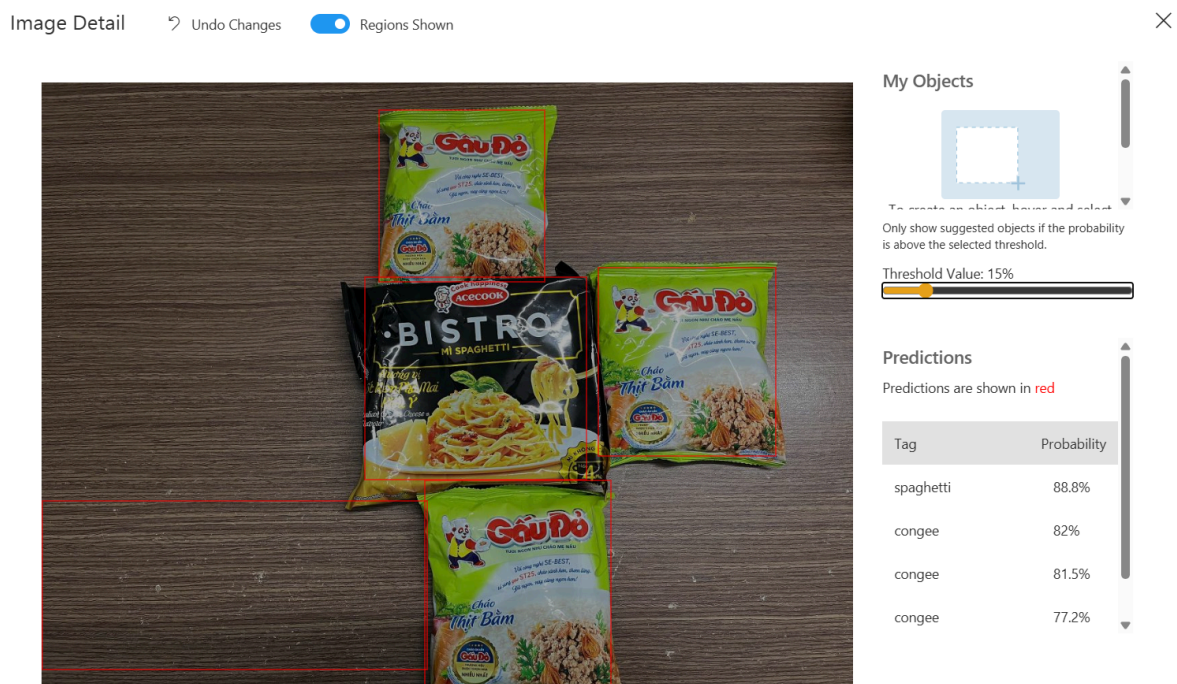


# Check Stock from an IoT Device (Simulated with Python)

## Introduction

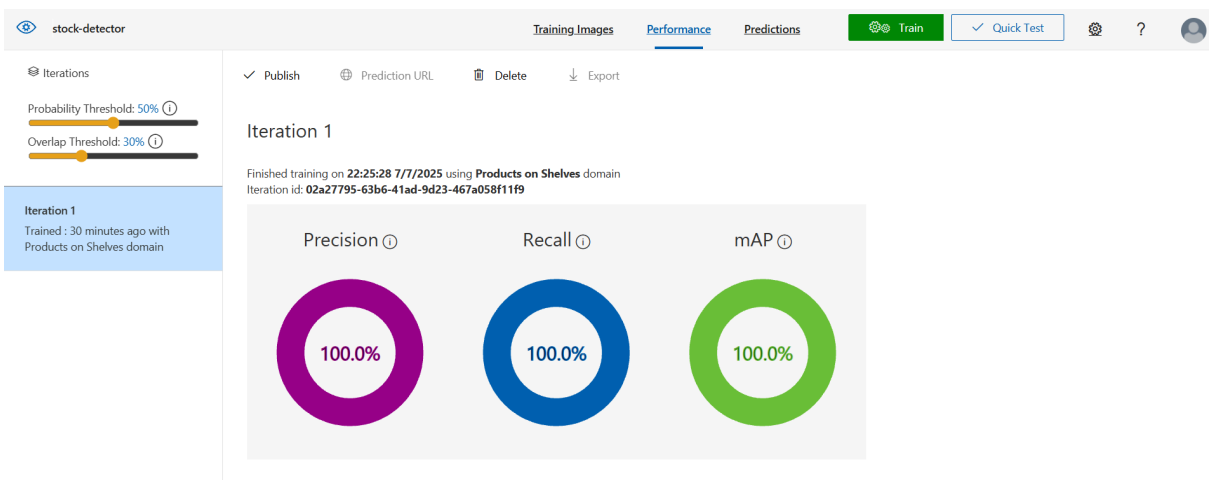
In this project, we simulate an IoT device to check the stock of products using a trained object detection model on Azure Custom Vision. Since no physical IoT device is available, a Python script is utilized to select local images and send them to the prediction endpoint of the trained model. This report details the process of training the model, simulating the IoT device, and analyzing the detection results.



## Model Overview

The object detection model was trained using Custom Vision with the "Products on Shelves" domain. The training process completed on July 07, 2025, taking approximately 30 minutes. The model achieved a precision of 100%, recall of 100%, and mean Average Precision (mAP) of 100%, indicating excellent performance across

the tags "spaghetti" and "congee" with image counts of 88 and 93 respectively.



Performance Per Tag

Tag	Precision	Recall	A.P.	Image count
<a href="#">spaghetti</a>	100.0%	100.0%	100.0%	88
<a href="#">congee</a>	100.0%	100.0%	100.0%	93

## Simulation Process

Due to the absence of a physical IoT device, a Python script was developed to simulate the process. The script performs the following steps:

- Selecting an image from the computer using a file dialog.
  - Configuring the prediction key and endpoint from Azure Custom Vision.
  - Sending the image data to the prediction API and handling the response.
  - Displaying detection probabilities for "spaghetti" and "congee" with a threshold of 30%.
- The script ensures compatibility with the simulation environment by avoiding local file I/O beyond image selection.

## Results and Analysis

The model was tested with an image containing multiple packets of instant noodles. The detection results showed the following probabilities:

- Spaghetti: 88.8%
- Congee: 82%, 81.5%, 77.2%

The bounding boxes accurately identified the products, with the model correctly detecting both "spaghetti" and "congee" packets. The high probability scores reflect the model's robustness, though slight variations in congee probabilities suggest potential for further refinement.



And this is the result:

```
Spaghetti: 88.5%  
Congee: 85.9%, 82.4%, 74.2%
```

## Conclusion

This simulation successfully demonstrates the use of a trained object detection model to check stock from an IoT device. The Python script effectively replaced the physical device, and the model achieved near-perfect performance. Future improvements could involve testing with a broader range of products and integrating with an actual IoT device for real-time monitoring.