



**Northumbria  
University**  
NEWCASTLE

Department of Computer and Information Sciences

KV4004 AI Fundamentals

Workshop 5

October 2024



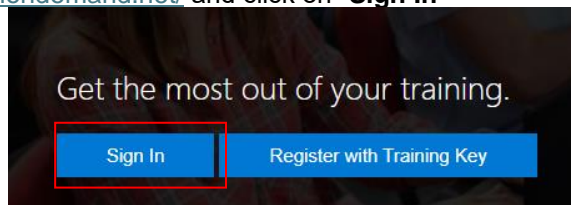
## Explore Computer Vision with Azure AI Services

In this workshop, you'll use a simple command-line application to practice Computer Vision in action. Imagine that a retailer Northwind Traders has decided to implement a "smart store", in which AI services monitor the store to identify customers requiring assistance, and direct employees to help them. By using the Computer Vision service, images taken by cameras throughout the store can be analysed to provide meaningful descriptions of what they depict.

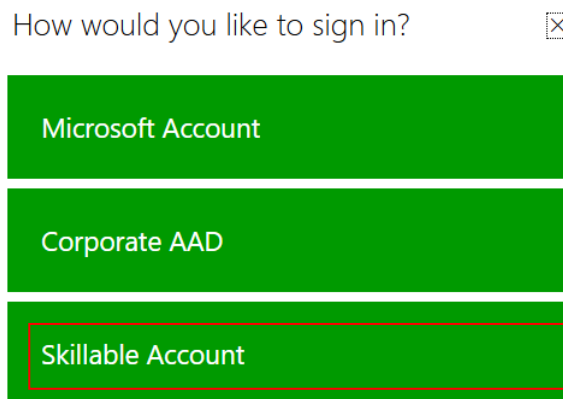
Before proceeding, make sure you have created an Azure Machine Learning workspace and a computing instance.

### Exercise 1: Create an Azure AI services resource

1. Go to link <https://msle.learnondemand.net/> and click on "Sign In"



2. Click on "Skillable Account" and then provide your username and password on the login page



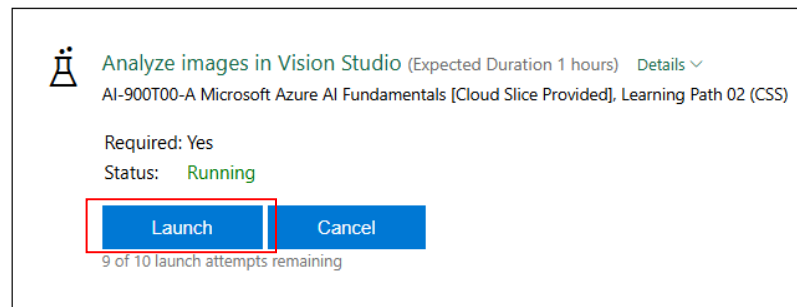
3. Once you are logged in, go to "My Training" and click on it, you will then be shown a list of classes on which you have been enrolled. Click into the class "AI Fundamentals 1 KV4004 (AI-900)"

A screenshot of the "My Training" page. At the top, there is a navigation bar with "My Training", "My Transcript", "Contact", and "Help". Below this, a user profile for "Shanfeng Hu" is shown. A section titled "Classes (2)" contains a table with the following data:

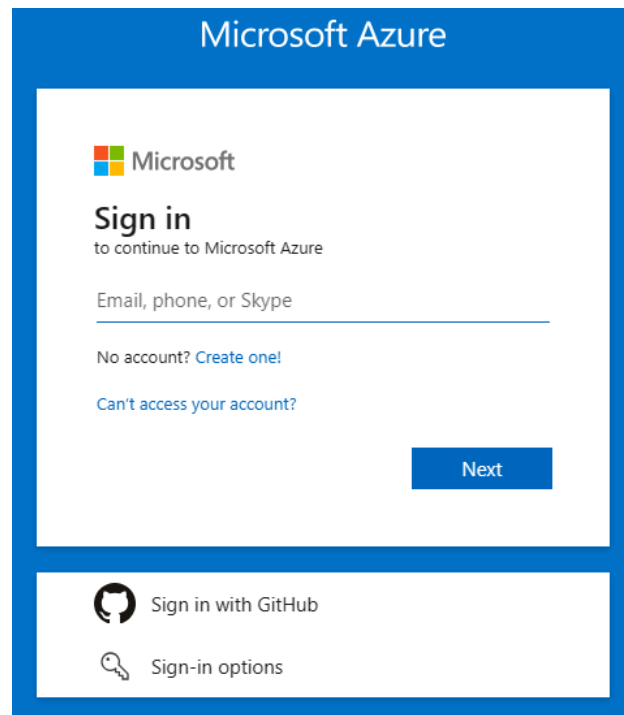
Class	Room	When ↑	Status
<a href="#">AI Fundamentals 1 KV4004 (AI-900)</a>		27 September 2024 09:00 - 27 February 2025 17:00 (GMT Standard Time)	Enrolled
<a href="#">AI Fundamentals 1 KV4004 (DP-100)</a>		27 September 2024 09:00 - 27 February 2025 17:00 (GMT Standard Time)	Enrolled

4. In the new page, there are multiple virtual machine options which come with different services provided. Launch the second one "Analyze images in Vision Studio"

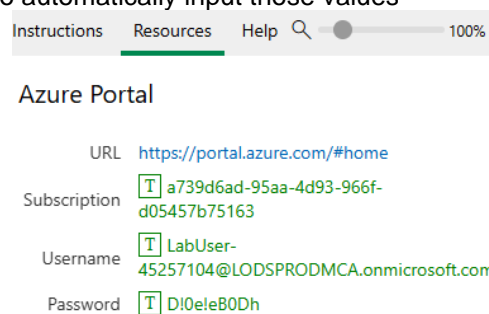
2



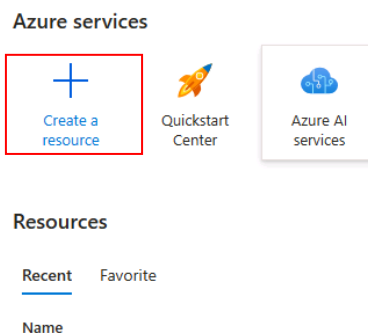
5. Once the virtual machine has been launched, open the Edge browser and navigate to the Azure login in page



6. Use the username and password provided under the **“Resources”** tab to login. You can simply click on the Username and Password to automatically input those values



7. After you have logged into Microsoft Azure, go to the top left corner of the landing page and click on **“Create a resource”**



8. In the new page, use the keyword “Azure AI services” to search for this service and then click on it



## Azure AI services

Microsoft

Azure Service

Connect powerful AI to your apps

Create ▾



9. When you create the service, use the following details (they are for reference and can be changed as long as the names are valid)

### Create Azure AI services ...

[Learn more](#)

#### Project Details

Subscription \* ⓘ

MOC Subscription-lod49795875 ▾

Resource group \* ⓘ

(New) ai-fundamentals-week5 ▾

[Create new](#)

#### Instance Details

Region ⓘ

UK South ▾

Name \* ⓘ

ai-fundamentals-week5-workspace ✓

Pricing tier \* ⓘ

Standard S0 ▾

[View full pricing details](#)

#### Content review policy

To detect and mitigate harmful use of the Azure OpenAI Service, Microsoft logs the content you send to the Completions and image generations APIs as well as the content it sends back. If content is flagged by the service's filters, it may be reviewed by a Microsoft full-time employee.

[Learn more about how Microsoft processes, uses, and stores your data](#)

[Apply for modified content filters and abuse monitoring](#)

[Review the Azure OpenAI code of conduct](#)

[Previous](#)

[Next](#)

[Review + create](#)

10. Click on “**Review+create**” to create the service and wait for the deployment to be completed

ai-fundamentals-week5-workspace ⚙️ ☆ ...

Azure AI services multi-service account

Search

⊞ ⏪

Bing Statistics Add-in Delete

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Resource Management

Security

Monitoring

Automation

Help

Essentials

Resource group (move) : ai-fundamentals-week5

Status : Active

Location : UK South

Subscription (move) : MOC Subscription-lod49795875

Subscription ID : 7e52878f-2acc-4837-b79b-b00512c7dc43

Tags (edit) : Add tags

API Kind : CognitiveServices

Pricing tier : Standard

Endpoint : https://ai-fundamentals-week5-workspace.cognitiveservices.azure.com/

Manage keys : [Click here to manage keys](#)

Autoscale : Disabled

Get Started

Decision

Language

Speech

Vision

Document Intelligence

Metrics Advisor

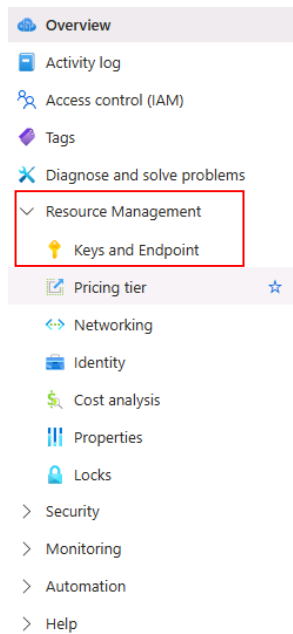
Containers

Build intelligent apps using a comprehensive family of AI services and cognitive APIs

The Azure AI services multi-service resource combines various services from Decision, Language, Speech, Vision, and Applied AI into a single key and endpoint to enable you to easily build solutions that can see, hear, speak, understand, and make decisions. Follow the cards below to learn the basics, read documentation, and join the community.


[Learn More](#)

11. On the left panel of the page, click on “**Resource Management**” to expand it and then click on “Keys and Endpoint” the sub menu



12. On the new page, you will be able to view the keys and endpoint string, which will be needed to run the following task

 Regenerate Key1  Regenerate Key2

 These keys are used to access your Azure AI services API. Do not share your keys. Store them securely– for example, using Azure Key Vault. We also recommend regenerating these keys regularly. Only one key is necessary to make an API call. When regenerating the first key, you can use the second key for continued access to the service.

**Show Keys**

KEY 1

..... 


KEY 2

..... 

Location/Region ⓘ

uksouth 

Endpoint

https://ai-fundamentals-week5-workspace.cognitiveservices.azure.com/ 

## Exercise 2: Launch Cloud Shell

1. Go back to the Azure portal and click on the shell icon at the top right of the page. Once done, you will be able to open a new window within the current page that contains console outputs.

```
Switch to Bash Restart Manage files New session Editor Web preview Settings Help
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Subscription used to launch your CloudShell 7e52878f-2acc-4837-b79b-b00512c7dc43 is not registered to Microsoft.CloudShell Namespace. Please follow
"RegisterCloudShell" to register. In future, unregistered subscriptions will have restricted access to CloudShell service.

Your Cloud Shell session will be ephemeral so no files or system changes will persist beyond your current session.

NOTD: Azure Cloud Shell now includes Predictive IntelliSense! Learn more: https://aka.ms/CloudShell/IntelliSense

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/labuser-45257651>
```

2. Now that you have a Cloud Shell environment, you can run a simple application that uses the Computer Vision service to analyze an image. In the command shell, enter the following command to download the sample application and save it to a folder called ai-900.

```
git clone https://github.com/MicrosoftLearning/AI-900-AIFundamentals ai-900
```

3. Once the application has been downloaded, the content in the shell should look like the following

```
Switch to Bash Restart Manage files New session Editor Web preview Settings Help
NOTD: Azure Cloud Shell now includes Predictive IntelliSense! Learn more: https://aka.ms/CloudShell/IntelliSense

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/labuser-45257651> git clone https://github.com/MicrosoftLearning/AI-900-AIFundamentals ai-900
Cloning into 'ai-900'...
remote: Enumerating objects: 2255, done.
remote: Counting objects: 100% (13/13), done.
remote: Compressing objects: 100% (10/10), done.
remote: Total 2255 (delta 5), reused 8 (delta 3), pack-reused 2242 (from 1)
Receiving objects: 100% (2255/2255), 129.08 MiB | 26.06 MiB/s, done.
Resolving deltas: 100% (1292/1292), done.
PS /home/labuser-45257651>
```

4. Now we want to see all of the files in your Cloud Shell storage and work with them. Type the following command into the shell to launch an editor. You may encounter “Switch back to the classical shell” – just click “Confirm” to proceed.

```
code .
```

5. In the Files panel on the left, expand the folder **ai-900** and select **analyze-image.ps1**. This file contains some code that uses the Computer Vision service to analyze an image

```
FILES
- ai-900
  .git
  .github
  .vscode
  data
  instructions
  _build.yml
  analyze-image.ps1
  analyze-text.ps1
  classify-image.ps1
  detect-anomalies.ps1
  detect-objects.ps1
  find-faces.ps1
  form-recognition.ps1
  index.md
  LICENSE
  mapping.md
  ocr.ps1
  readme.md

1 $key="YOUR_KEY"
2 $endpoint="YOUR_ENDPOINT"
3
4
5 # Code to call Computer Vision service for image analysis
6 $img_file = "store-camera-1.jpg"
7 if ($args.count -gt 0 -And $args[0] -in ("store-camera-1.jpg", "store-camera-2.jpg", "store-camera-3.jpg",
8 {
9     $img_file = $args[0]
10 }
11
12 $img = "https://raw.githubusercontent.com/MicrosoftLearning/AI-900-AIFundamentals/main/data/vision/$img_file"
13
14 $headers = @{}
15 $headers.Add( "Ocp-Apim-Subscription-Key", $key )
16 $headers.Add( "Content-Type","application/json" )
17
18 $body = '{"url' : '$img'}"
19
20 write-host "Analyzing image..."
21 $result = Invoke-RestMethod -Method Post `
22     -Uri "$endpoint/vision/v3.2/analyze?visualFeatures=Categories,Description,Objects" `
23     -Headers $headers
```

6. Don't worry too much about the code. The important thing is that it needs the endpoint URL and either of the keys for your Azure AI services resource. Copy these from the Keys and Endpoints page for your resource from the Azure portal and paste them into the code editor, replacing the “YOUR KEY” and “YOUR ENDPOINT” placeholder values respectively.

Regenerate Key1
Regenerate Key2

KEY 1  
.....

KEY 2  
.....

Location/Region ⓘ  
uksouth

Endpoint  
https://ai-fundamentals-week5-workspace.cognitiveservices.azure.com/

analyze-image.ps1

```

1 $key="7KotXeMM2q2vAQrOCyRyaTkL6Me6nj659MzeLP9NEGU46v1VV4QjJQQJ99AJACmepeSXJ3w3AAAEACOGsRaf"
2 $endpoint="https://ai-fundamentals-week5-workspace.cognitiveservices.azure.com/"
3

```

7. Right click your mouse within the editor and then click on **"Save"** to save your changes.

### Exercise 3: Perform Image Analysis

1. Now, let's use our newly created Computer Vision service to analyze the following image, taken by a camera in the Northwind Traders store.



2. In the PowerShell panel, enter the following command to go into our working directory



```
cd ai-900
```

3. Once inside the **ai-900** folder, run the following command to execute the Computer vision service to analyze our first image

```
./analyze-image.ps1 store-camera-1.jpg
```

4. After a short while, the image analysis will be completed, and you will be able to see the results printed in the console as follows.

```
VERBOSE: Authenticating to Azure ...  
VERBOSE: Building your Azure drive ...  
PS /home/labuser-45257651> code .  
PS /home/labuser-45257651> cd ai-900  
PS /home/labuser-45257651/ai-900> ./analyze-image.ps1 store-camera-1.jpg  
Analyzing image...  
  
Description:  
a woman showing her phone to a child  
  
Objects in this image:  
- cell phone  
- person  
- person  
- room  
  
Tags relevant to this image:  
- text  
- person  
- woman  
- store  
- shop  
  
PS /home/labuser-45257651/ai-900> █
```

5. Review the results of the image analysis, which include:
  - A suggested caption that describes the image
  - A list of objects identified in the image
  - A list of tags that are relevant to the image
6. Let's try the second image. This time, we should be using a different image name as in **./analyze-image.ps1 store-camera-2.jpg**. The application we are launching here is the same as for the first image



7. The result will look like the following – have an examination of it!

```
PS /home/labuser-45257651/ai-900> ./analyze-image.ps1 store-camera-2.jpg
Analyzing image...

Description:
a woman holding a shopping cart in a grocery store

Objects in this image:
- person

Tags relevant to this image:
- text
- person
- woman
- marketplace
- shop

PS /home/labuser-45257651/ai-900> |
```