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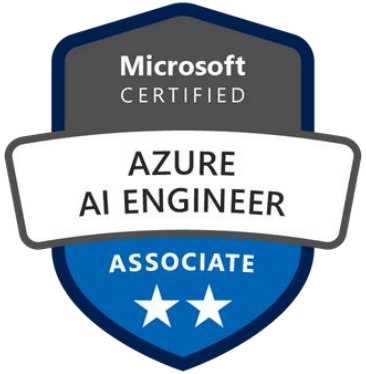
Hands-on Azure Cognitive Services

Reza Salehi

Reza Salehi

Cloud Consultant and Trainer

@zaalion



COURSE

Microsoft Azure Fundamentals (AZ-900) Certification Course

★★★★★ 1 review

By Reza Salehi

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TIME TO COMPLETE:
4h 37m

LEVEL:
Beginner

TOPICS:
Microsoft Azure

PUBLISHED BY:
O'Reilly Media, Inc.

PUBLICATION DATE:
October 2022

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Azure Cookbook

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https://www.amazon.ca/Azure-Cookbook-Recipes-Maintain-Solutions/dp/1098135792/

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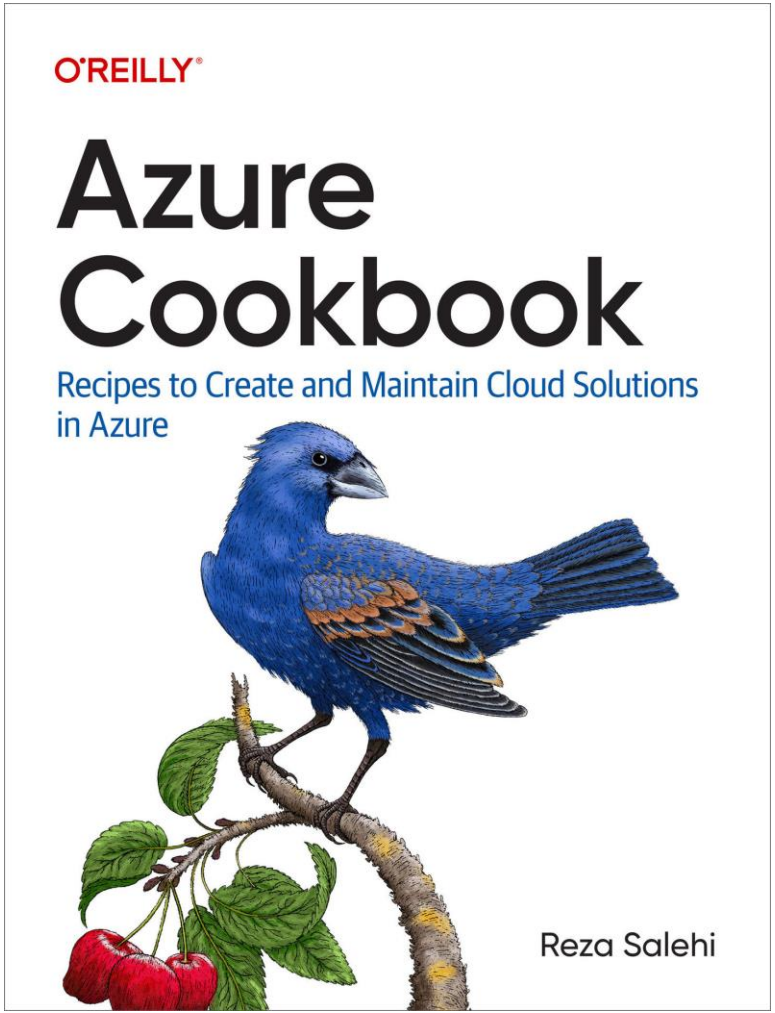

Overview

Azure Cognitive Services

- Speech
- Language
- Vision
- Decision
- Azure OpenAI Service

Improve customer experiences with Cognitive Service for Speech

Speech to text

Transcribe audible speech into readable, searchable text.

Text to speech

Convert text to lifelike speech for more natural interfaces.

Speech translation

Integrate real-time speech translation into your apps.

Speaker recognition

Identify and verify the people speaking based on audio.

Speech

Speech

Language

Vision

Decision

Azure OpenAI Service

Improve customer experiences with Cognitive Service for Speech

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Transcribe audible speech into readable, searchable text.

Text to speech

Convert text to lifelike speech for more natural interfaces.

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Integrate real-time speech translation into your apps.

Speaker recognition

Identify and verify the people speaking based on audio.

Language

Speech

Language

Vision

Decision

Azure OpenAI Service

Understand conversations and unstructured text with Cognitive Service for Language

Entity recognition

Identify commonly-used and domain-specific terms.

Sentiment analysis

Automatically detect sentiments and opinions from text.

Question Answering

Distill information into easy-to-navigate questions and answers.

Conversational language understanding

Enable your apps to interact with users through natural language.

Translator

Translate more than 100 languages and dialects.

Vision

- Speech
- Language
- **Vision**
- Decision
- Azure OpenAI Service

Identify and analyze content within images and videos

Azure Cognitive Services for Vision

Identify and analyze content within images and videos.

Custom Vision

Customize image recognition to fit your business needs.

Decision

Speech

Language

Vision

Decision

Azure OpenAI Service

Make smarter decisions faster

Anomaly Detector

Identify potential problems early on.

Content Safety

Detect potentially offensive or unwanted content.

Personalizer

Create rich, personalized experiences for every user.

Azure OpenAI Services

Speech

Language

Vision

Decision

Azure OpenAI Service

Dynamic language models to power your apps

OpenAI Service

Apply advanced coding and language models to a variety of use cases.

Azure Cognitive Services

- Speech to text
- Text to speech
- Speech translation
- Speaker recognition
- Entity recognition
- Sentiment analysis
- Question Answering
- Conversational language understanding
- Translator

- Azure Cognitive Services for Vision
- Custom Vision
- Anomaly Detector
- Content Safety
- Personalizer
- OpenAI Service

By the End of This Course

You will understand Azure Cognitive Services APIs and their use cases.

What are Azure Cognitive Services?

What are Azure Cognitive Services?

- Services available to help developers build intelligent applications.
- “*Cognitive Services brings AI within reach of every developer and data scientist.*”

What are Azure Cognitive Services?

- Services available to help developers build intelligent applications.
- Without having direct ML, AI or data science skills or knowledge.
- Easily provisioned and consumed.

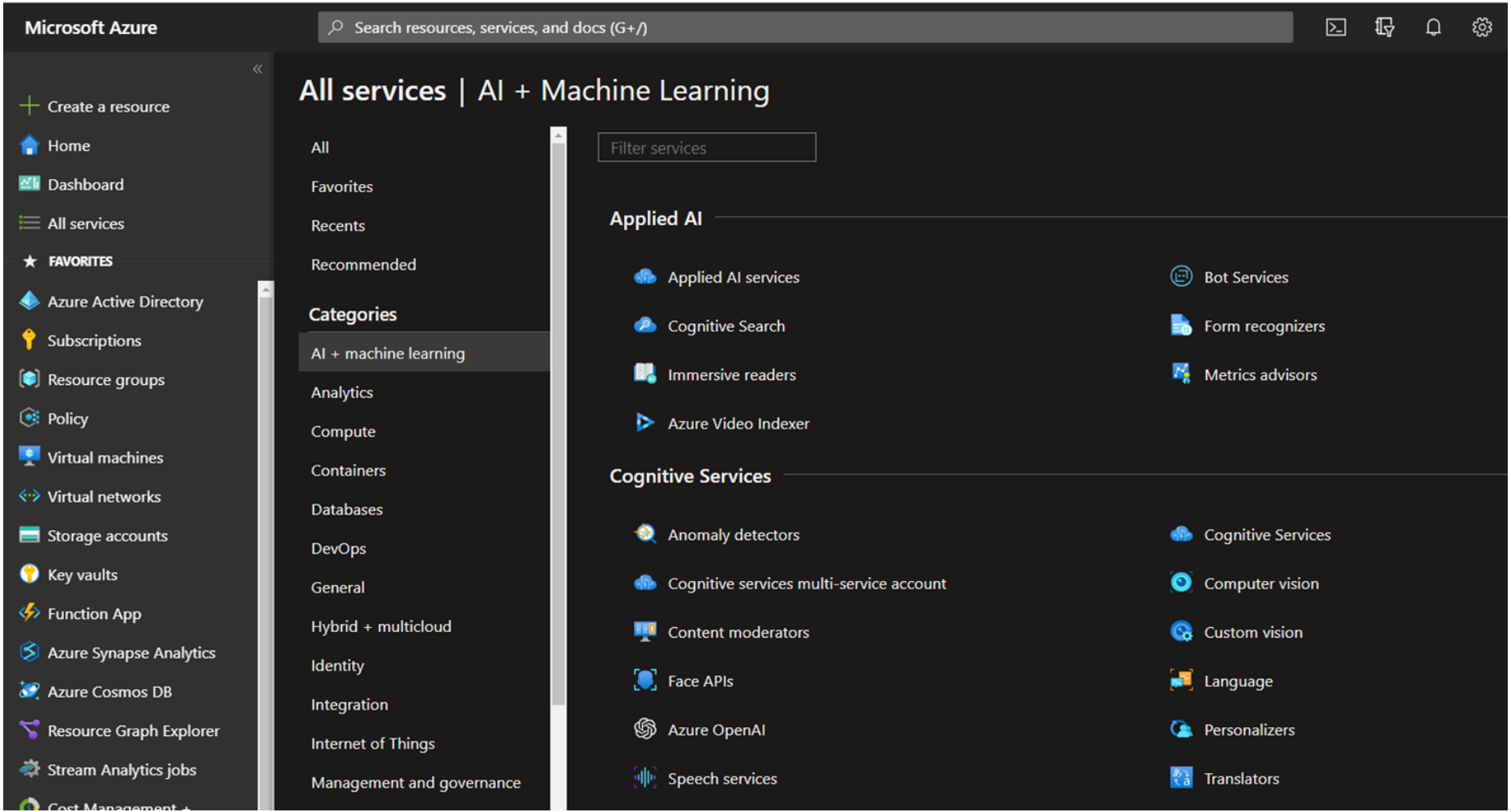
Find the Cats

Creating Your Own ML Model

1. Collect training datasets; 1000+ cat and not-cat photos
2. Cleanup the collected training data
3. Choose the right ML model for your usecase
4. Train the model and verify the result
5. Deploy the read-to-use model to your application
6. Start using the model with the data in question

Using Cognitive Services Models

1. Provision an Azure Computer Vision service
2. Start using the service with the data in question
    a. Microsoft has trained the models for you
    b. These models can be customized if needed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All services
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Resource groups
Policy
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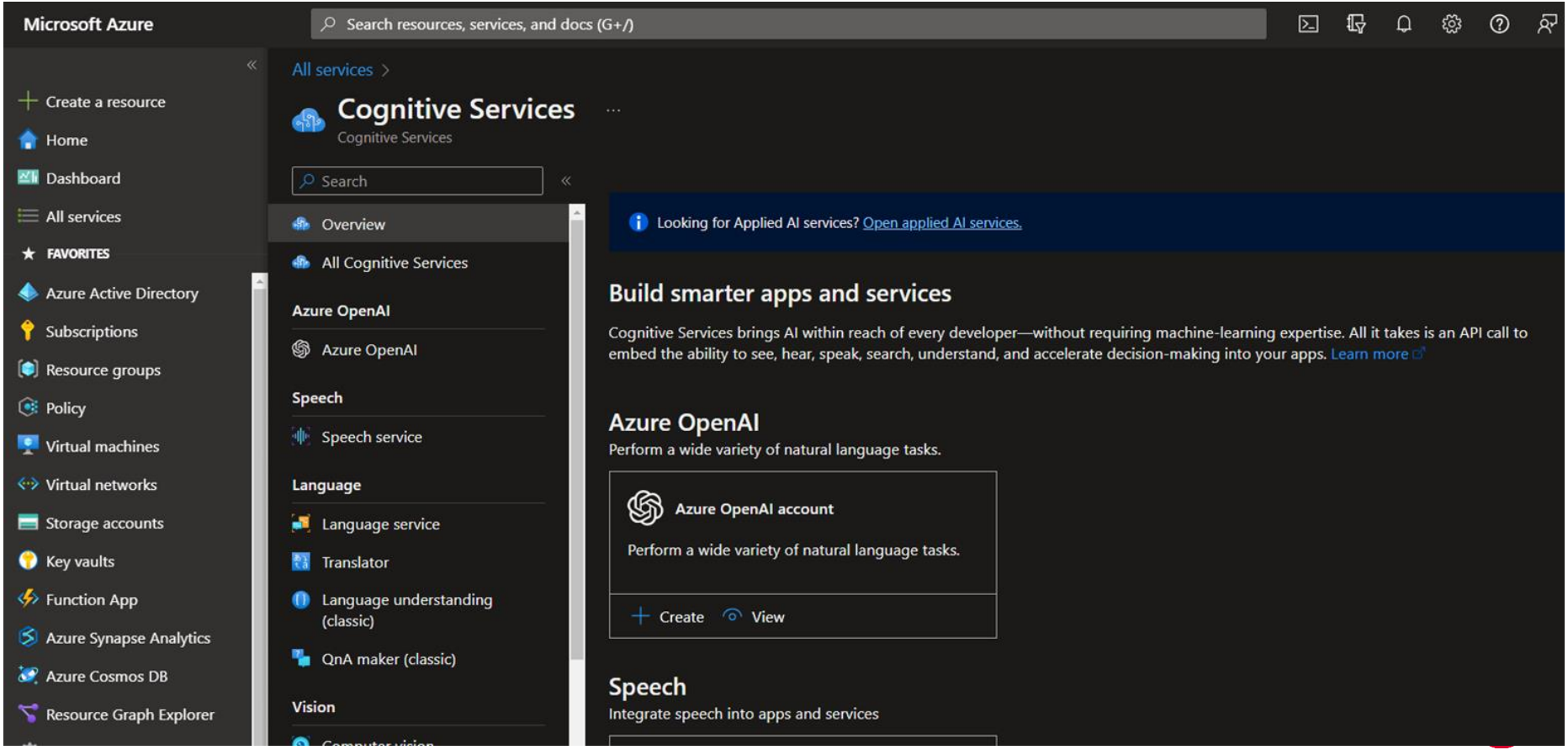
Virtual networks
Storage accounts
Key vaults
Function App
Azure Synapse Analytics
Azure Cosmos DB
Resource Graph Explorer
Stream Analytics jobs
All services | AI + Machine Learning
All
Favorites
Recents
Recommended
Categories
AI + machine learning
Analytics
Compute
Containers
Databases
DevOps
General
Hybrid + multicloud
Identity
Integration
Internet of Things
Management and governance
Filter services
Applied AI
Applied AI services
Cognitive Search
Immersive readers
Azure Video Indexer
Bot Services
Form recognizers
Metrics advisors
Cognitive Services
Anomaly detectors
Cognitive services multi-service account
Content moderators
Face APIs
Azure OpenAI
Speech services
Cognitive Services
Computer vision
Custom vision
Language
Personalizers
Translators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Virtual networks
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Key vaults
Function App
Azure Synapse Analytics
Azure Cosmos DB
Resource Graph Explorer
All services
Cognitive Services
Cognitive Services
Search
Overview
All Cognitive Services
Azure OpenAI
Azure OpenAI
Speech
Speech service
Language
Language service
Translator
Language understanding (classic)
QnA maker (classic)
Vision
Looking for Applied AI services? Open applied AI services.
Build smarter apps and services
Cognitive Services brings AI within reach of every developer—without requiring machine-learning expertise. All it takes is an API call to embed the ability to see, hear, speak, search, understand, and accelerate decision-making into your apps. Learn more
Azure OpenAI
Perform a wide variety of natural language tasks.
Azure OpenAI account
Perform a wide variety of natural language tasks.
Create
View
Speech
Integrate speech into apps and services

Azure Cognitive Services

Vision

Azure Cognitive Service for Vision

Azure Cognitive Service for Vision

“Azure Cognitive Service for Vision is a unified service that offers innovative computer vision capabilities. Give your apps the ability to **analyze images**, **read text**, and **detect faces** with prebuilt image tagging, text extraction with optical character recognition (OCR), and responsible facial recognition. Incorporate vision features into your projects with no machine learning experience required.”

Microsoft

Cognitive Services Vision APIs

1. Image analysis
2. Spatial analysis
3. Optical character recognition (OCR)
4. Facial recognition

Image Analysis

Image Analysis

Image Analysis

Even though I'm writing notes at an angle, I can still get the correct words recognized.

Image Analysis

Even though I'm writing notes at an angle, I can still get the correct words recognized.

Image Analysis

Even though I'm writing notes at an angle, I can still get the correct words recognized.

Image Analysis

1. Image classification & identification

Image Analysis

1. Image classification & identification
    a. Scene and activity recognition

FEATURE NAME:	VALUE
Objects	[{ "rectangle": { "x": 78, "y": 268, "w": 44, "h": 62 }, "object": "building", "confidence": 0.653 }, { "rectangle": { "x": 384, "y": 51, "w": 66, "h": 312 }, "object": "building", "confidence": 0.737 }, { "rectangle": { "x": 39, "y": 315, "w": 107, "h": 128 }, "object": "building", "confidence": 0.543 }, { "rectangle": { "x": 246, "y": 263, "w": 61, "h": 198 }, "object": "building", "confidence": 0.694 }, { "rectangle": { "x": 473, "y": 297, "w": 127, "h": 165 }, "object": "building", "confidence": 0.847 }]
Tags	[{ "name": "sky", "confidence": 0.9986011 }, { "name": "outdoor", "confidence": 0.9967468 }, { "name": "tower", "confidence": 0.979019642 }, { "name": "building", "confidence": 0.9587357 }, { "name": "city", "confidence": 0.9352679 }, { "name": "cloud", "confidence": 0.8818442 }, { "name": "black and white",

Image Analysis

1. Image classification & identification
    a. Scene and activity recognition
    b. Celebrity and landmark recognition

```
{
  "categories": [
    {
      "name": "people_",
      "score": 0.86328125,
      "detail": {
        "celebrities": [
          {
            "name": "Satya Nadella",
            "faceRectangle": {
              "left": 240,
              "top": 294,
              "width": 135,
              "height": 135
            },
            "confidence": 0.99984323978424072
          }
        ],
        "landmarks": null
      }
    }
  ],
  "adult": null,
  "tags": [
    {
      "name": "person",
      "confidence": 0.99956607818603516
```

Image Analysis

1. Image classification & identification
    a. Scene and activity recognition
    b. Celebrity and landmark recognition
2. Optical character recognition (OCR)

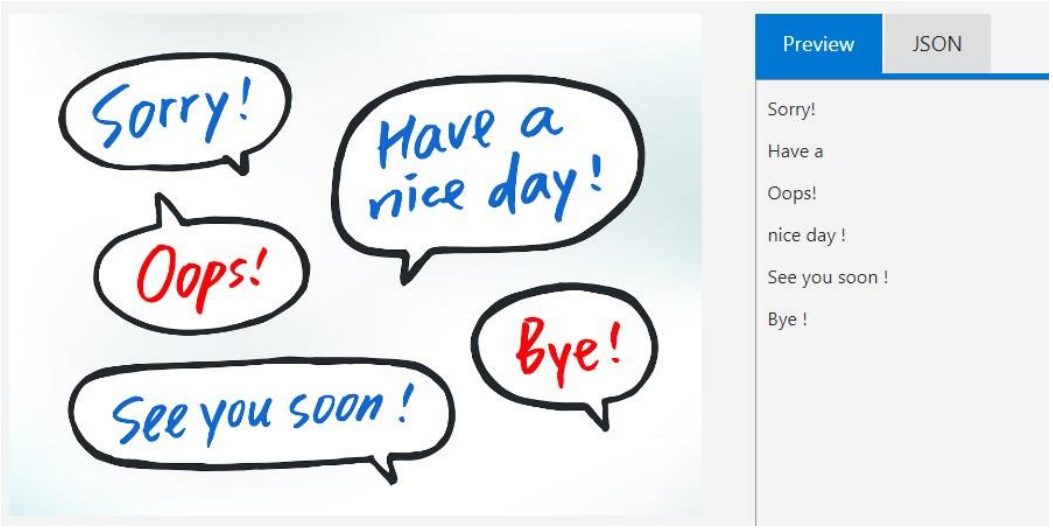


Image Analysis

1. Image classification & identification
    a. Scene and activity recognition
    b. Celebrity and landmark recognition
2. Optical character recognition (OCR)
    a. Printed
    b. Handwritten

Image Analysis

1. Image classification & identification
    a. Scene and activity recognition
    b. Celebrity and landmark recognition
2. Optical character recognition (OCR)
    a. Printed
    b. Handwritten
3. Generate smart thumbnails

Thumbnails

Thumbnails

Face

Face

Sample image 1

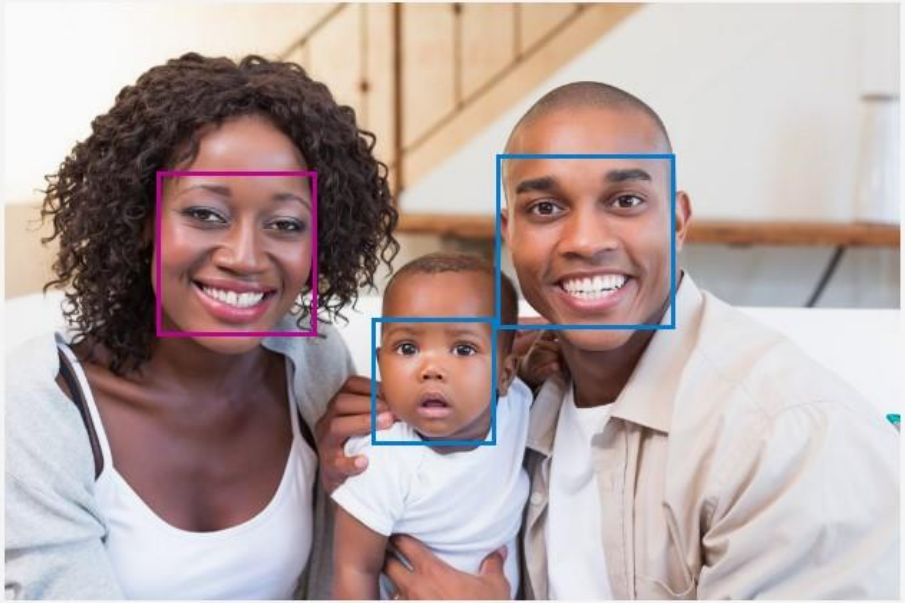
Detected attributes JSON


```
[
 {
   "faceRectangle": {
     "top": 186,
     "left": 470,
     "width": 141,
     "height": 201
   },
   "faceLandmarks": {
     "pupilLeft": {
       "x": 510.5,
       "y": 256.4
     },
     "pupilRight": {
       "x": 574.7,
       "y": 263.7
     },
     "noseTip": {
       "x": 538.1,
       "y": 301.7
     },
     "mouthLeft": {
       "x": 502.2,
       "y": 325
     },
     "mouthRight": {
       "x": 568.7,
       "y": 331.8
     },
```

Face

1. Face detection
2. Identity verification
3. Face grouping
4. Similar face search

Face Detection




```
Detection result:
JSON:
 [
  {
    "faceId": "53bd0a34-6384-4b6d-8193-14fa38feeca4",
    "faceRectangle": {
      "top": 169,
      "left": 553,
      "width": 195,
      "height": 195
    },
    "faceAttributes": {
      "hair": {
        "bald": 0.81,
        "invisible": false,
        "hairColor": []
      },
      "smile": 1.0,
      "headPose": {
        "pitch": 0.3,
        "roll": -4.6,
        "yaw": -6.7
      },
      "gender": "male",
      "age": 25.0,
      "facialHair": {
        "moustache": 0.4,
        "beard": 0.1,
```

Custom Vision

Custom Vision

Easily create a customized model to **classify** images or **detect** objects for your unique use case.

Custom Vision

Easily create a customized model to **classify** images for your unique use case.

Custom Vision

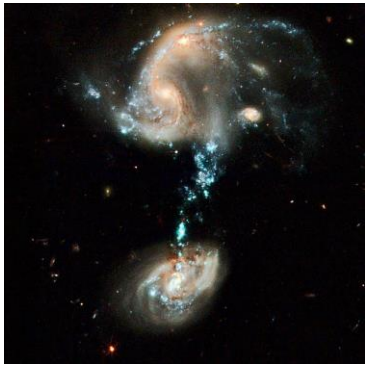
Easily create a customized model to **classify** images for your unique use case.

Sugar Maple

Japanese Maple

Custom Vision

Easily create a customized model to **classify** images for your unique use case.

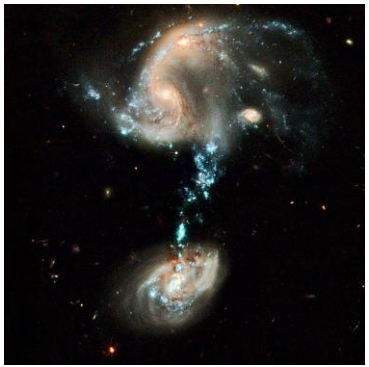


Custom Vision

Easily create a customized model to classify images for your unique use case.

Elliptical Galaxies

Spiral Galaxies



Irregular Galaxies

Custom Vision: Detection

Easily create a customized model to detect objects in images for your unique use case.

Moon

Custom Vision

Provisioning steps:

1. Upload Images
2. Train
3. Test
4. Deploy
5. Active learning

Break

Azure Cognitive Services

Decision

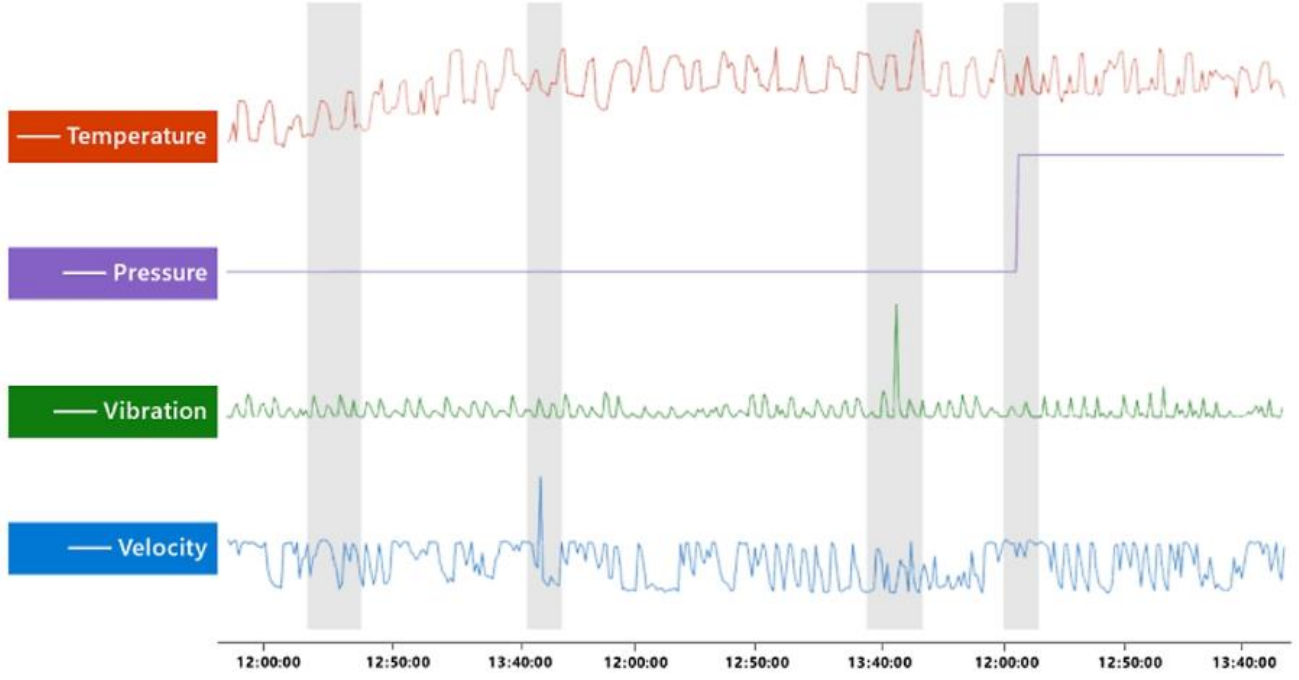
Cognitive Services Decision APIs

- Anomaly Detector
- Content Safety
- Personalizer

Anomaly Detector

“Foresee problems before they occur with an Azure AI anomaly detection service.”

Anomaly Detector



Anomaly Detector

“Monitor and detect anomalies in your time series data with little machine learning (ML) knowledge, either batch validation or real-time inference.”

Anomaly Detector

Monitor and detect anomalies in your time series data:

- Monitor business health in real-time
- Detect cyber attacks in real-time
- Detect industrial data abnormalities (power plants, IoT, etc.)

Content Safety

Content Safety

- Azure AI Content Safety
  - Moderate text content
  - Moderate image content
  - Monitor online activity

Content Safety Studio

“Azure AI Content Safety Studio is an online tool designed to handle potentially offensive, risky, or undesirable content using cutting-edge content moderation ML models. “

Azure Cognitive Services

Speech

Cognitive Services Speech APIs

Cognitive Services Speech APIs

Convert spoken language into text or produce natural sounding speech from text.

Cognitive Services Speech APIs

- Speech to text
- Text to speech
- Speech translation
- Speaker recognition

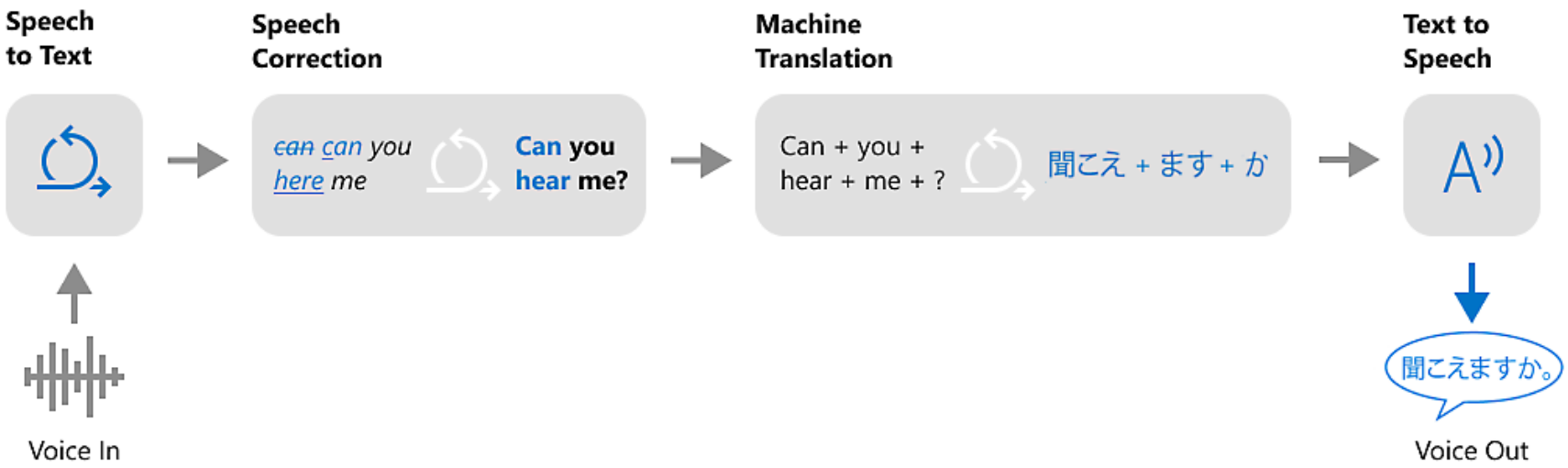
Speech Services

- Speech-to-text transcription

Speech Services

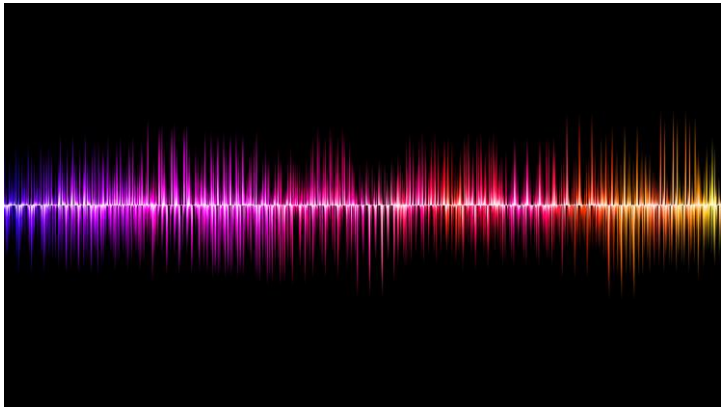
- Speech-to-text transcription
  - Voice assistant
  - Translation
  - Conversation/call center transcription
  - …
- Natural text-to-speech
  - With customizable voice fonts, SSML

Speech Translation



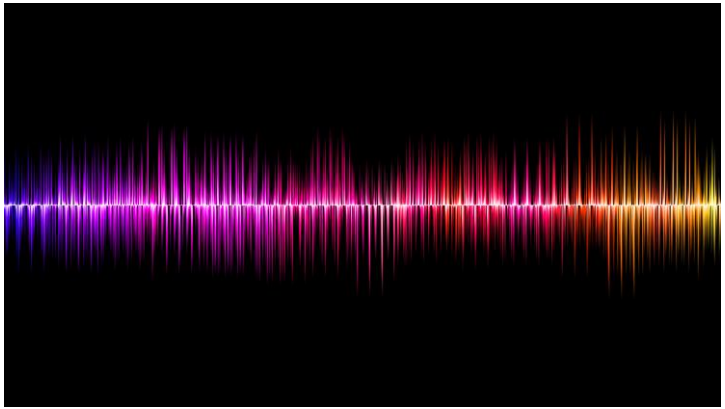
Speaker Recognition

- Speaker recognition



Speaker Recognition

- Speaker verification



Speaker Recognition

- Speaker recognition
- Speaker identification

Text | JSON

President Jimmy Carter

is the one identified speaking in the selected audio.

Audio 1 | Audio 2 | Audio 3 | Audio 4 | Audio 5 | Stop

Break

Azure Cognitive Services

Language

Cognitive Services Language

Helps your app to understand the meaning of unstructured text.

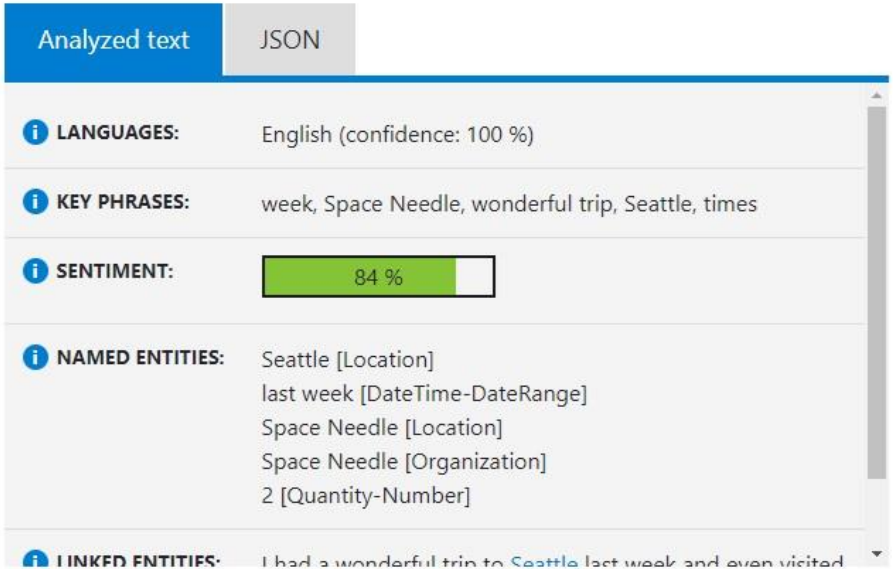
Cognitive Services Language

- Entity recognition
- Sentiment analysis
- Question Answering
- Conversational language understanding
- Translator

Entity Recognition

I had a wonderful trip to Seattle last week and even visited the Space Needle 2 times!

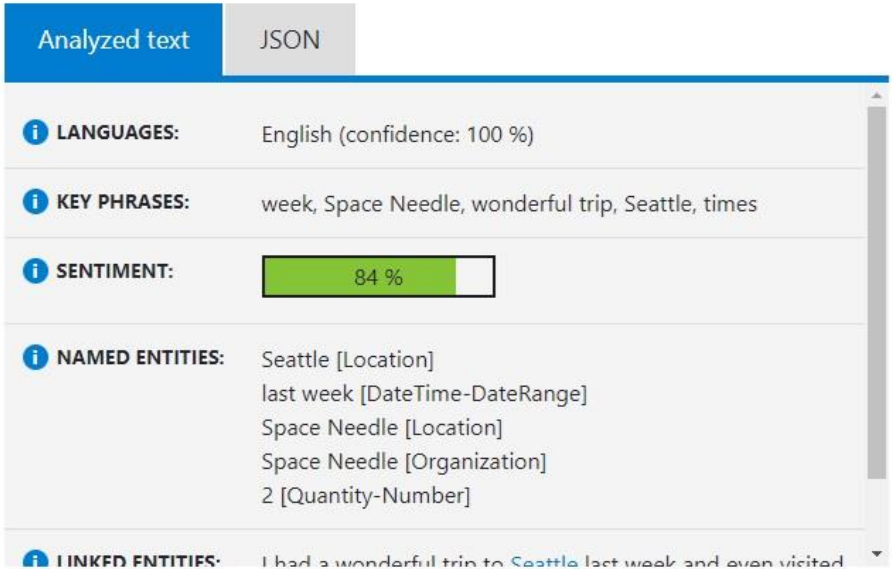
Analyze



Sentiment Analysis

I had a wonderful trip to Seattle last week and even visited the Space Needle 2 times!

Analyze



Translator

- Language detection
- Text translation
- Text transliteration
- Customizable translation (industry specific)
    - Using unstructured documentation such as manuals

Question Answering

- Creates a conversational, Q&A layer **over your data.**
- QnA extraction from unstructured text:
  - FAQ documents
  - Product manuals
    - URLs, PDF, Word, Excel, CSV
- Manually add questions and answers.
- Integration with the Azure Bot service
- Azure Language Studio

Question Answering

- Getting started

Conversational Language Understanding

Conversational Language Understanding

Enables contextual language understanding

- Turn off the living room light
- Read my calendar

Great for creating voice assistants

Azure Cognitive Services

OpenAI Services

OpenAI Services

OpenAI Services

“Apply large language models and generative AI to a variety of use cases.”

OpenAI Services

Introduction to Azure OpenAI Service

OpenAI Models

Model family	Description
GPT-4	A set of models that improve on GPT-3.5 and can understand as well as generate natural language and code.
GPT-3	A series of models that can understand and generate natural language. This includes the new ChatGPT model.
DALL-E	A series of models that can generate original images from natural language.
Codex	A series of models that can understand and generate code, including translating natural language to code.
Embeddings	A set of models that can understand and use embeddings. An embedding is a special format of data representation that can be easily utilized by machine learning models and algorithms. The embedding is an information dense representation of the semantic meaning of a piece of text. Currently, we offer three families of Embeddings models for different functionalities: similarity, text search, and code search.

Azure Applied AI Services

Azure Applied AI Services

- AI services for common business processes.

Azure Applied AI Services

CONVERSATIONS

[Azure Bot Service]

Create bots and connect them across channels.

DOCUMENTS

[Azure Form Recognizer]

Turn documents into usable data at a fraction of the time and cost.

SEARCH

[Azure Cognitive Search]

Bring AI-powered cloud search to your mobile and web apps.

MONITORING

[Azure Metrics Advisor]

Proactively monitor metrics and diagnose issues.

VIDEOS

[Azure Video Indexer]

Easily extract meaningful insights from audio and video files using media AI.

ACCESSIBILITY

[Azure Immersive Reader]

Help users read and comprehend text.

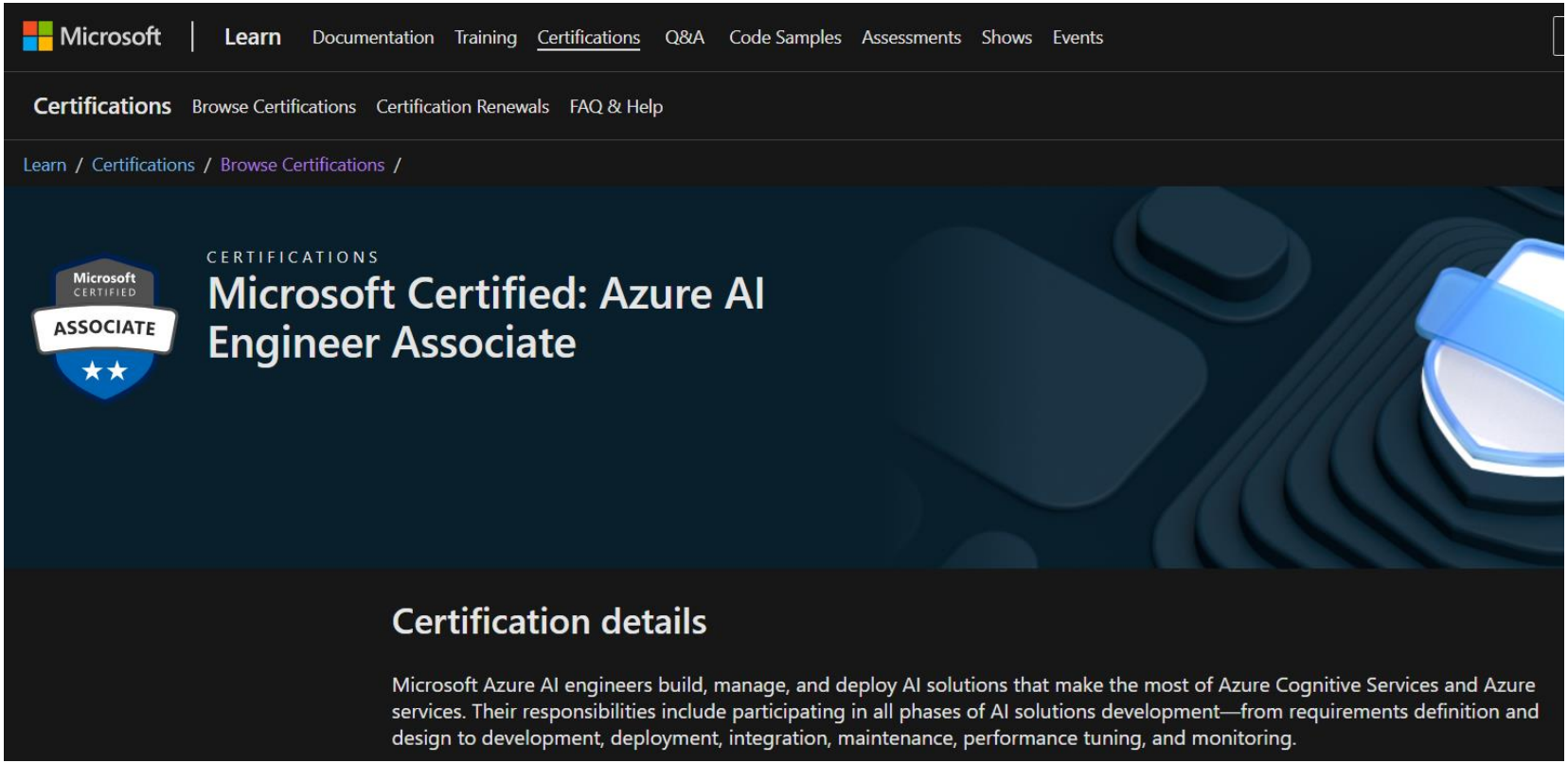
Exam AI-102

Designing and Implementing a Microsoft Azure AI Solution

Exam AI-102

Schedule exam
Exam AI-102: Designing and Implementing a Microsoft Azure AI Solution
United States
$165 USD*
Price based on the country or region in which the exam is proctored.
Languages: English, Japanese, Chinese (Simplified), Korean, German, French, Spanish, Portuguese (Brazil), Arabic (Saudi Arabia), Russian, Chinese (Traditional), Italian, Indonesian (Indonesia)
Retirement date: none
This exam measures your ability to accomplish the following technical tasks: plan and manage an Azure AI solution; implement image and video processing solutions; implement natural language processing solutions; implement knowledge mining solutions; and implement conversational AI solutions.
Schedule exam
Take a free practice assessment
Test your skills with practice questions to help you prepare for the exam. Learn more about practice assessments.
Add

Exam AI-102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Certifications Browse Certifications Certification Renewals FAQ & Help
Learn / Certifications / Browse Certifications /
CERTIFICATIONS
Microsoft Certified: Azure AI Engineer Associate
Microsoft CERTIFIED ASSOCIATE
Certification details
Microsoft Azure AI engineers build, manage, and deploy AI solutions that make the most of Azure Cognitive Services and Azure services. Their responsibilities include participating in all phases of AI solutions development—from requirements definition and design to development, deployment, integration, maintenance, performance tuning, and monitoring.

Course Resources

https://github.com/zaalion/oreilly-cognitive-services

COURSE

Microsoft Azure Fundamentals (AZ-900) Certification Course

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PUBLICATION DATE:
October 2022

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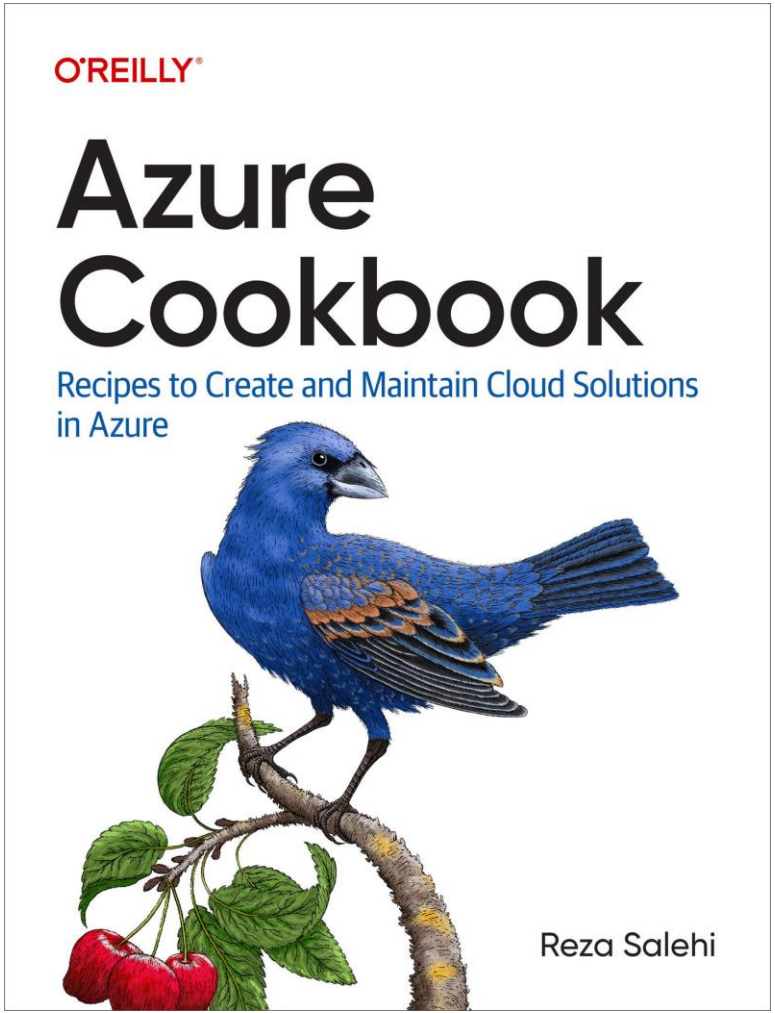

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Thank you!

Reza Salehi

@zaalion