Microsoft

Microsoft Azure AI Fundamentals: Computer Vision

Agenda

- Computer vision concepts
- Computer vision capabilities in Azure

Learning Objectives

After completing this module, you will be able to:

1. Understand the capabilities of Azure AI Vision.
2. Identify the different services included in Azure AI Vision.
3. Describe the Face detection service.

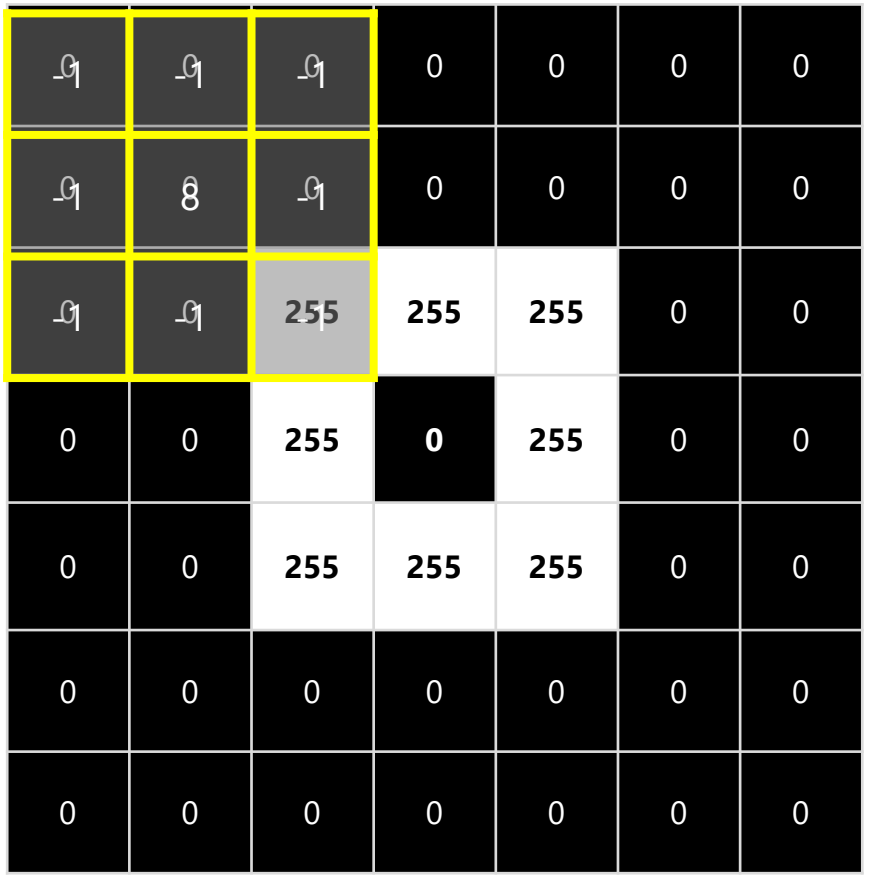
Computer Vision Concepts

Images and image processing

An image is an array of pixel values

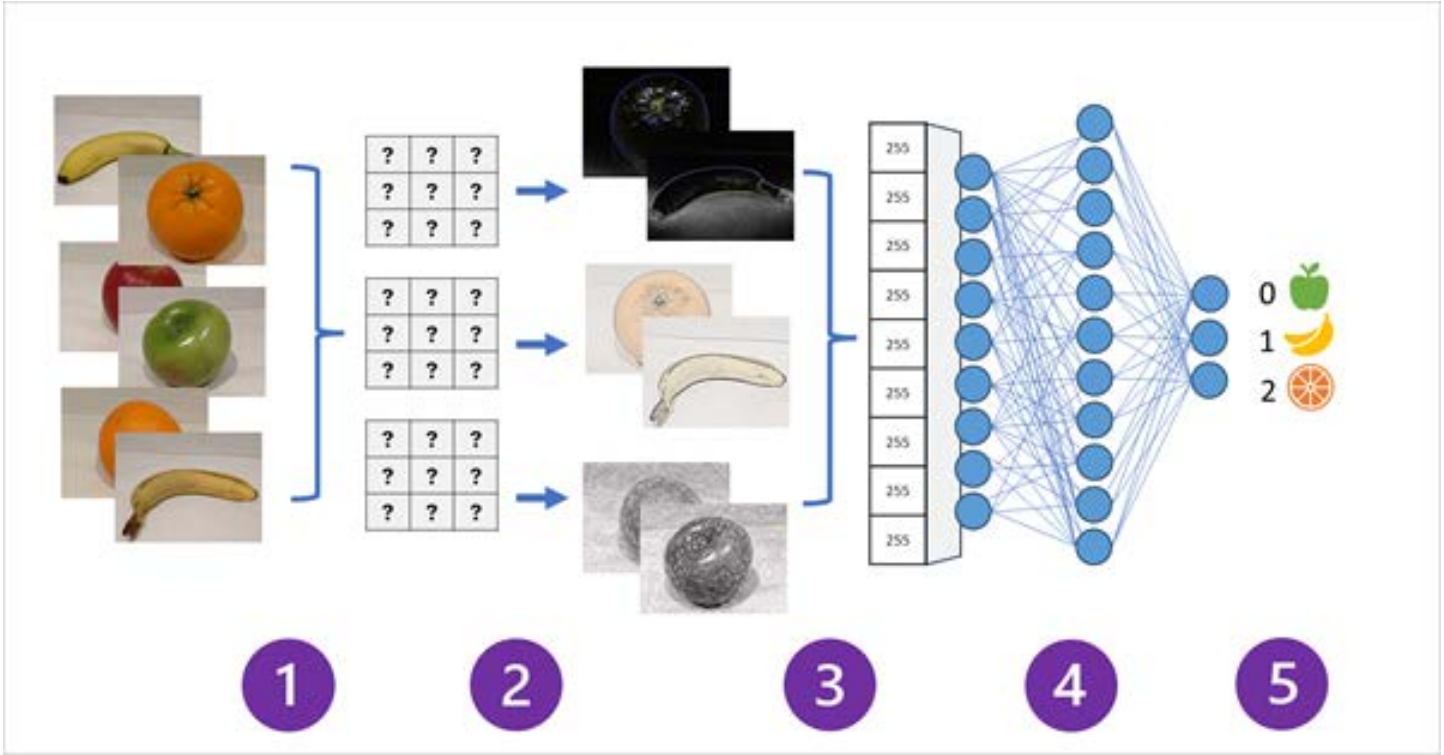
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	255	255	255	0	0
0	0	255	255	255	0	0
0	0	255	255	255	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

Filters are applied to change images



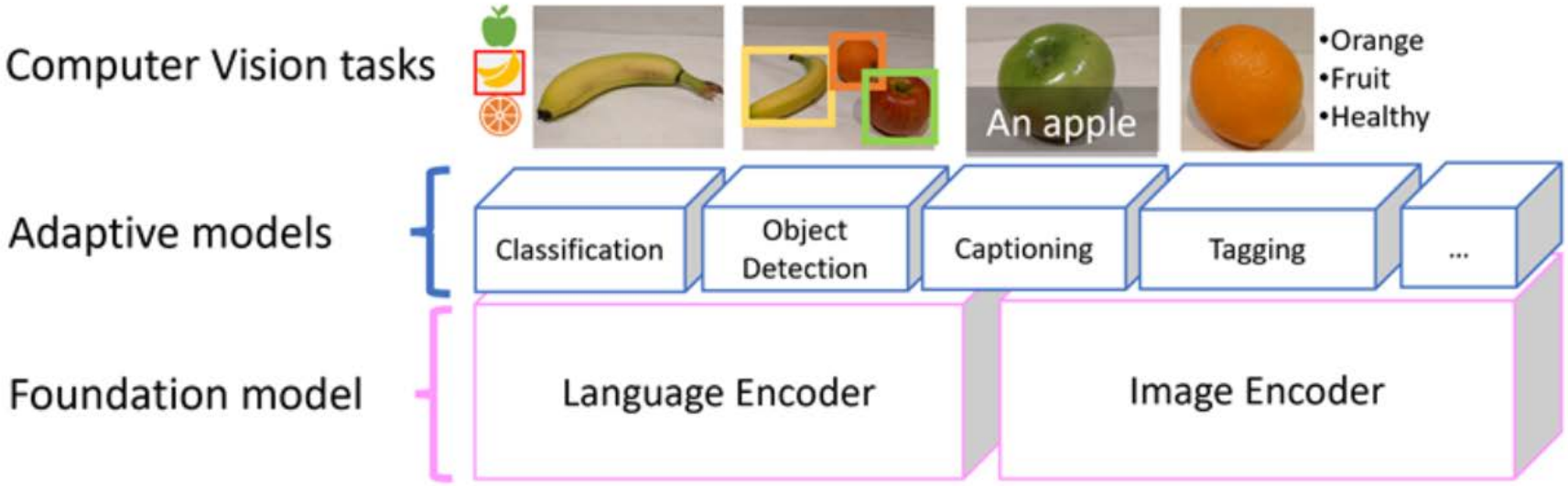
Convolutional Neural Networks

1. Labeled mages are used to train the model
2. Filter layers extract *feature maps* from each image
3. The feature maps are flattened
4. The feature values are fed into a fully connected neural network
5. The output layer produces a probability value for each possible class label



- During training, the filter kernels start with random weights. These weights are iteratively adjusted to improve the accuracy of the predictions based on the known labels.
- The trained model uses learned weights to extract features from new images and predict their class.

Multi-modal models



- A newer approach to modeling involves combining language and vision models that encode image and text data
- The model encapsulates semantic relationships between features extracted from the images and text extracted from related captions.
- A multi-modal model can be used as a *foundation* model for more specialized *adaptive* models.

Computer vision services in Azure

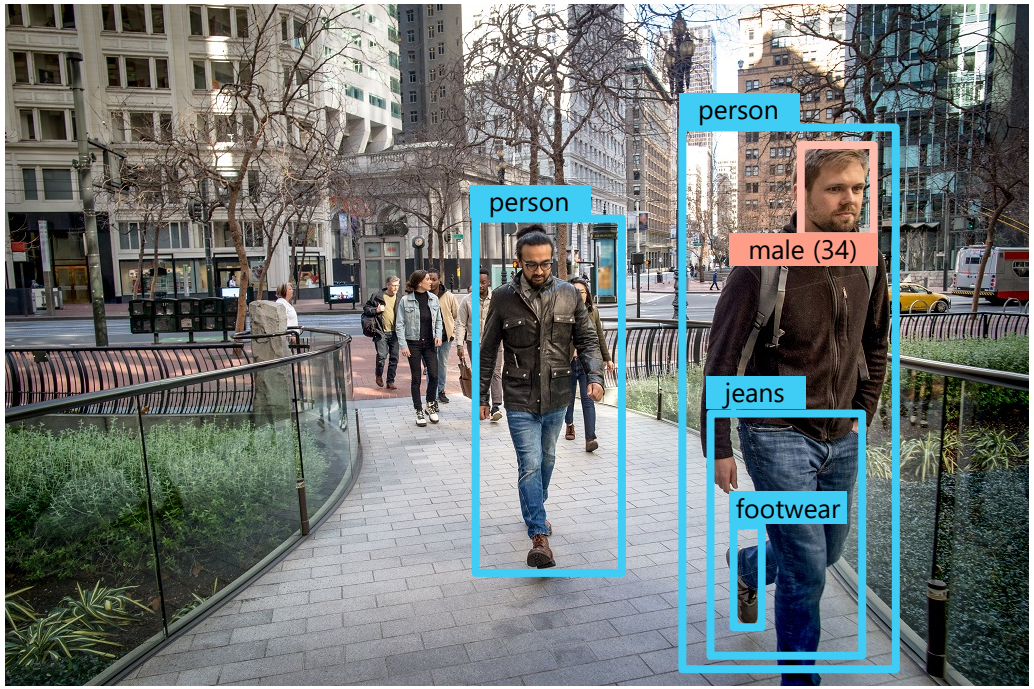
 **Vision**	 **Face**
• Image Analysis: • Image tagging, captions, model customization, and more. • Optical Character Recognition (OCR) • Spatial analysis	• Face detection • Face recognition

Computer Vision Capabilities in Azure

Image analysis 4.0 with the *AI Vision* Service

Capabilities include:

- Model customization
- Read text from images
- Detect people in images
- Generate image captions
- Detect objects
- Tag visual features
- Smart crop



Caption: A group of people walking on a sidewalk
Tags: Building, jeans, street, outdoor, jacket, city, person

Detecting faces with the *Face* Service

Anyone can use the Face service to detect:

- Blur
- Exposure
- Glasses
- Head pose
- Noise
- Occlusion

Only Managed Microsoft customers can access facial recognition capabilities:

- Similarity matching
- Identity verification

*To support Microsoft's Responsible AI Principles, Facial Recognition is under a Limited Access policy.

Demo: Detect faces in Vision Studio

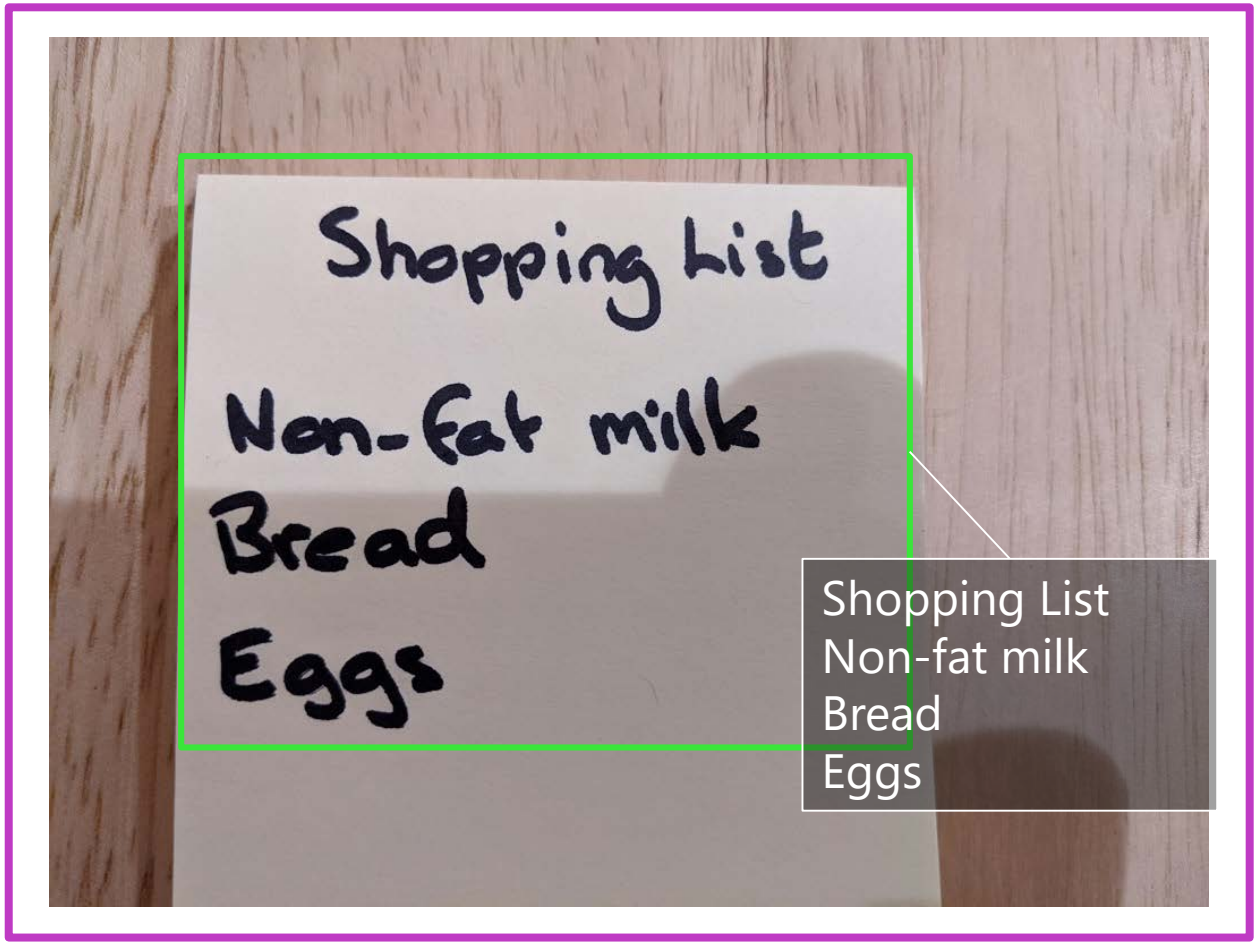
In this demo, you will take a look at the face detection capabilities of the **Azure AI Face** service.

1. Follow along on the exercise page at: **https://aka.ms/ai900-face**

Reading text with Optical Character Recognition (OCR)

- Detect the location of text:
- Printed
- Handwritten

Options for quick text extraction from images, or asynchronous analysis of larger scanned documents



Demo: Read text in Vision Studio

In this demo, you'll see **Azure AI Vision**'s optical character recognition capabilities in action.

1. Follow along on the exercise page at: **https://aka.ms/ai900-ocr**

Exercise: Analyze images in Vision Studio

In this exercise, you will use the **Azure AI Vision** service to analyze images.

1. Use the hosted environment and Azure credentials provided for this exercise.

2. The instructions are also available on Learn: **https://aka.ms/ai900-image-analysis**

Knowledge check

1 **You want to use the Face detection service to identify faces in images. What can be identified using the Face detection service?**

- ☐ Faces that cannot be seen because the person has turned their back.
- ☑ Partially obscured faces.
- ☐ Faces that are obscured by another object.

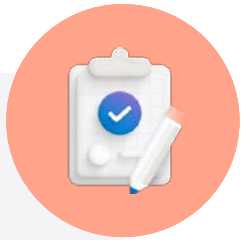
2 **You want to use the AI Vision and AI Language service. You also want developers to require only one key and endpoint to access all your services. What kind of resource should you create in Azure?**

- ☑ Azure AI service
- ☐ Language
- ☐ Vision

3 **Which services are part of Azure AI Vision?**

- ☐ Face detection and speech recognition
- ☑ Optical Character Recognition and face detection
- ☐ Document Intelligence and speech recognition

Summary



Computer vision concepts

- What is Azure AI Vision?
- Applications of AI Vision
- Azure AI services

Computer vision capabilities in Azure

- Image Analysis with the AI Vision service
- Detecting faces with the Face service
- Reading text with optical character recognition

References

Read more about:

- Fundamentals of Computer Vision
- Fundamentals of Facial Recognition
- Fundamentals of Optical Character Recognition

Through the content on Learn: Microsoft Azure AI Fundamentals: Computer Vision - Training | Microsoft Learn