'Application Insights Smart Detection', 'fruit-quality-detector-aml' (an Azure Machine Learning workspace), 'fruit-quality-detector-hub' (an IoT Hub), 'fruit-quality-detector-prediction' (Custom vision), 'fruit-quality-detector-training' (Custom vision), and 'fruityqualityde1383427142' (Application Insights). The resources are sorted by Type and Location. At the bottom, there are pagination controls ('Page 1 of 1') and a 'Give feedback' link.

2. Create and Configure Image Classifier

- Create a Custom Vision project named: fruit-quality-detector.
- Domain selected: Food
- Classification type: Multiclass (Single tag per image)

Create new project X

Name*

Description

Resource* [create new](#)
 ▼

[Manage Resource Permissions](#)

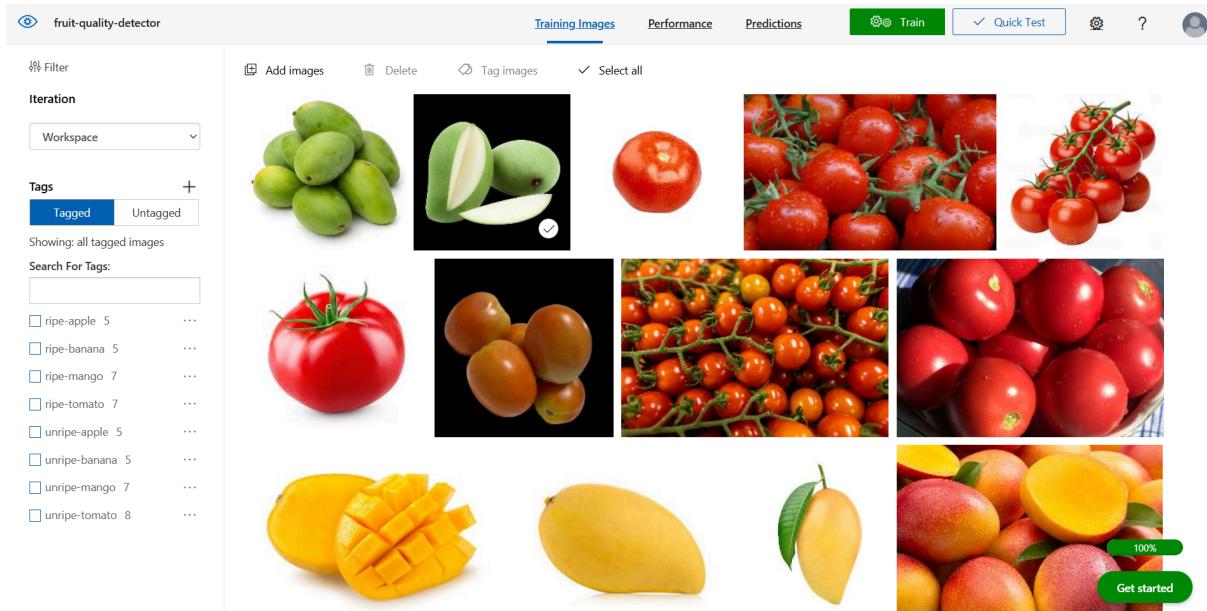
Project Types (i)
 Classification
 Object Detection

Classification Types (i)
 Multilabel (Multiple tags per image)
 Multiclass (Single tag per image)

Domains:
 General [A2]
 General [A1]
 General
 Food
 Landmarks
 Retail
 General (compact) [S1]
 General (compact)
 Food (compact)
 Landmarks (compact)

- Uploaded and tagged images across 8 classes:
 - + ripe-apple (5 images)

- + unripe-apple (5 images)
- + ripe-banana (5 images)
- + unripe-banana (5 images)
- + ripe-tomato (7 images)
- + unripe-tomato (8 images)
- + ripe-mango (7 images)
- + unripe-mango (7 images)



3. Train the Model

- Used the Quick Training feature on the Custom Vision portal.
- Trained on 8 fruit categories (ripe/unripe for 4 fruits).
- Model details:
 - + Domain: Food
 - + Type: Multiclass (Single tag per image)
 - + Published as: Iteration 4
 - + Trained at: 19:01:17, 07/05/2025
- Overall model performance:
 - + Precision: 90.9%
 - + Recall: 83.3%
 - + Average Precision (AP): 96.5%

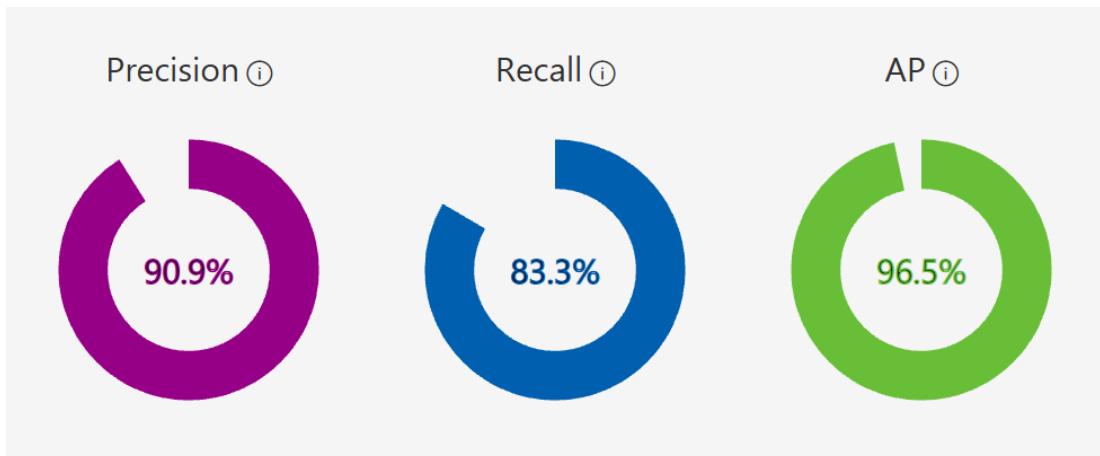
Iteration 4

Finished training on **19:01:17 5/7/2025** using **Food** domain

Iteration id: **f847fae7-2284-4069-80d5-249709f3fd2b**

Classification type: **Multiclass (Single tag per image)**

Published as: **Iteration4**



4. Test and Evaluate the Classifier (Quick Test)

- Test 1: Unripe green apples: unripe-apple 90.8%

Quick Test

X

The image shows two green apples hanging from a tree branch with green leaves. One apple is slightly larger than the other.

Image URL
Enter Image URL →
or
Browse local files
File formats accepted: jpg, png, bmp
File size should not exceed: 4mb
Using model trained in
Iteration
Iteration 4

Predictions

Tag	Probability
unripe-apple	90.8%
unripe-mango	7.4%
unripe-tomato	1%
ripe-tomato	0.3%
ripe-mango	0.2%

- Test 2: Red ripe apple: ripe-apple 87.6%

Quick Test

X



Image URL
Enter Image URL →
or
Browse local files
File formats accepted: jpg, png, bmp
File size should not exceed: 4mb
Using model trained in
Iteration
Iteration 4

Predictions

Tag	Probability
ripe-apple	87.6%
ripe-tomato	9.5%
ripe-mango	1.8%
unripe-tomato	0.4%
unripe-apple	0.2%

- Test 3: Red ripe tomatoes: ripe-tomato 99.7%

Quick Test

X



Image URL
Enter Image URL →
or
Browse local files
File formats accepted: jpg, png, bmp
File size should not exceed: 4mb
Using model trained in
Iteration
Iteration 4

Predictions

Tag	Probability
ripe-tomato	99.7%
ripe-mango	0.1%
unripe-tomato	0%
ripe-apple	0%
unripe-mango	0%

5. Train for Multiple Fruits

- Successfully trained the model to classify four types of fruits, each with ripe/unripe states.
- Fully met the 'Exemplary' criteria in the rubric.

Conclusion

- All project requirements were successfully completed. I was able to:
 - + Set up and configure Custom Vision resources on Azure.

- + Train an image classifier with 8 different labels using a small dataset.
- + Evaluate and test the model with new images using the Quick Test tool.
- + Achieve high precision and acceptable recall, even with limited data.
- + Extend the model to classify multiple fruits, each with ripe/unripe distinction.
- This project demonstrates how Custom Vision and Azure AI can be used to quickly build effective image classifiers that support agricultural automation and smart IoT-based food sorting systems.