Microsoft

Microsoft Azure AI Fundamentals: AI Overview

Agenda

- Fundamental AI concepts
- Fundamentals of machine learning
- Fundamentals of Azure AI services

Learning Objectives

After completing this module, you will be able to:

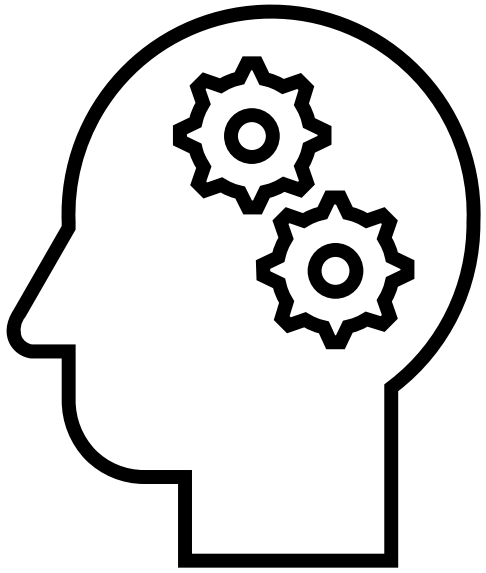
1. Explain what AI is and understand the importance of responsible AI.
2. Understand the different types machine learning models.
3. Identify the AI services available on Azure, and what they are used for.

Fundamental AI concepts

What is Artificial Intelligence?

Software that imitates human capabilities

- Predicting outcomes and recognizing patterns based on historic data.
- Recognizing abnormal events and making decisions.
- Interpreting visual input.
- Understanding language and engaging in conversations.
- Extracting information from sources to gain knowledge.



Common AI workloads

	**Machine Learning**	Predictive models based on data and statistics – the foundation for AI.
	**Computer Vision**	Capabilities within AI to interpret the world visually through cameras, video, and images.
	**Natural Language Processing**	Capabilities within AI for a computer to interpret written or spoken language and respond appropriately.
	**Document Intelligence**	Capabilities within AI that deal with managing, processing, and using high volumes of data found in forms and documents.
	**Knowledge Mining**	Capabilities within AI to extract information from large volumes of often unstructured data to create a searchable knowledge store.
	**Generative AI**	Capabilities within AI that create original content in a variety of formats including natural language, image, code, and more.

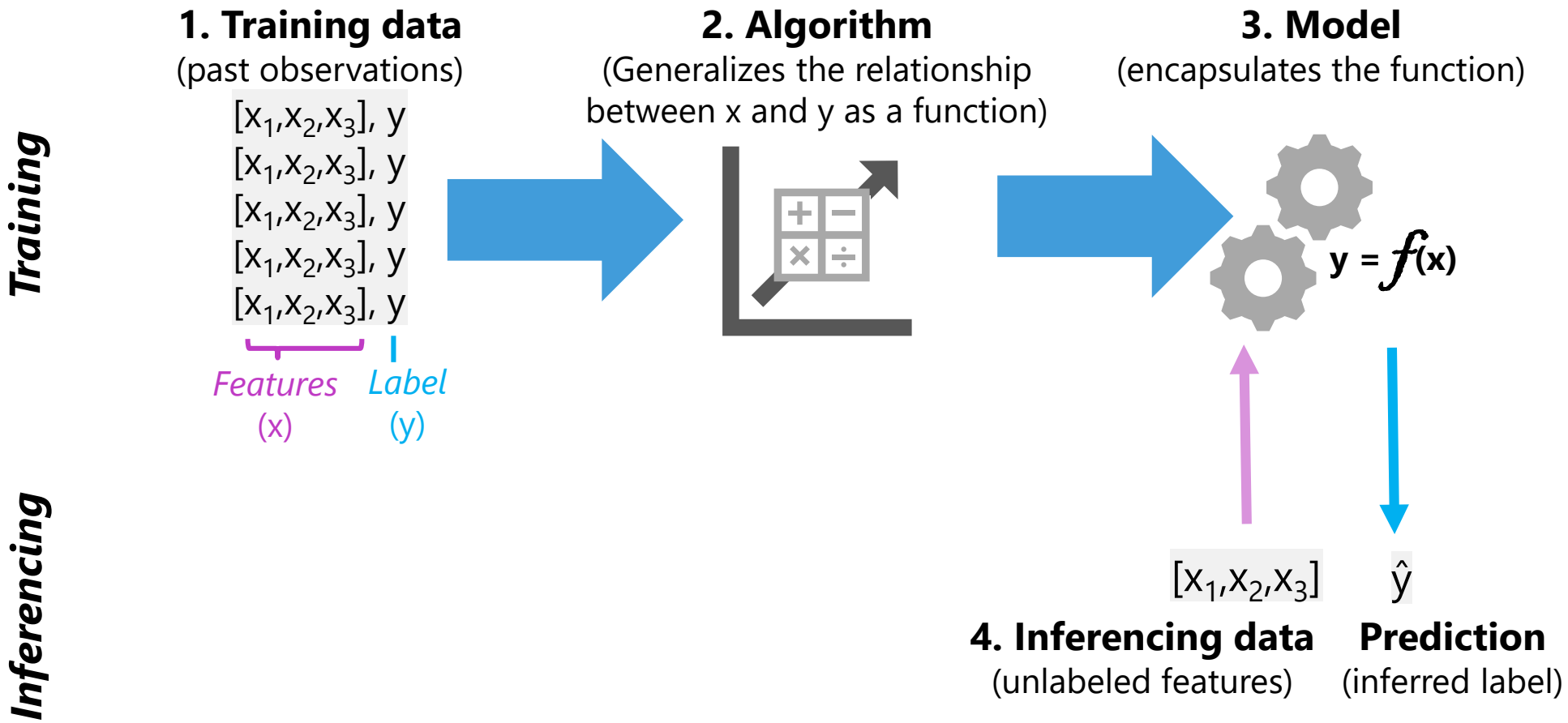
Principles of responsible AI

	Challenge or Risk	Example
 **Fairness**	Bias can affect results.	A loan-approval model discriminates by gender due to bias in the data with which it was trained.
 **Reliability & safety**	Errors may cause harm.	An autonomous vehicle experiences a system failure and causes a collision.
 **Privacy & security**	Private data could be exposed.	A medical diagnostic bot is trained using sensitive patient data, which is stored insecurely.
 **Inclusiveness**	Solutions may not work for everyone.	A predictive app provides no audio output for visually impaired users.
 **Transparency**	Users must trust a complex system.	An AI-based financial tool makes investment recommendations – what are they based on?
 **Accountability**	Who's liable for AI-driven decisions?	An innocent person is convicted of a crime based on evidence from facial recognition – who's responsible?

Fundamentals of machine learning

What is machine learning?

Creating predictive models by finding relationships in data

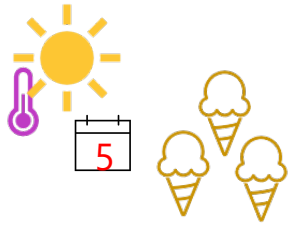


Types of machine learning

Machine Learning

Supervised machine learning
Training data includes known labels

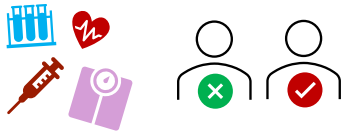
Regression
Label is a numeric value



Predict the number of ice creams sold based on day, season, and weather

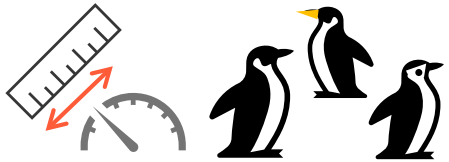
Classification
Label is a categorization (or *class*)

Binary classification
Label *is* or *is not* a class



Predict whether a patient is at-risk for diabetes based on clinical data

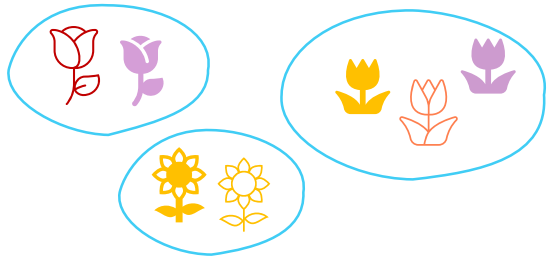
Multiclass classification
Label is one of multiple classes



Predict the species of a penguin based on its measurements

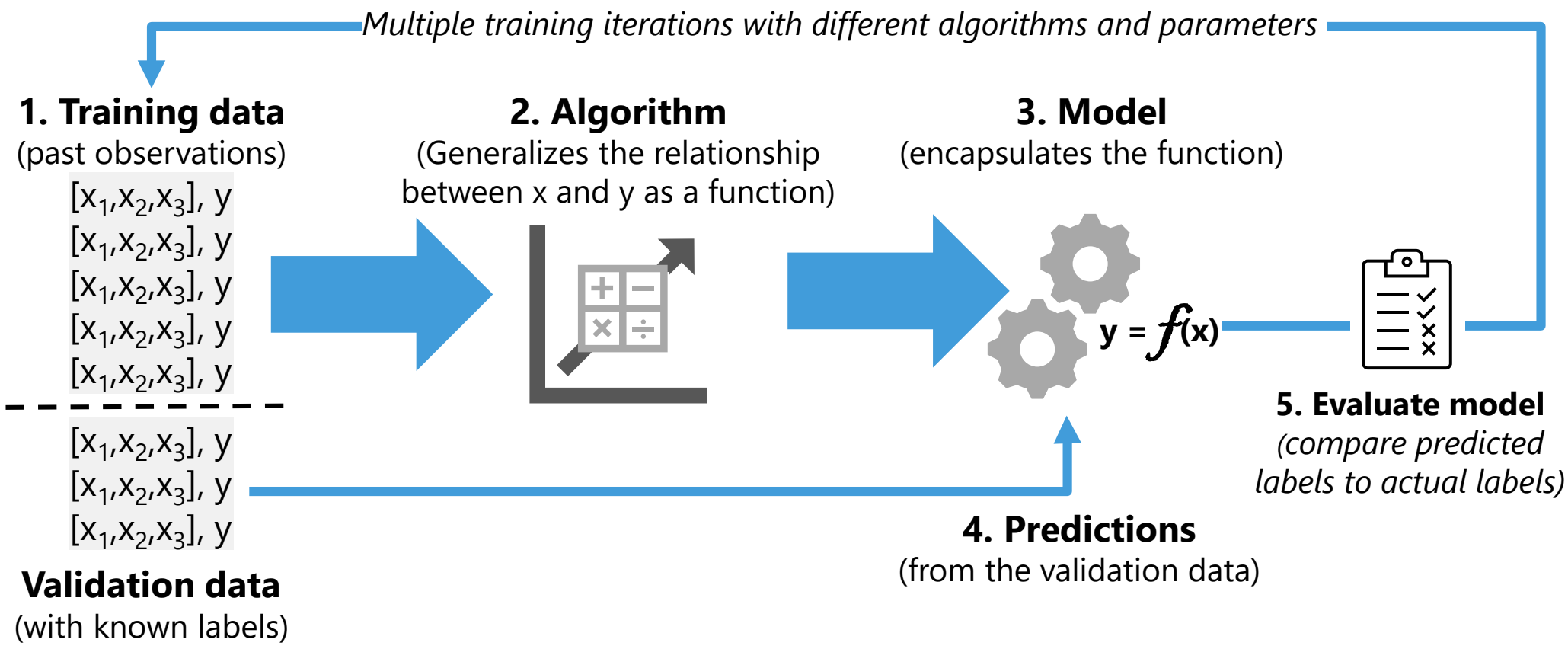
Unsupervised machine learning
Training data is unlabeled

Clustering
Similar items are grouped together



Separate plants into groups based on common characteristics

Model training and evaluation

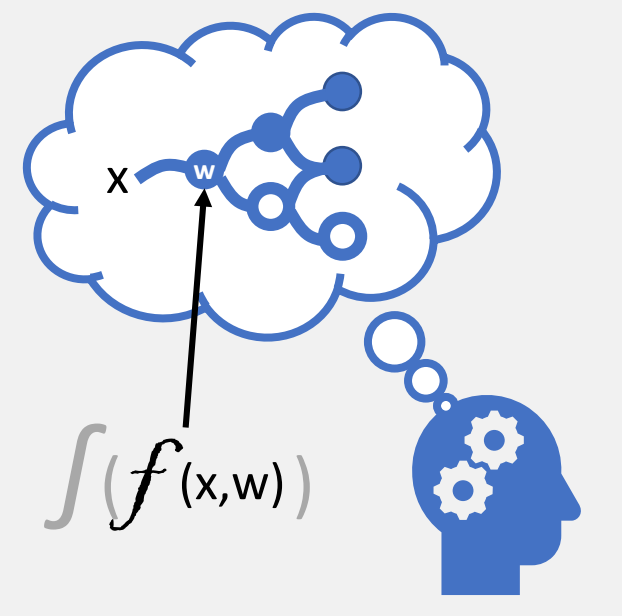


Deep learning

Human neural network

- Neurons fire in response to electrochemical stimuli
- When fired, the signal is passed to connected neurons

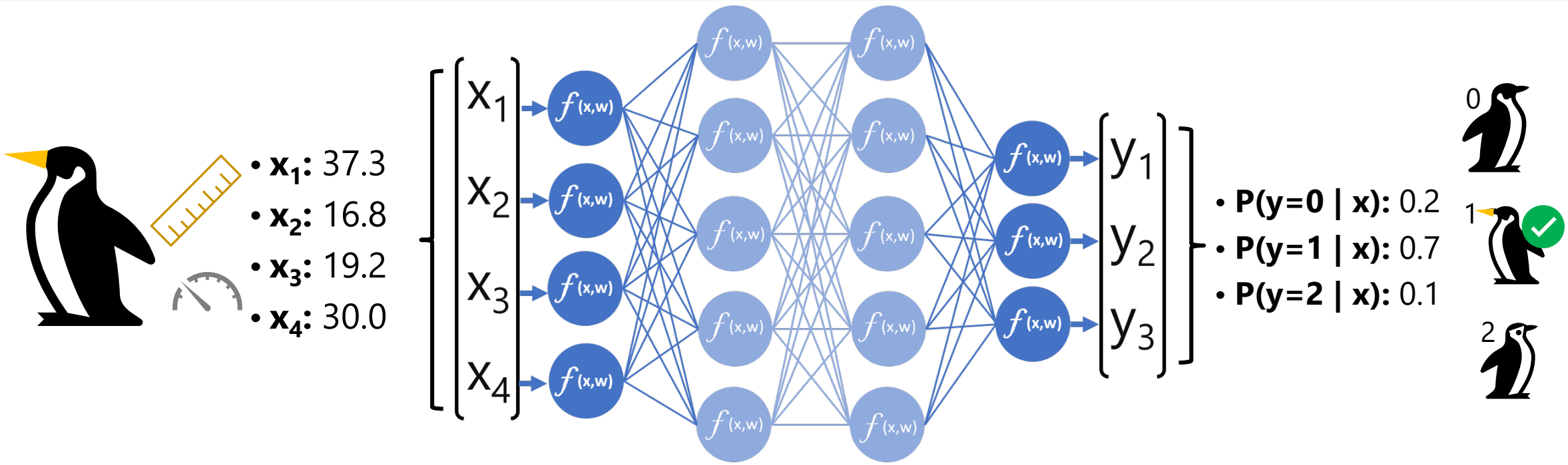
Artificial neural network



- Each neuron is a function that operates on an *input* value (x) and a *weight* (w)
- The function is wrapped in an *activation function* that determines whether to pass the output on

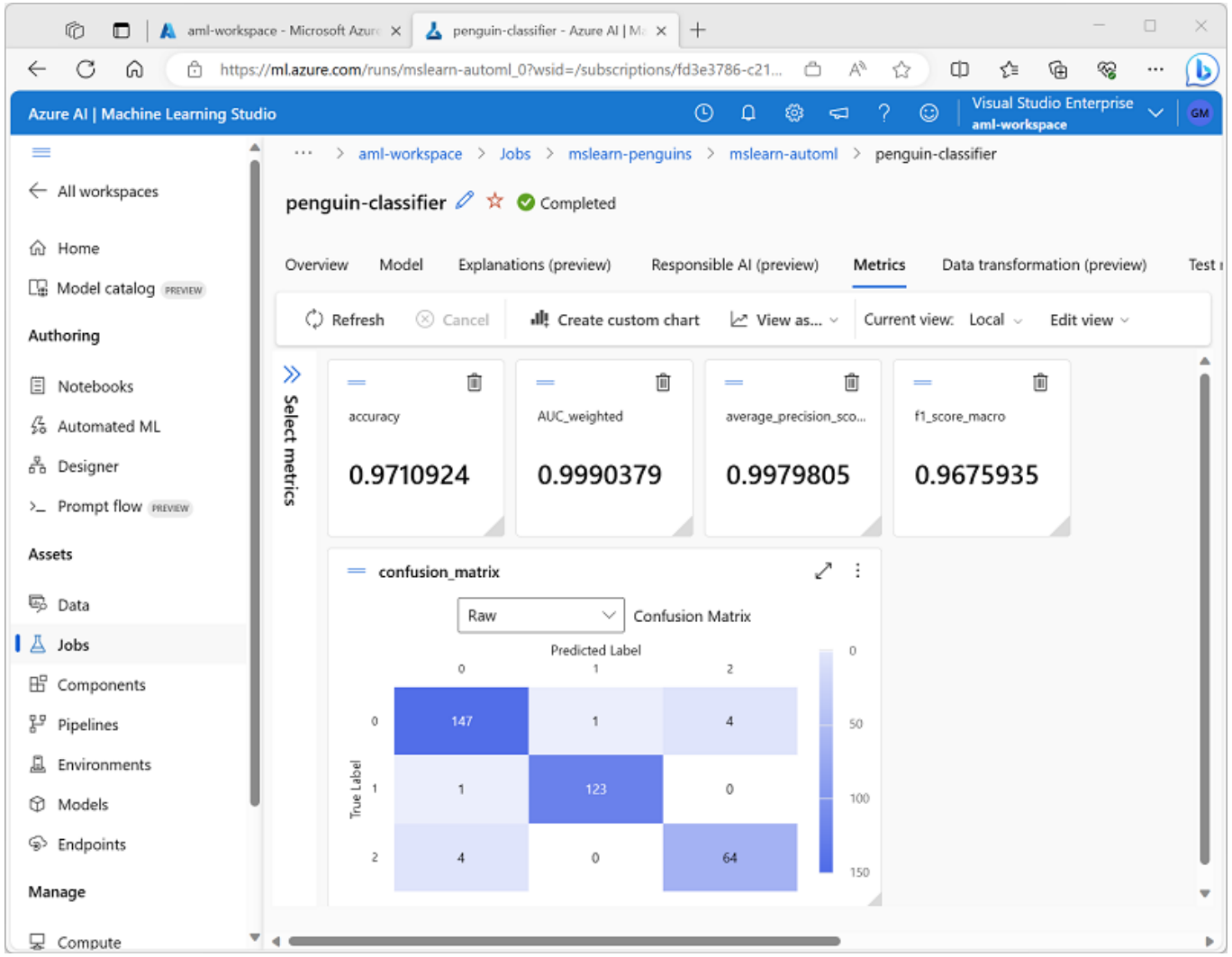
Deep learning

Neural network example – multiclass classification



What is Azure Machine Learning?

- Azure Machine Learning is a cloud-based platform for machine learning.
- Azure Machine Learning Studio is a user interface for accessing Azure Machine Learning capabilities.
- Machine learning models trained with Azure Machine Learning can be published as services.



Demo: Explore Automated Machine Learning in Azure Machine Learning Studio

In this demo, you will see how machine learning features can be used to train a machine learning model to make predictions.

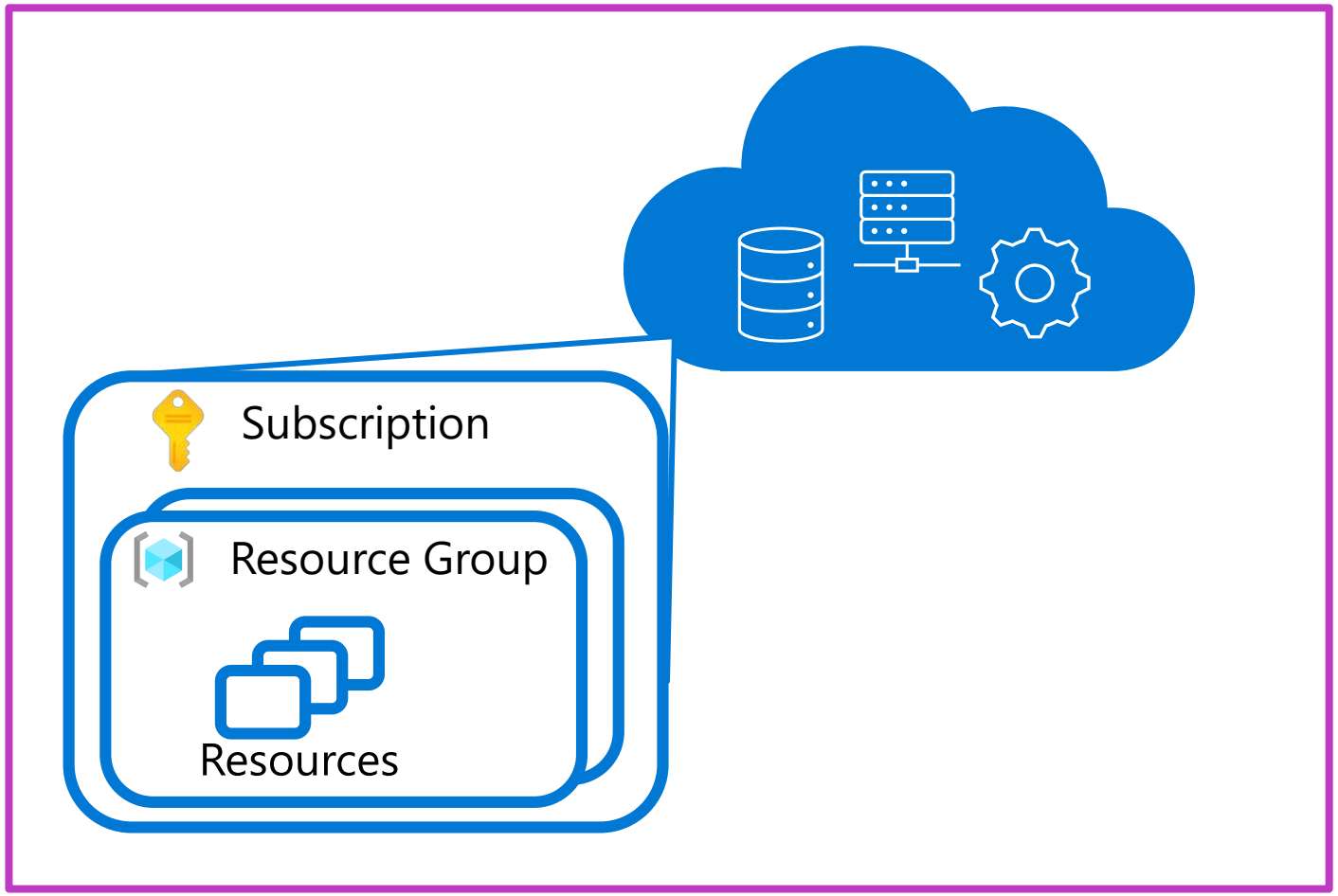
1. Follow along on the exercise page at: **https://aka.ms/ai900-auto-ml**

Fundamentals of Azure AI services

Azure basics

Microsoft's Azure cloud platform provides scalable and reliable:

- Data storage
- Compute
- Services



AI services in Microsoft Azure

 **Azure Machine Learning**	A platform for training, deploying, and managing machine learning models
 **Azure AI services**	A suite of services covering Vision, Speech, Language, Decision, and Generative AI
 **Azure Cognitive Search**	Data extraction, enrichment, and indexing for intelligent search and knowledge mining

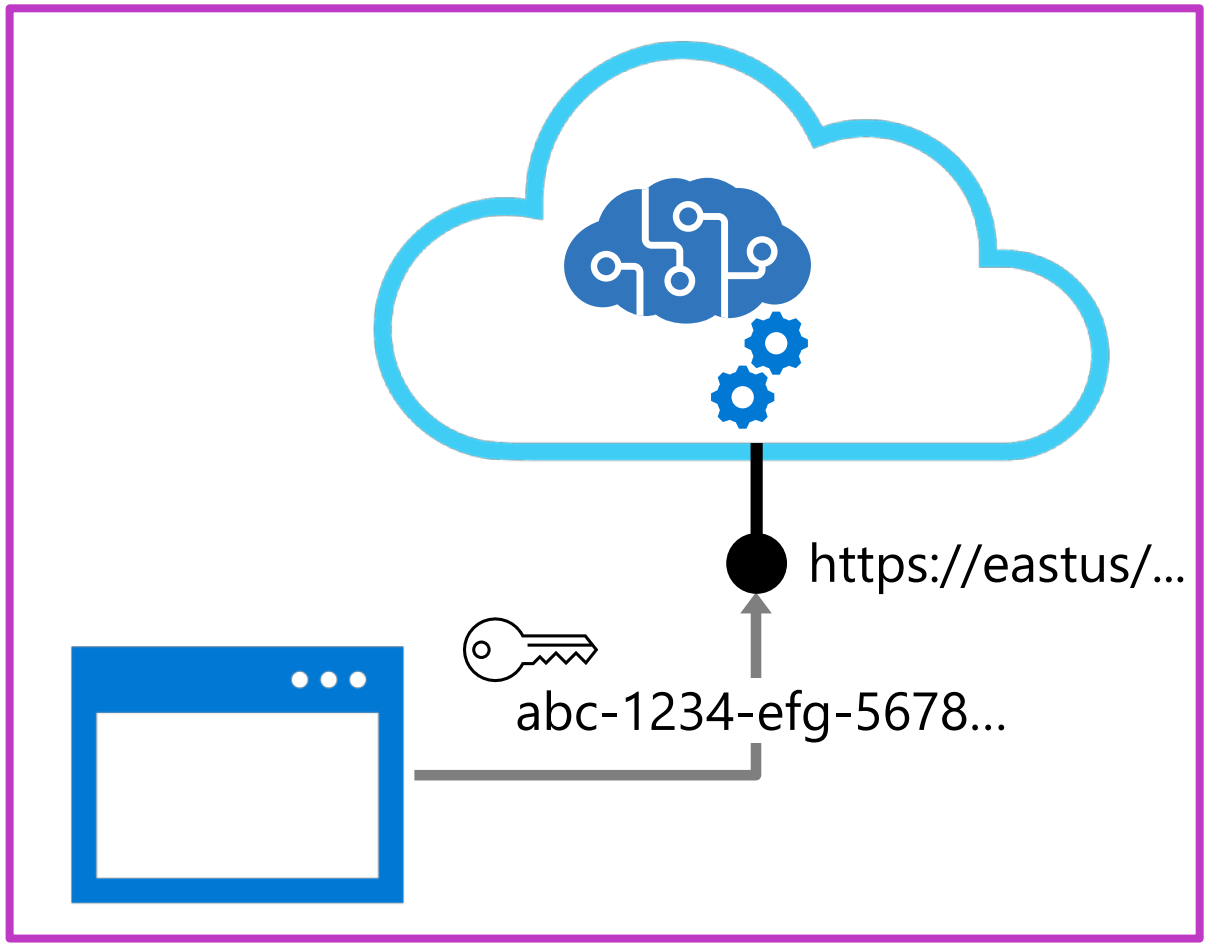
Azure AI services

AI application resources in an Azure subscription:

- Standalone resources for specific services
- General *Azure AI services* resource for multiple services

Consumed by applications via:

- A REST endpoint (https://address)
- An authentication key or authorization token



Exercise: Explore Azure AI services

In this exercise, you will explore the Content Safety Studio, create a resource and try out an Azure AI service.

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

2. The instructions are also available on Learn: **https://aka.ms/ai900-azure-ai-services**

Knowledge check

1 You want to create a model to predict sales of ice cream based on historic data that includes daily ice cream sales totals and weather measurements. Which Azure service should you use?

- ☑ Azure Machine Learning
- ☐ Azure Bot Service
- ☐ Azure AI services

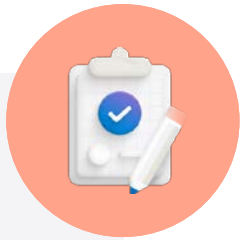
2 An automobile dealership wants to use historic car sales data to train a machine learning model. The model should predict the price of a pre-owned car based on its make, model, engine size, and mileage. What kind of machine learning model should the dealership use automated machine learning to create?

- ☐ Classification
- ☑ Regression
- ☐ Time series forecasting

3 A predictive app provides audio output for visually impaired users. Which principle of Responsible AI is reflected here?

- ☐ Transparency
- ☑ Inclusiveness
- ☐ Fairness

Summary



Fundamental AI concepts

- What is AI?
- Common AI workloads
- Principles of responsible AI

Fundamentals of Machine Learning

- What is machine learning?
- Types of machine learning
- Model training and validation
- What is Deep Learning?
- What is Azure Machine Learning?

Fundamentals of Azure AI services

- Azure basics
- AI services on Microsoft Azure
- Azure AI services

References

Read more about:

- Fundamental AI concepts
- Fundamentals of machine learning
- Fundamentals of Azure AI services

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

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