

Image Analysis

- One of the fundamental fields of artificial intelligence, computer vision concentrates on the development of solutions that enable AI applications to "see" and interpret data.
- Computers lack eyes but can analyze images and videos from live camera feeds or digital photographs and videos. This capacity to analyze images is essential for developing software that can simulate human visual perception.
- Potential uses for computer services include:
 1. Content organization – Identifying individuals or things depicted in photographs, followed by their organization according to the established identification. Photo recognition applications, such as the one mentioned, are frequently employed in the context of photo storage and social media platforms.
 2. Text extraction – Analysis of photographs and PDF documents that encompass textual content, with the objective of extracting the text and organizing it into a structured format.
 3. Spatial analysis – Identification and tracking of individuals or items within a given spatial environment, with the aim of creating a visual representation of their movements within that space.

An image is simply an array of pixel values to an AI (artificial intelligence) program. These numbers serve as features for ML (machine learning) models that predict aspects of an image. Training ML models from inception can be extremely time-consuming and data intensive. Microsoft provides this kind of pre-trained computer vision through its Computer Vision service.

Learning objectives:

1. Identifying the image analysis tasks that can be performed with Computer Vision service.
2. Provision a Computer Vision resource.
3. Use a Computer Vision resource to analyze an image.

Computer Vision service on Azure

Microsoft Azure's Computer Vision service offers cognitive capabilities for computer vision that are already built in. The service can analyze images and returning information about the image and the depicted objects. It employs pre-trained machine learning models to analyze and describe images.

Case Study:

Northwind Traders, a hypothetical retail establishment, decides to use "smart store" technology, wherein artificial intelligence services keep an eye on the place and alert staff when they spot a consumer who needs help. photos captured by cameras placed throughout the business can be processed with the help of a Computer Vision service, which then provides descriptive information about the photos.

This lab utilizes a simple command-line application to demonstrate the Computer Vision service. In real-world scenarios, such as websites and mobile applications, the same principles and functionalities apply.

Steps Involved:

01. Create resource group

Name: Samridhi

Subscription ID: 3f28ce84-0564-4959-b194-94bc26e6c72f

API Type: Computer Vision

End point: <https://samridhi24.cognitiveservices.azure.com/>
(initially)

Key 1: 5f9990a73b7841dc823f828c468ed0f3

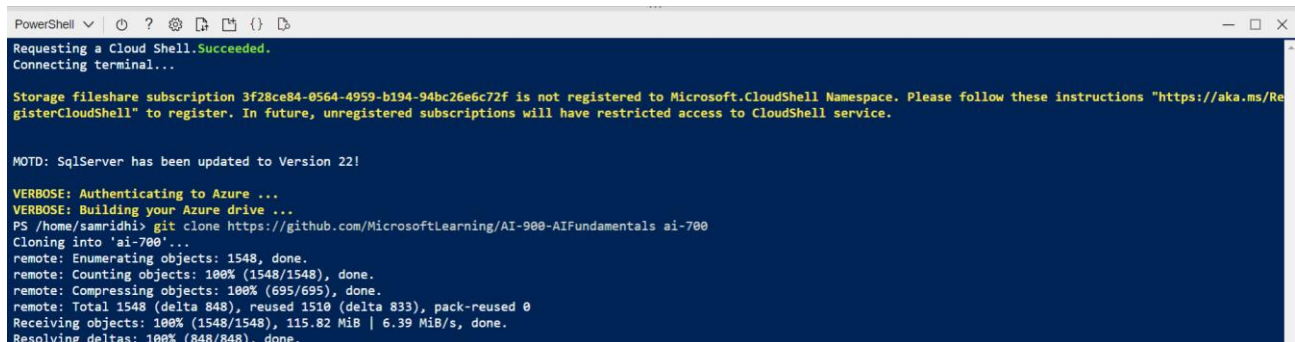
Key 2: 5d9c128181204f5bb4fc2979e9e236d1

02. Run Cloud Shell

> git clone <https://github.com/MicrosoftLearning/AI-900-AIFundamentals> ai-700

a. Storage is created, folder name: ai-700

b. Cloud shell environment is successful



```
PowerShell
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Storage fileshare subscription 3f28ce84-0564-4959-b194-94bc26e6c72f is not registered to Microsoft.CloudShell Namespace. Please follow these instructions "https://aka.ms/RegisterCloudShell" to register. In future, unregistered subscriptions will have restricted access to CloudShell service.

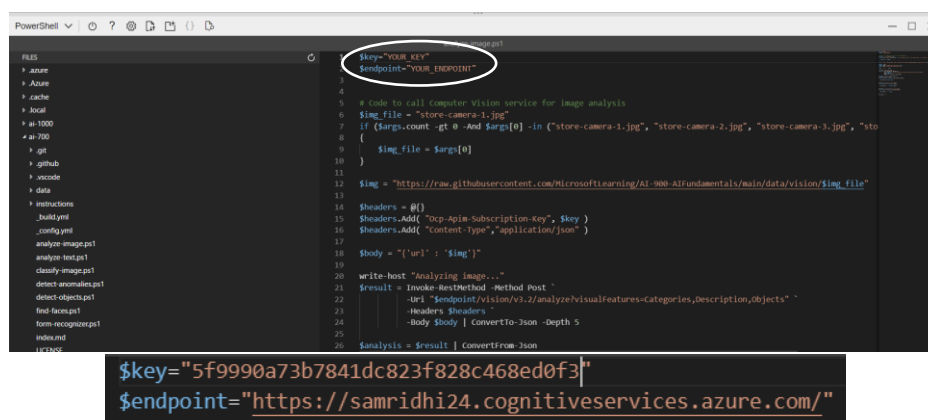
MOTD: SqlServer has been updated to Version 22!

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/samridhi> git clone https://github.com/MicrosoftLearning/AI-900-AIFundamentals ai-700
Cloning into 'ai-700'...
remote: Enumerating objects: 1548, done.
remote: Counting objects: 100% (1548/1548), done.
remote: Compressing objects: 100% (695/695), done.
remote: Total 1548 (delta 848), reused 1510 (delta 833), pack-reused 0
Receiving objects: 100% (1548/1548), 115.82 MiB | 6.39 MiB/s, done.
Resolving deltas: 100% (848/848), done.
```

03. Configure and run a client application

The **FILES** pane on the left, consists of ai-900 and open *analyze-images.ps.1*. this file contains some code that uses the Computer Vision service to analyze the image.

YOUR_KEY and *YOUR_ENDPOINT* is replaced by the above-mentioned endpoint and either key value respectively.



```
PowerShell
FILES
  Azure
  Azure
  cache
  local
  ai-1000
  ai-700
  git
  github
  vscode
  data
  instructions
  analyze.ps1
  analyze-images.ps1
  analyze-test.ps1
  classify-images.ps1
  detect-anomalies.ps1
  detect-objects.ps1
  find-faces.ps1
  form-recognizer.ps1
  index.md
  LICENSE

  $key="YOUR_KEY"
  $endpoint="YOUR_ENDPOINT"

  # Code to call Computer Vision service for image analysis
  $img_file = "store-camera-1.jpg"
  if ($args.count -gt 0 -and $args[0] -in ("store-camera-1.jpg", "store-camera-2.jpg", "store-camera-3.jpg", "sto
  {
    $img_file = $args[0]
  }
  $img = "https://raw.githubusercontent.com/MicrosoftLearning/AI-900-AIFundamentals/main/data/vision/$img_file"

  $headers = @{}
  $headers.Add("Ocp-Apim-Subscription-Key", $key)
  $headers.Add("Content-Type", "application/json")

  $body = '{"url": "$img"}'

  write-host "Analyzing image..."
  $result = Invoke-RestMethod -Method Post -
    -Uri "$endpoint/vision/v3.2/analyze?visualfeatures=categories,description,objects" -
    -Headers $headers -
    -Body $body | ConvertTo-Json -Depth 5

  $analysis = $result | ConvertFrom-Json

  $key="5f9990a73b7841dc823f828c468ed0f3"
  $endpoint="https://samridhi24.cognitiveservices.azure.com/"
```

After the above changes, the program is ready to analyze the stored images in ai-700 folder.

04. Cloud shell configuration for the below images in ai-700

a.



```
> cd ai-700
> ./analyze-image.ps1 store-camera-1.jpg
```

```
PowerShell | ? | ⚙ | 📄 | {} | 📄
MOTD: SqlServer has been updated to Version 22!
VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/samridhi> git clone https://github.com/MicrosoftLearning/AI-900-AIFundamentals ai-700
Cloning into 'ai-700'...
remote: Enumerating objects: 1548, done.
remote: Counting objects: 100% (1548/1548), done.
remote: Compressing objects: 100% (695/695), done.
remote: Total 1548 (delta 848), reused 1510 (delta 833), pack-reused 0
Receiving objects: 100% (1548/1548), 115.82 MiB | 6.39 MiB/s, done.
Resolving deltas: 100% (848/848), done.
PS /home/samridhi> cd ai-700
PS /home/samridhi/ai-700> ./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
```

b.



```
> ./analyze-image.ps1 store-camera-2.jpg
```

```
PS /home/samridhi/ai-700> ./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
```

As the above images are properly analyzed, we can conclude that the model has passed testing and we have successfully deployed an image analyzer which gives description about the images and objects in the image as well as relevant tags to the image.