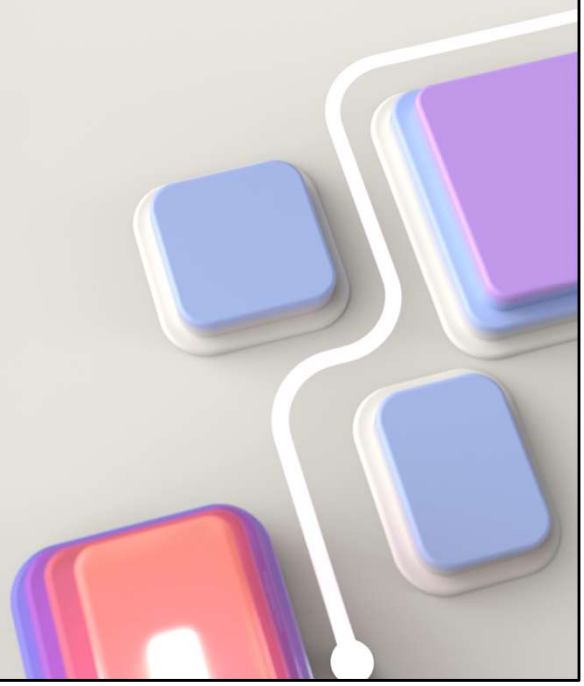
Microsoft

Introduction to AI and AI on Azure

Agenda

- Introduction to AI
- AI on Azure
- Get started with Azure AI services
- Using Azure AI Services for enterprise applications

Introduction to AI and Azure AI services



Learning Objectives

After completing this module, you will be able to:

1. Describe artificial intelligence and how it compares to machine learning and data science.
2. Describe Azure AI services.

What is Artificial Intelligence?

Software that exhibits human-like capabilities, such as:

Visual Perception

Text Analysis

Conversation

Decision Making

AI for Software Engineers

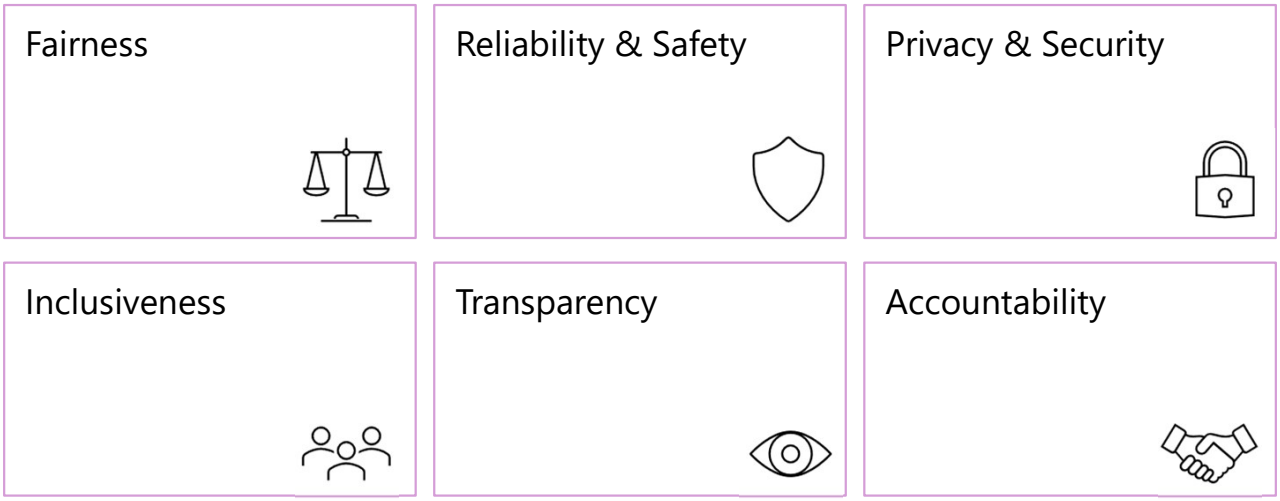
Software Development Skills

- Coding (C#, Python, JavaScript, …)
- Consuming APIs (REST or SDKs)
- DevOps (source control, CI/CD)

Conceptual AI Understanding

- Model training and inferencing
- Probability and confidence scores
- Responsible AI and ethics

Considerations for Responsible AI



https://www.microsoft.com/ai/responsible-ai

At Microsoft, AI software development is guided by a set of six principles for responsible AI. Considering Responsive AI is important not just for Microsoft developers, but for all AI developers and organizations who use AI technologies.

Use the summaries below to relate these to the challenges and risks on the previous slide.

Fairness
AI systems should treat all people fairly. For example, suppose you create a machine learning model to support a loan approval application for a bank. The model should ma ke predictions of whether or not the loan should be approved without incorporating an y bias based on gender, ethnicity, or other factors that might result in an unfair ad vantage or disadvantage to specific groups of applicants.

Azure Machine Learning includes the capability to interpret models and quantify the e xtent to which each feature of the data influences the model's prediction. This capab ility helps data scientists and developers identify and mitigate bias in the model.

Reliability and safety
AI systems should perform reliably and safely. For example, consider an AI-based software system for an autonomous vehicle; or a machine learning model that dia gnoses patient symptoms and recommends prescriptions. Unreliability in these kinds of system can result in substantial risk to human life.

AI-based software application development must be subjected to rigorous testing and depl oyment management processes to ensure that they work as expected before release.

Privacy and security
AI systems should be secure and respect privacy. The machine learning models on which AI systems are based rely on large volumes of data, which may contain personal detai

ls that must be kept private. Even after the models are trained and the system is in production, it uses new data to make predictions or take action that may be subject to privacy or security concerns.

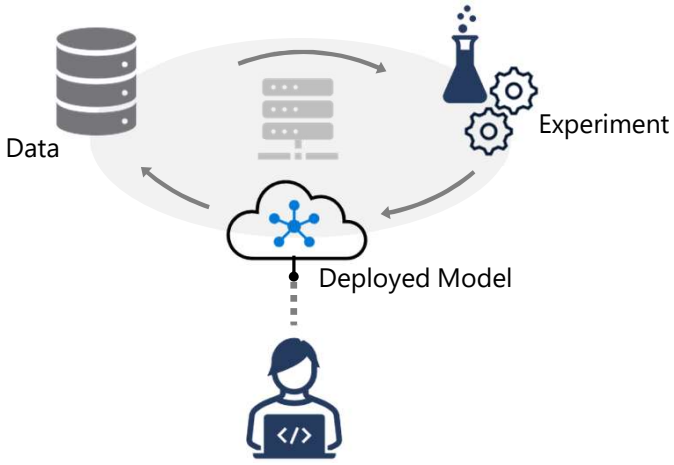
Inclusiveness
AI systems should empower everyone and engage people. AI should bring benefits to all parts of society, regardless of physical ability, gender, sexual orientation, ethnicity, or other factors.

Transparency
AI systems should be understandable. Users should be made fully aware of the purpose of the system, how it works, and what limitations may be expected.

Accountability
People should be accountable for AI systems. Designers and developers of AI-based solution should work within a framework of governance and organizational principles that ensure the solution meets ethical and legal standards that are clearly defined.

Azure Machine Learning

Cloud platform for creating and operating machine learning solutions



Azure AI Services

Prepackaged AI services you can integrate into solutions

Capabilities include:

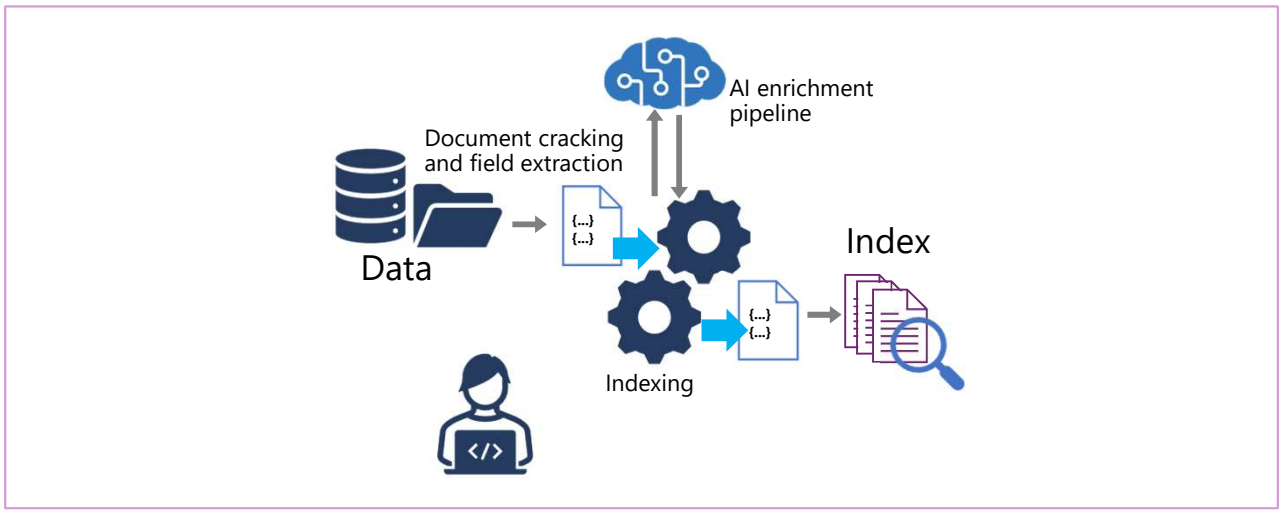
Language	Speech	Vision	Generative
• Text analysis • Question answering • Language understanding • Translation	• Speech recognition • Speech synthesis • Speech Translation • Speaker Recognition	• Image and video analysis • Image classification • Object detection • Optical character recognition	• Generate text completions • Image generation

Azure AI Services

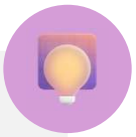
- Azure AI Document Intelligence
- Azure AI Language
- Azure AI Vision
- Azure OpenAI
- Azure AI Search

Azure AI Search

AI-enriched indexing for search and knowledge mining



Knowledge check



1 **Which of the following best describes the predictions made by a machine learning model?**

- ☐ Absolutely correct values based on conditional logic.
- ☐ Randomly selected values with an equal chance of selection.
- ☑ Probabilistic values based on correlations found in training data.

2 **A data scientist has used Azure Machine Learning to train a machine learning model. How can you use the model in your application?**

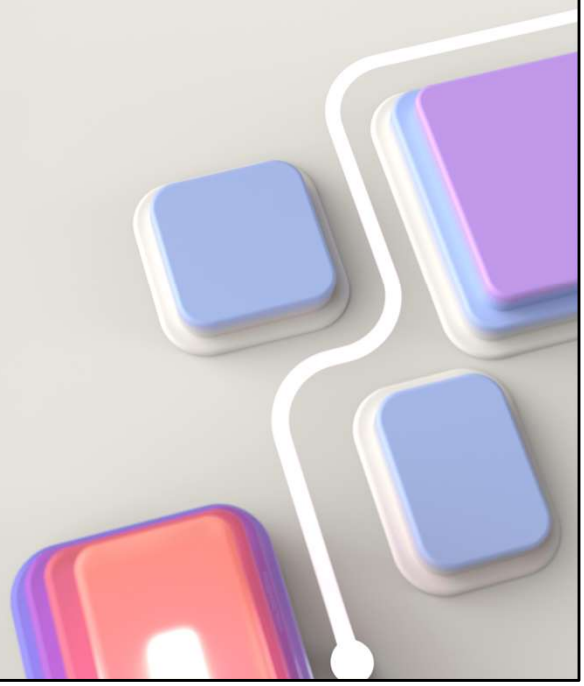
- ☑ Use Azure Machine Learning to publish the model as a web service.
- ☐ Export the model as an Azure AI service.
- ☐ You must build your application using the Azure Machine Learning designer.

3 **You want to index a collection of text documents, and search them from a mobile application. Which service should you use to create the index.**

- ☐ Azure AI Language
- ☑ Azure AI Search
- ☐ Azure AI Speech

Use the slide animation to reveal the correct answers.

Get Started with Azure AI services



Learning Objectives

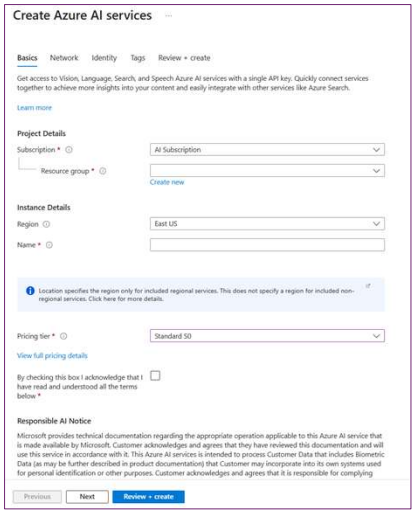
After completing this module, you will be able to:

1. Understand Azure AI APIs.
2. Create and consume Azure AI services resources.

Provisioning Azure AI Services resources

Create a resource in your Azure subscription

- You will create either a *single-service* resource or a *multi-service* resource:
- Multi-service resource **(Azure AI Services):**
  - Access multiple Azure AI Services with a single key and endpoint.
  - Consolidates billing from the services you use.
- Single-service resource (for example, **Language):**
  - Access a single Azure AI service with a unique key and endpoint for each service created.
  - Use the free tier to try out the service.



Endpoints, Keys, and Locations

Information required to connect

Endpoint:

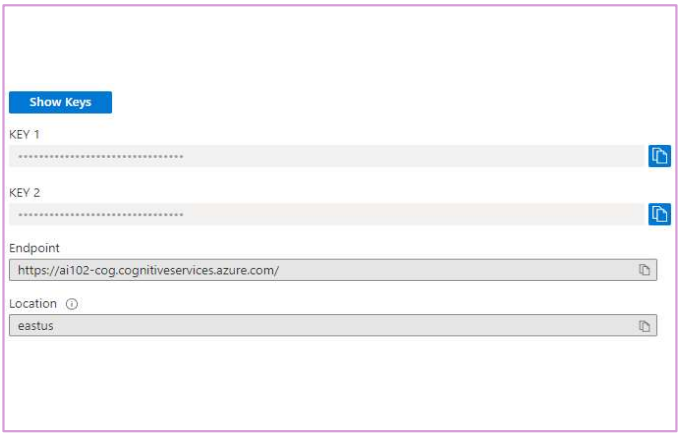
- URL at which service can be consumed
- Required by *most* SDK clients

Keys:

- Use *either* key to authenticate

Location:

- Azure data center in which resource is provisioned
- Required by *some* SDK clients

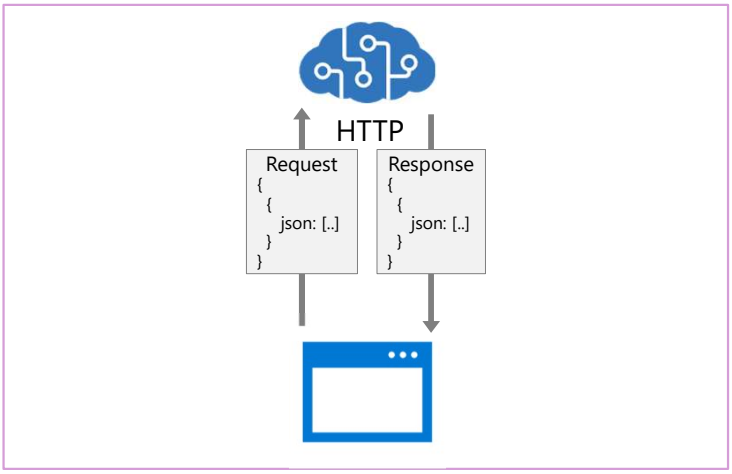


Azure AI Services REST APIs

Clients submit HTTP requests to the resource endpoint

- Key specified in request header
- Input data in JSON format
- Specific schema varies by service and method

Service returns JSON response

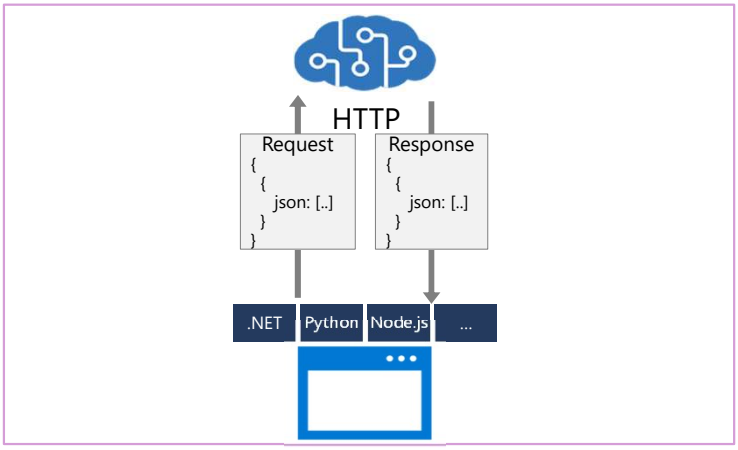


Azure AI Services SDKs

Runtime library abstracts REST interface

Multiple SDKs for each service:

- .NET
- Python
- Node.js
- Java
- Others…



Exercise – Get Started with Azure AI Services

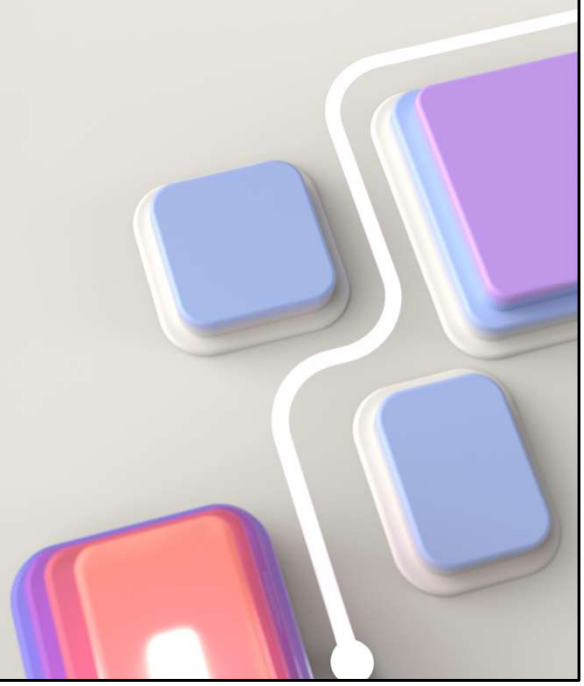
Provision an Azure AI Services resource

Use a REST interface

Use an SDK

Exercises here, for reference: [mslearn-ai-services/Instructions/Exercises at main · MicrosoftLearning/mslearn-ai-services (github.com)]

Using Azure AI Services for enterprise applications



Learning Objectives

After completing this module, you will be able to:

1. Consider and manage authentication and network security for Azure AI services.
2. Manage costs, view metrics, and manage alerts and diagnostic logging.
3. Deploy to secure containers and consume Azure AI services from containers.

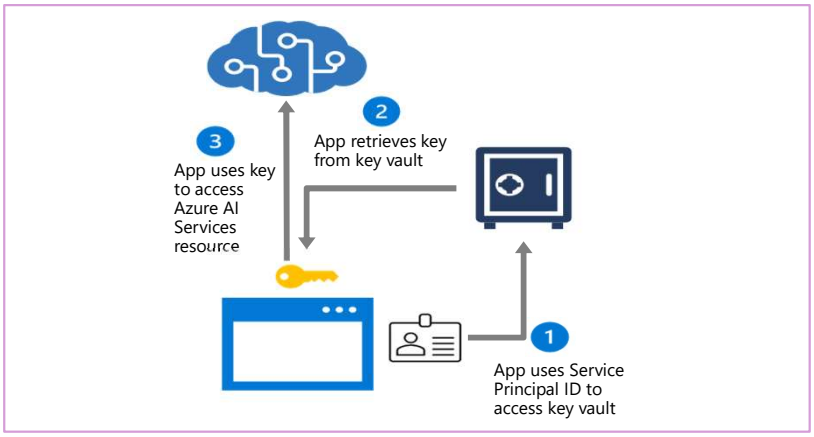
Considerations for Azure AI Services security

Regenerate keys regularly to protect access

- To avoid service interruption, switch apps to use key 2 before regenerating key 1; and vice-versa

Consider protecting keys by storing them in Azure Key Vault

- Apps can use a Service Principal as a managed identity to retrieve keys from Key Vault



Demo – Manage Azure AI Services security

Manage Authorization Keys

Secure Key Access with Azure Key Vault

This is intended to be an instructor demo – use a predeployed resource, and show the features in lab 2: [mslearn-ai-services/Instructions/Exercises at main · MicrosoftLearning/mslearn-ai-services (github.com)]

Monitoring Azure AI Services Activity

Alerts

- Alerts will ensure that the correct team knows when a problem arises.
- Every alert or notification available in Azure Monitor is the product of a rule

Metrics

- Metrics are numerical values
- The metrics are collected at regular intervals and are useful for alerting.
- Metrics are stored in a time-series database.

Diagnostic settings

- Configure diagnostic settings is to provide detailed information for diagnostics and auditing.
- Diagnostic Destinations:
  - Log Analytics Workspace
  - Event Hubs
  - Azure Storage

Logs

- Logs contain time-stamped information about changes made to resources.
- The log data is organized into record
- The logs can include numeric values, but most include text data
- The most common type of log entry records an event

Demo – Monitor Azure AI Services

Configure an alert

Visualize a metric

This is intended to be an instructor demo – use a predeployed resource, and show the features in lab 3: [mslearn-ai-services/Instructions/Exercises at main · MicrosoftLearning/mslearn-ai-services (github.com)]

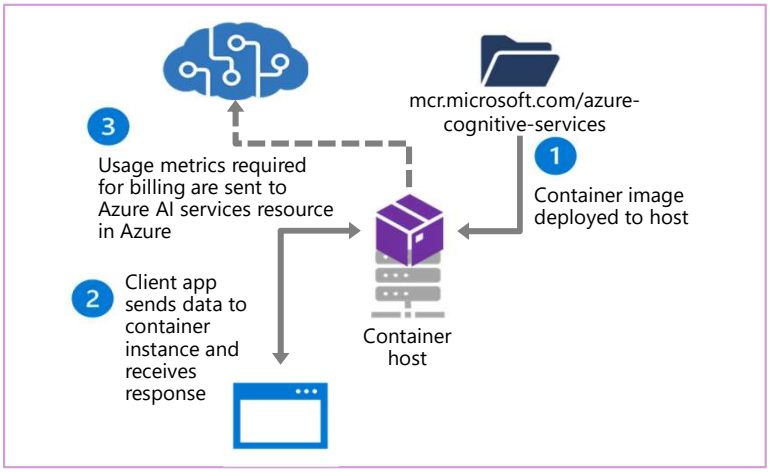
Azure AI Services and Containers

Container images are available for commonly used Azure AI services APIs

- Deploy containers to:
- Local Docker hosts
- Azure Container Instances
- Azure Kubernetes Services clusters
- others…

Enables more control over data sent to public Azure AI service endpoint

- An Azure AI services resource is still required, and the container must communicate with it to send billing data



Highlight that a container needs to connect to Azure for billing periodically

Some questions learners may ask:

Q: Are all the features of Azure AI Service available in containers? A: No, only some limited features are available in containers. https://learn.microsoft.com/azure/ai-services/cognitive-services-container-support

Q: Can I use Azure AI Services containers in a local environment without an Internet connection? A: Yes, you can. However, you will be charged for the commitment plan instead of pay-as-you-go. https://learn.microsoft.com/azure/ai-services/containers/disconnected-containers

Q: Can I run Azure OpenAI Service in a container? A: No, operating large language models usually requires large computing capacity such as Azure datacenters. Additionally, the GPT or DALL-E models are proprietary products.

Extended interactive exercises – Use an Azure AI Services container

Create you AI resource

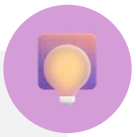
Deploy to a container

Use deployed container

https://aka.ms/ai-services-container

This is intended for students to do on their own time, on Learn.

Knowledge check



1 **How are client applications typically granted access to an Azure AI services endpoint?**

- ☑ The application must specify a valid subscription key for the Azure resource.
- ☐ The user of the application must enter a user name and password associated with the Azure subscription.
- ☐ Access to Azure AI services is granted to anonymous users by default.

2 **You want to keep track of how often the subscription keys for your Azure AI services resource are retrieved. What should you do?**

- ☐ Regenerate the keys for your Azure AI services resource.
- ☑ Create an alert for your Azure AI services resource.
- ☐ Store the keys in Azure Key Vault.

3 **You plan to use an Azure AI services container in a local Docker host. Which of the following is true?**

- ☐ Client applications must pass a subscription key to the Azure resource endpoint before using the container.
- ☐ All data passed from the client application to the container is forwarded to the Azure resource endpoint.
- ☑ The container must be able to connect to the Azure resource endpoint to send usage data for billing.

Use the slide animation to reveal the correct answers.

Learning Path Recap

In this learning path, we:

Described artificial intelligence and how it compares to machine learning and data science.

Described Azure AI services.

Understood how to get started with Azure AI services

Understood how to use Azure AI Services for enterprise applications