Microsoft

AI-900

AI Overview

AI-900 Agenda

1: AI Overview

2: Computer Vision

3: Natural Language Processing

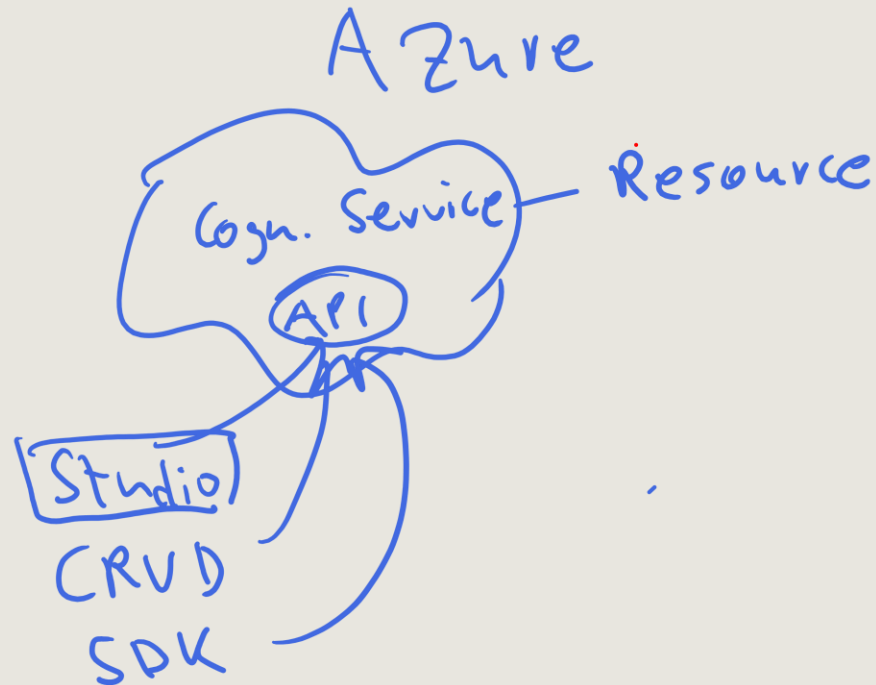4: Document Intelligence and Knowledge Mining

5: Generative AI

LP Agenda

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

Neuronale Netwerke   OCR

Azure

Cogn. Service — Resource

API

Studio

CRUD

SDK

Fundamental AI concepts

What is Artificial Intelligence?
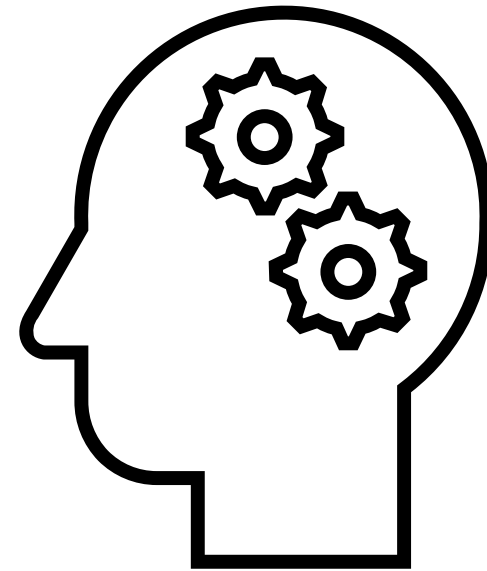
Software that imitates human capabilities

- 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.

old

NLP

dog cat car

Semantik

index

new

Transformers
LLM GPT 3.5
4
4o
OpenAI
Microsoft
Apple

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?

LLama

Fundamentals of machine learning

What is machine learning?

Creating predictive models by finding relationships in data
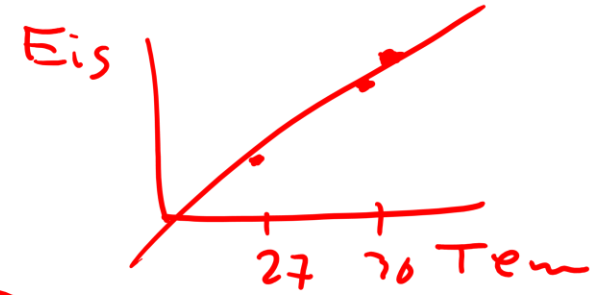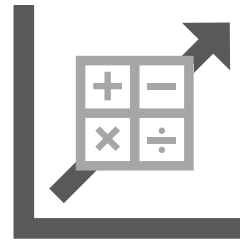
Training

1. Training data
(past observations)

$[x_1,x_2,x_3], y$
$[x_1,x_2,x_3], y$
$[x_1,x_2,x_3], y$
$[x_1,x_2,x_3], y$
$[x_1,x_2,x_3], y$

Features *Label*
(x)   (y)

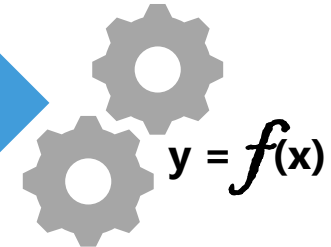**2. Algorithm**
(Generalizes the relationship between x and y as a function)

3. Model
(encapsulates the function)

$y = f(x)$

Inferencing

$[x_1,x_2,x_3]$ $\hat{y}$

4. Inferencing data
(unlabeled features)

Prediction
(inferred label)

Types of machine learning

Machine Learning

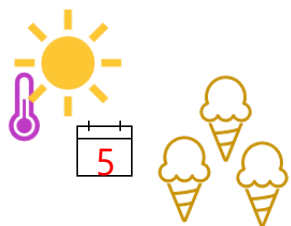**Supervised machine learning**
Training data includes known labels

Unsupervised machine learning
Training data is unlabeled

Regression
Label is a numeric value

Predict the number of ice creams sold based on day, season, and weather
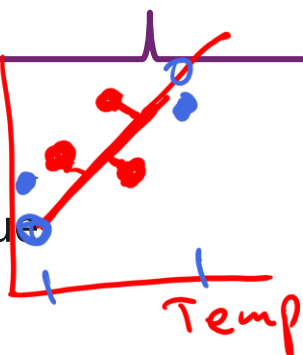
Classification
Label is a categorization (or *class*)

Binary classification
Label *is* or *is not* a class
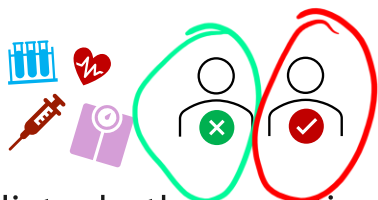
Predict whether a patient is at-risk for diabetes based on clinical data

Multiclass classification
Label is one of multiple classes

Predict the species of a penguin based on its measurements

Clustering
Similar items are grouped together
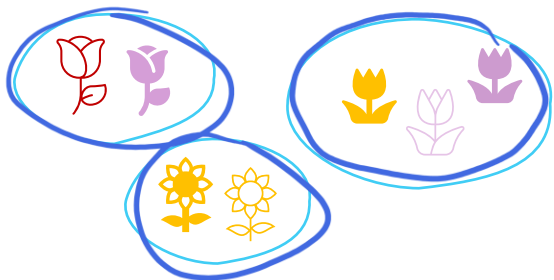
Separate plants into groups based on common characteristics

Model training and evaluation

Multiple training iterations with different algorithms and parameters
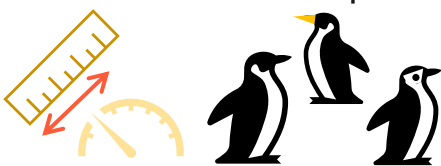
1. Training data
(past observations)

$[x_1, x_2, x_3], y$
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$[x_1, x_2, x_3], y$
$[x_1, x_2, x_3], y$
$[x_1, x_2, x_3], y$

Validation data
(with known labels)

2. Algorithm
(Generalizes the relationship between x and y as a function)

3. Model
(encapsulates the function)

$y = f(x)$

5. Evaluate model
(compare predicted labels to actual labels)

4. Predictions
(from the validation data)

Deep learning

Neuron

Human neural network

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

Artificial neural network

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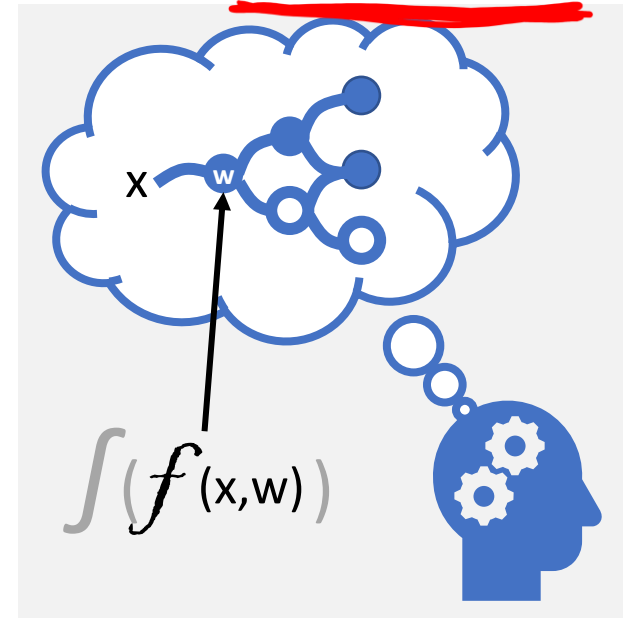
- Each neuron is a function that operates on an *input* value (x) and a *weight* (w)
- The function is wrapped in an *activation function* that determines whether to pass the output on

Deep learning
Neural network example – multiclass classification
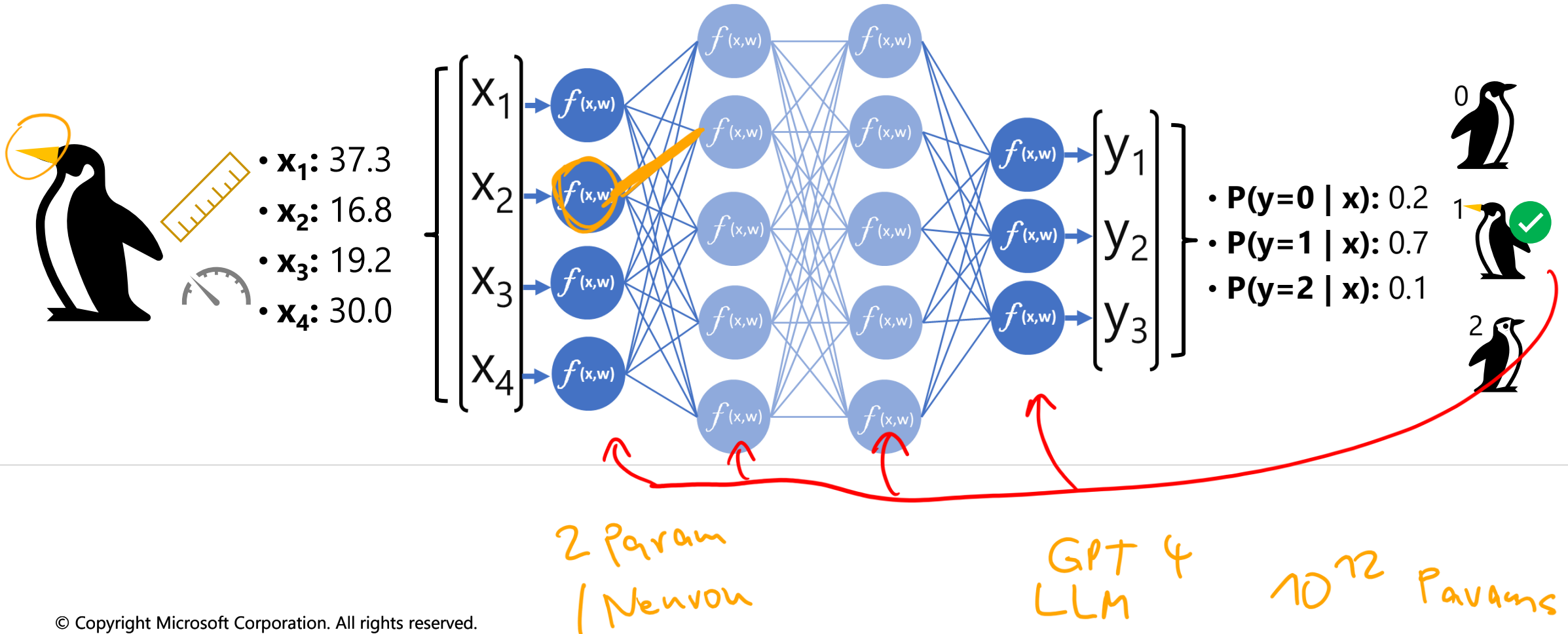
What is Azure Machine Learning?

- 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.
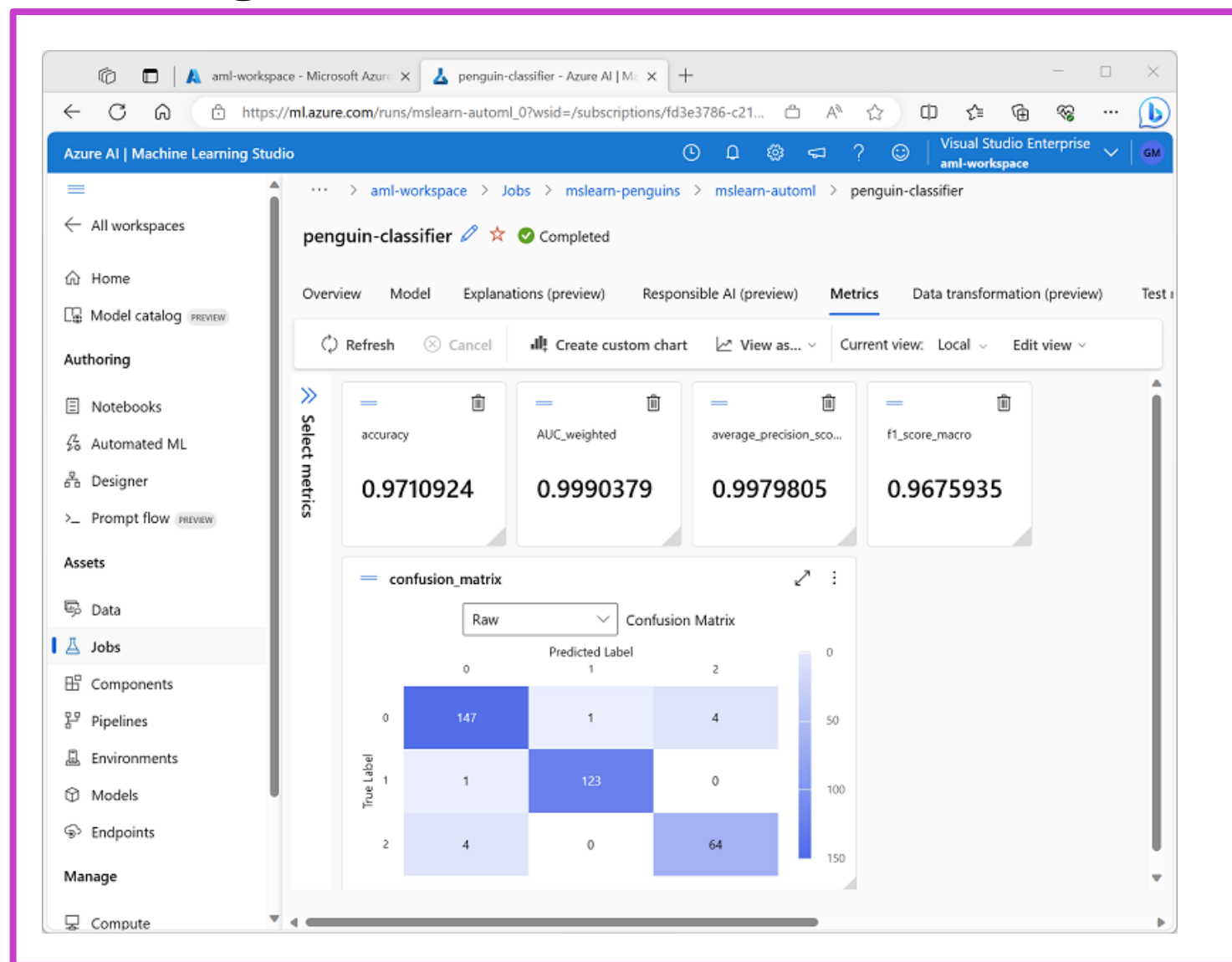
Entra ID   Lab: Skillable

Tenant
ᕦ Labuser ...@

Fundamentals of
Azure AI services

Subscription $ Azure

Resource
Group   VMs   Resource
                       SQL
                       Storage Account
                       Cognitive Service Account

Azure basics

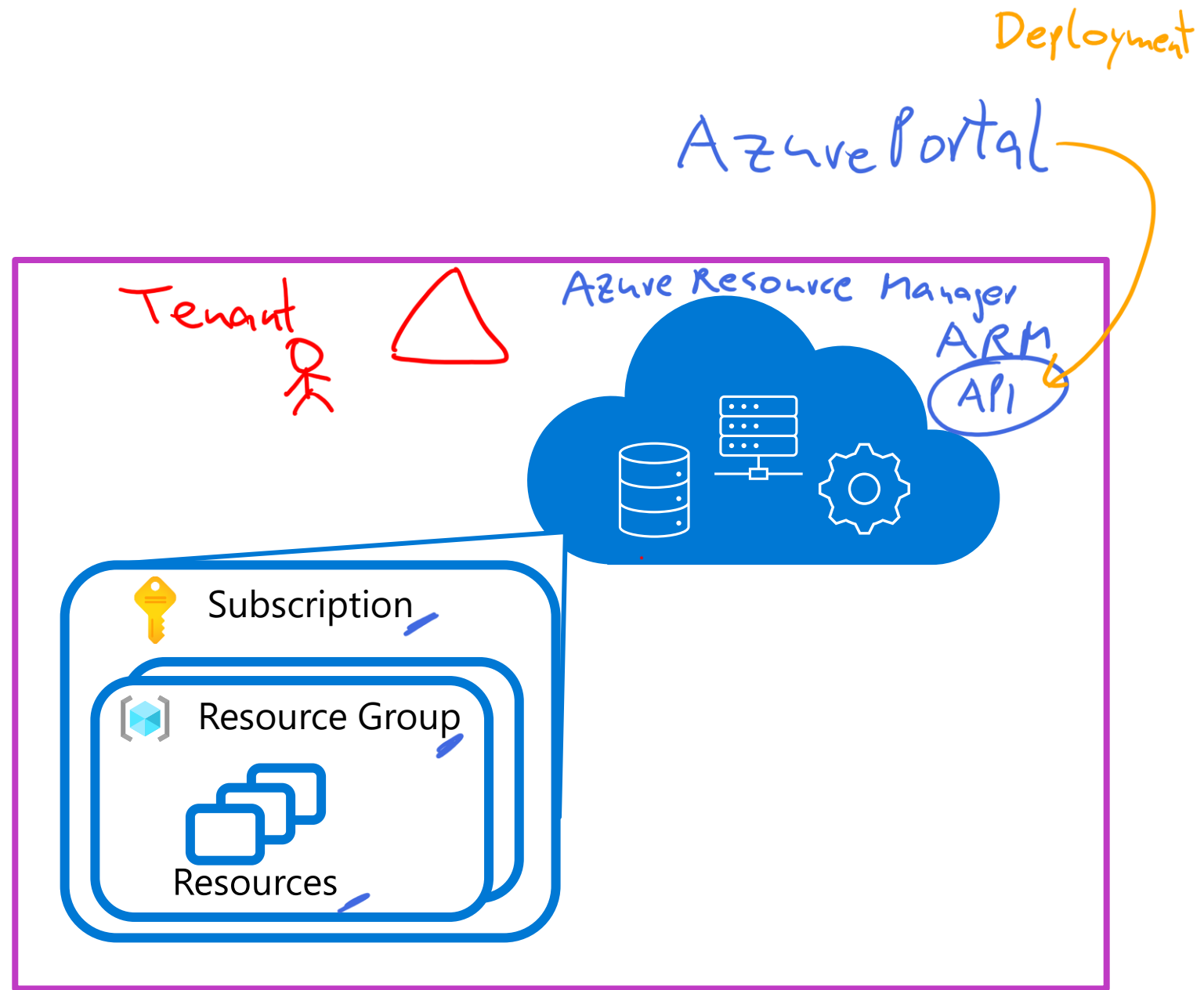**Microsoft's Azure cloud platform provides scalable and reliable:**

- Data storage

- Compute

- Services

Deployment

Azure Portal

Tenant

Azure Resource Manager
ARM
API

🔑 Subscription

▣ Resource Group

Resources

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 AI 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

Studio

Azure

Service

REST API

Key

https://eastus/...

URL

abc-1234-efg-5678...

Postman
Curl

App

Selber
Schreiben
SDK Python
C#...
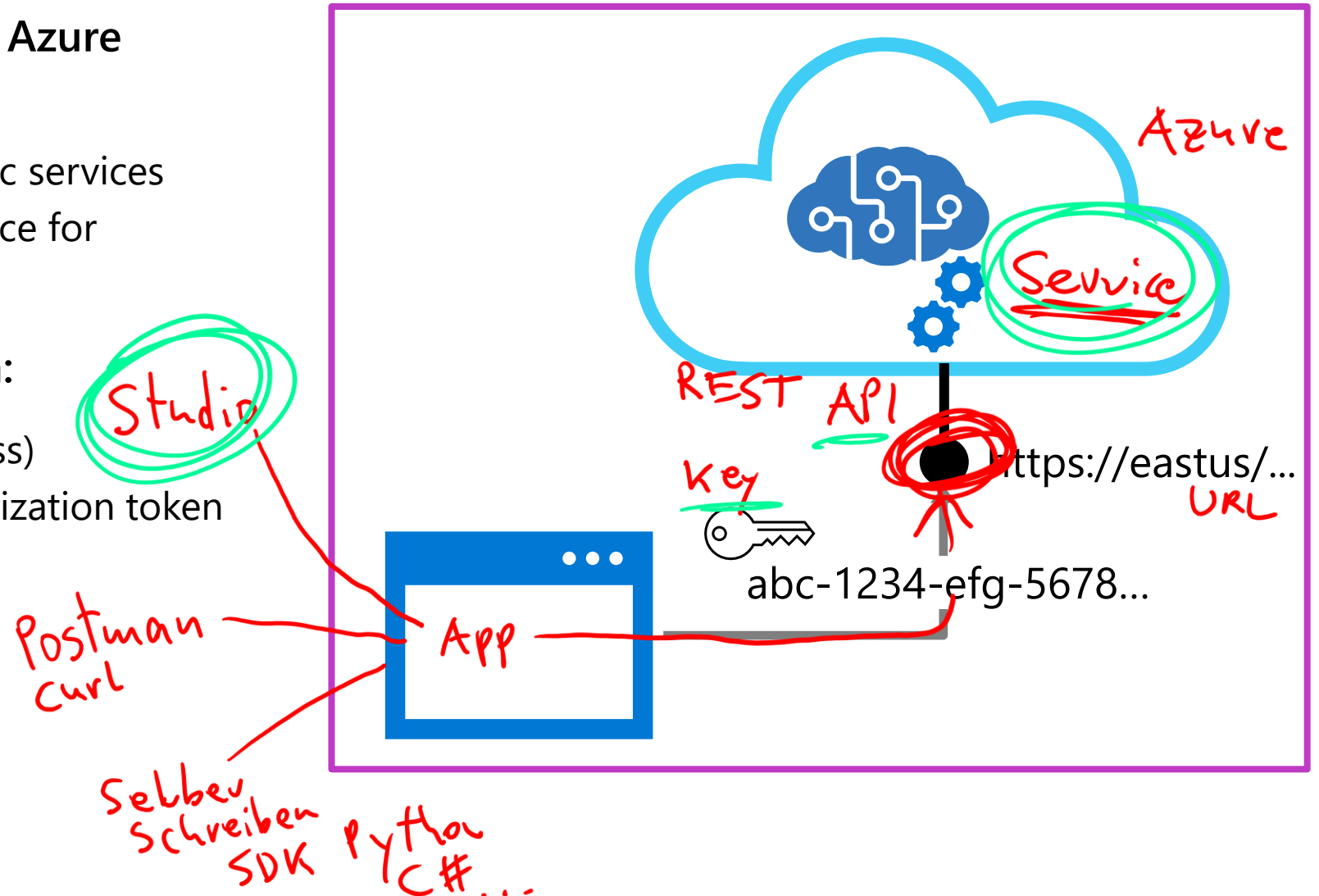
Exercise: Explore Azure AI services

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

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

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   - ☐ 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
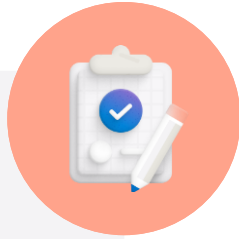
Fundamental AI concepts
- What is AI?
- Common AI workloads
- Principles of responsible AI

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