ICT 901 Microsoft Azure AI Fundamentals

Revision Notes

Azure Applied AI Services

CONVERSATIONS

Create bots and connect them across channels

Azure Bot Service

DOCUMENTS

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

Azure Form Recognizer

Family of Azure AI services

Build, deploy and manage machine learning (ML) models with tools that make ML accessible regardless of your skill level

Azure Machine Learning

Embed the ability to see, hear, speak and search into your apps with this family of AI models that can be deployed as APIs

Azure Cognitive Services

https://azure.microsoft.com/en-ca/product-categories/applied-ai-services/

Azure Machine Learning designer
Visually build, test, and deploy machine learning models

Azure Machine Learning

Automated machine learning
Automatically build machine learning models with speed and scale

Capabilities:

- Collaborative notebooks
- Drag-and-drop machine learning
- Automated machine learning
- Data labelling
- Autoscaling compute
- Responsible machine learning

https://azure.microsoft.com/en-ca/services/machine-learning/

APIs

Azure Cognitive Services

Vision: Identify and analyse content with images and videos

- Computer Vision – Analyze content in images and videos
- Custom Vision – Customize image recognition to fit your business needs
- Face API – Detect and identify people and emotions in images

Speech: Integrate speech into apps and services

- 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

https://azure.microsoft.com/en-ca/services/cognitive-services/#api

APIs

Azure Cognitive Services

Language: Extract meaning from unstructured text

- Language Understanding – Build natural language understanding into apps, bots, and IoT devices
- QnA Maker – Create a conversational question and answer layer over your data
- Text Analytics – Detect sentiment, key phrases and named entities
- Translator – Detect and translate more than 90 supported languages

Decision: Make smarter decision faster

- Anomaly Detector – Identify potential problems early on

https://azure.microsoft.com/en-ca/services/cognitive-services/#api

Skills measured (updated April 23, 2021)

1. Describe AI workloads and considerations (15-20%)
2. Describe fundamental principles of machine learning on Azure (30-35%)
3. Describe features of computer vision workloads on Azure (15-20%)
4. Describe features of Natural Language Processing (NLP) workloads on Azure (15-20%)
5. Describe features of conversational AI workloads on Azure (15-20%)

1. Describe Artificial Intelligence workloads and considerations (15-20%)

1A.Identify features of common AI workloads

- Identify prediction/forecasting workloads
- Identify features of anomaly detection workloads
- Identify computer vision workloads
- Identify natural language processing or knowledge mining workloads
- Identify conversational AI workloads

1. Describe Artificial Intelligence workloads and considerations (15-20%)

1B. Identify guiding principles for responsible AI

- Describe considerations for fairness in an AI solution
- Describe considerations for reliability and safety in an AI solution
- Describe considerations for privacy and security in an AI solution
- Describe considerations for inclusiveness in an AI solution
- Describe considerations for transparency in an AI solution
- Describe considerations for accountability in an AI solution

Machine learning - This is often the foundation for an AI system, and is the way we "teach" a computer model to make prediction and draw conclusions from data.

Predictive/Forecasting Workload Examples

- Predict demand for a product in a retail/online store, forecasting hospital visits, and anticipating power consumption
- Ingest historical transaction data, predict future demand, and regularly optimize pricing, saving time and effort spent on pricing tasks (Price optimization)
- Shipping or delivery company wants to predict the quantities of the different products customers want delivered at different locations and at future times

Anomaly Detection Workload Examples

- Monitor credit card transactions and detect unusual usage patterns that might indicate fraud.
- An application that tracks activity in an automated production line and identifies failures.
- A racing car telemetry system that uses sensors to proactively warn engineers about potential mechanical failures before they happen.
- Airbus deployed Anomaly Detector, part of Cognitive Services, to monitor the condition of an aircraft and fix potential problems before they occur.

Computer Vision Workload Examples

- Extract printed and handwritten text from images and documents
- Analyse how people move in a space in real time for occupancy count, social distancing and face mask detection
- Label content with objects and concepts
- Generate image descriptions
- Moderate content of images/videos
- Understand people's movement in physical spaces (camera installed at site)

Natural Language Processing Workload Examples

- Make the website of your company available in a range of languages
- Detect and correct grammatical errors in the input text
- Analyze customer review
- Document categorization
- text moderation capability - to identify possible abusive, derogatory or discriminatory language such as slang, abbreviated words, offensive, and intentionally misspelled words
- speech-to-text applications to allow real-time communication among people from different backgrounds, languages

Conversational AI Workload Example

- Smart device that respond to user questions
- Personal assistants to facilitate conversations between customers and businesses
- FAQ bot, basic answer and response machines, also known as chatbots, where you must type the exact keyword required to receive the appropriate response
- Virtual Personal Assistants - Amazon Alexa, Apple’s Siri, and Google Home
- Virtual “Customer” Assistants to provide customer service conversations at scale
- Virtual Employee Assistants used to streamline enterprise operations

Question:

What is the main business benefits of deploying a webchat bot to provide automated answer to customer queries?

A. To increase sales
B. To reduce the workload of customer service
C. To reach new customers
D. To gain insights into customer behavior

Answer:

What is the main business benefits of deploying a webchat bot to provide automated answer to customer queries?

A. To increase sales
B. To reduce the workload of customer service
C. To reach new customers
D. To gain insights into customer behavior

Accountability

The people who design and deploy AI systems must be accountable for how their systems operate. Organizations should draw upon industry standards to develop accountability norms. These norms can ensure that AI systems are not the final authority on any decision that impacts people's lives and that humans maintain meaningful control over otherwise highly autonomous AI systems.

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.

https://docs.microsoft.com/en-us/learn/modules/responsible-ai-principles/4-guiding-principles

Fairness

AI systems should treat all people fairly. Example: Azure Machine Learning includes the capability to interpret models and quantify the extent to which each feature of the data influences the model's prediction. This capability helps data scientists and developers identify and mitigate bias in the model.

Transparency

When AI systems are used to help inform decisions that have tremendous impacts on people's lives, it is critical that people understand how those decisions were made. A crucial part of transparency is what we refer to as intelligibility, or the useful explanation of the behavior of AI systems and their components.

https://docs.microsoft.com/en-us/learn/modules/responsible-ai-principles/4-guiding-principles

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 details that must be kept private. AI systems must comply with privacy laws that require transparency about the collection, use, and storage of data and mandate that consumers have appropriate controls to choose how their data is used.

Reliability and safety

AI systems should be able to operate as they were originally designed, respond safely to unanticipated conditions, and resist harmful manipulation. It's also important to be able to verify that these systems are behaving as intended under actual operating conditions. For example, consider an AI-based software system for an autonomous vehicle; or a machine learning model that diagnoses patient symptoms and recommends prescriptions. Unreliability in these kinds of system can result in substantial risk to human life.

Question

Which Microsoft guiding principle for responsible AI defines everyone should benefit from intelligent technology, meaning it must incorporate and address a broad range of human needs and experiences?

For example, intelligent solutions such as real-time speech-to-text transcription, visual recognition services, and predictive text functionality are already empowering those with hearing, visual, and other impairments.

Fairness
Inclusiveness
Reliability and safety
Transparency
Privacy and security
Accountability

Answer: 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.

https://docs.microsoft.com/en-us/learn/modules/responsible-ai-principles/4-guiding-principles

Question:

You create a machine learning model to support a loan approval application for a bank. The model should make predictions of whether or not the loan should be approved without incorporating any bias based on gender, ethnicity, or other factors that might result in an unfair advantage or disadvantage to specific groups of applicants. Which principle of responsible AI does this come under?

Fairness	Reliability and safety	Privacy and security
Inclusiveness	Transparency	Accountability

Answer: Fairness

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

https://docs.microsoft.com/en-us/learn/modules/responsible-ai-principles/4-guiding-principles

2. Describe fundamental principles of machine learning on Azure (30- 35%)

2A.Identify common machine learning types

- Identify regression machine learning scenarios
- Identify classification machine learning scenarios
- Identify clustering machine learning scenarios

2. Describe fundamental principles of machine learning on Azure (30- 35%)

2B.Describe core machine learning concepts

- Identify features and labels in a dataset for machine learning
- Describe how training and validation datasets are used in machine learning
- Describe how machine learning algorithms are used for model training
- Select and interpret model evaluation metrics for classification and regression

2. Describe fundamental principles of machine learning on Azure (30- 35%)

2C.Identify core tasks in creating a machine learning solution

- Describe common features of data ingestion and preparation
- Describe feature engineering and selection
- Describe common features of model training and evaluation
- Describe common features of model deployment and management

2. Describe fundamental principles of machine learning on Azure (30- 35%)

2D.Describe capabilities of no-code machine learning with Azure Machine Learning studio

- Automated ML UI
- Azure Machine Learning designer

The **features** in your data will directly **influence the predictive models** you use and the **results** you can achieve.

Feature selection is the process of selecting a subset of relevant, useful features to use in building an analytical model. Feature selection helps narrow the field of data to the most valuable inputs. Narrowing the field of data helps reduce noise and improve training performance.

Feature engineering is the process of using domain knowledge of the data to create features that help ML algorithms learn better. In Azure Machine Learning, scaling and normalization techniques are applied to facilitate feature engineering. Collectively, these techniques and feature engineering are referred to as featurization.

Regression refers to prediction of a numeric target.

Classification is a machine learning method that uses data to determine the category, type, or class of an item or row of data.

Clustering is a method of grouping data points into similar clusters. For example, you might apply clustering to find similar people by demographics. You might use clustering with text analysis to group sentences with similar topics or sentiment.

Regression is a supervised machine learning technique used to predict a numeric label based on an item's features. For example, an automobile sales company might use the characteristics of car (such as engine size, number of seats, mileage -> features) to predict its likely selling price -> label.

Module2 Lab Demo 02 Regression Model with Azure ML Designer.mp4

horsepower	peak-rpm	city-mpg	highway-mpg	price	Scored Labels
0.166667	0.346939	0.305556	0.368421	8921	5824.272031
0.15	0.265306	0.361111	0.421053	10245	10957.413502
0.104167	0.102041	0.361111	0.394737	7053	4774.371562
0.083333	0.55102	0.666667	0.657895	5389	6641.048397
0.533333	0.244898	0.055556	0.078947	32250	35543.879633
0.0875	0.428571	0.5	0.552632	6649	5569.040694
0.091667	0.265306	0.472222	0.552632	7198	7194.063861
0.083333	0.55102	0.666667	0.657895	5572	6240.256285
0.116667	0.755102	0.5	0.578947	6855	6609.756063
0.258333	0.44898	0.222222	0.315789	12170	15092.774635
0.083333	0.55102	0.666667	0.657895	5572	6262.140488
0.083333	0.55102	0.5	0.578947	6692	5327.661064
0.433333	0.428571	0.166667	0.236842	13499	14692.805743
0.116667	0.755102	0.472222	0.473684	7295	7739.143318
0.166667	0.346939	0.333333	0.421053	8189	8813.745863
0.116667	0.755102	0.472222	0.473684	7295	5300.981392
0.166667	0.346939	0.333333	0.421053	8499	8096.152986

27:29 55:16

https://docs.microsoft.com/en-us/learn/modules/create-regression-model-azure-machine-learning-designer/introduction

Classification is a form of machine learning that is used to predict which category, or class, an item belongs to. For example, a health clinic might use the characteristics of a patient (such as age, weight, blood pressure etc -> features) to predict whether the patient is at risk of diabetes -> label.

Score Model result visualization

Rows 3,000 | Columns 12

I	DiabetesPedigree	Age	Diabetic	Scored Labels	Scored Probabilities
0268	0.009029	0.035714	0	0	0.219257
706	0.040235	0.053571	[illegible]	0	0.169063
51272	0.353668	0.767857	1	1	0.613203
01636	0.040244	0.017857	1	0	0.224424
38283	0.011734	0.071429	0	0	0.317039
2549	0.075234	0.017857	0	0	0.247934
00765	0.04491	0.035714	0	0	0.046636
63966	0.412606	0.464286	1	0	0.452544
29648	0.100953	0.892857	0	1	0.699294
9415	0.443553	0.035714	1	0	0.3916
9541	0.031046	0.017857	0	0	0.094409
35284	0.167428	0.178571	0	0	0.152772
92796	0.086374	0.017857	0	0	0.045666
55793	0.215151	0.214286	0	0	0.118628
83896	0.678838	0.017857	1	0	0.37697
82334	0.097794	0.017857	0	0	0.032289
18658	0.030457	0.017857	1	1	0.542189

Module2 Lab Demo 03 Classification model with Azure ML Designer.mp4

15:15 39:02

https://docs.microsoft.com/en-us/learn/modules/create-classification-model-azure-machine-learning-designer/introduction

Clustering is an example of unsupervised machine learning, in which you train a model to separate items into clusters based purely on their characteristics, or features. There is no previously known cluster value (or label) from which to train the model.

Module2 Lab Demo 04 Clustering model with Azure ML Designer.mp4

Assign Data to Clusters result visualization

Rows 103 Columns 8

CulmenLength	CulmenDepth	FlipperLength	BodyMass	Assignmen
0.549091	0.071429	0.711864	0.618056	1
0.509091	0.238095	0.728814	0.666667	1
0.585455	0.142857	0.644068	0.527778	1
0.581818	0.392857	0.457627	0.173611	2
0.494545	0.5	0.355932	0.25	2
0	0.285714	0.271186	0.097222	0
0.643636	0.5	0.440678	0.270833	2
0.476364	0.321429	0.728814	0.722222	1
0.636364	0.345238	0.898305	0.833333	1
0.389091	0.642857	0.389831	0.430556	2
0.658182	0.142857	0.779661	0.833333	1
0.476364	0.392857	0.864407	0.902778	1
0.269091	0.428571	0.101695	0.152778	0
0.498182	0.130952	0.79661	0.555556	1
0.556364	0.178571	0.677966	0.5625	1
0.836364	0.345238	0.983051	0.875	1

11:09 22:26

https://docs.microsoft.com/en-us/learn/modules/create-clustering-model-azure-machine-learning-designer/introduction

Fundamental Principles of Machine Learning

Watch this video:
https://www.microsoft.com/en-us/videoplayer/embed/RE4xAok

https://docs.microsoft.com/en-us/learn/modules/use-automated-machine-learning/what-is-ml

Machine learning Features and Capabilities in Microsoft Azure

Feature	Capability
Automated machine learning	This feature enables non-experts to quickly create an effective machine learning model from data.
Azure Machine Learning designer	A graphical interface enabling no-code development of machine learning solutions.
Data and compute management	Cloud-based data storage and compute resources that professional data scientists can use to run data experiment code at scale.
Pipelines	Data scientists, software engineers, and IT operations professionals can define pipelines to orchestrate model training, deployment, and management tasks.

https://docs.microsoft.com/en-us/learn/modules/get-started-ai-fundamentals/2-understand-machine-learn

Regression Model Evaluation

Mean Absolute Error (MAE): The average difference between predicted values and true values.
Root Mean Squared Error (RMSE): The square root of the mean squared difference between predicted and true values.
Relative Squared Error (RSE): A relative metric between 0 and 1 based on the square of the differences between predicted and true values. The closer to 0 this metric is, the better the model is performing.
Relative Absolute Error (RAE): A relative metric between 0 and 1 based on the absolute differences between predicted and true values.
Coefficient of Determination (R2): This metric is more commonly referred to as R-Squared, and summarizes how much of the variance between predicted and true values is explained by the model. The closer to 1 this value is, the better the model is performing.

Evaluate Model result visualization

Rows	Columns
1	5

Mean_Absolute_Error	Root_Mean_Squared_Error	Relative_Squared_Error
1792.37965	2559.678524	0.097771

Relative_Absolute_Error	Coefficient_of_Determin
0.316947	0.902229

Module2 Lab Demo 02 Regression Model with Azure ML Designer.mp4

https://docs.microsoft.com/en-us/learn/modules/create-regression-model-azure-machine-learning-designer/evaluate-model

Automated Machine Learning (Regression)

What is a Predicted vs. True chart?
Predicted vs. True shows the relationship between a predicted value and its correlating true value for a regression problem.

This graph can be used to measure performance of a model as the closer to the y=x line the predicted values are, the better the accuracy of a predictive model.

https://docs.microsoft.com/en-us/learn/modules/use-automated-machine-learning/use-auto-ml

Clustering Model Evaluation

Accuracy: The ratio of correct predictions (true positives + true negatives) to the total number of predictions. In other words, what proportion of diabetes predictions did the model get right?

Precision: The fraction of positive cases correctly identified (the number of true positives divided by the number of true positives plus false positives). In other words, out of all the patients that the model predicted as having diabetes, how many are actually diabetic?

Recall: The fraction of the cases classified as positive that are actually positive (the number of true positives divided by the number of true positives plus false negatives). In other words, out of all the patients who actually have diabetes, how many did the model identify?

F1 Score: An overall metric that essentially combines precision and recall.

ROC curve: The larger the area under the curve (which can be any value from 0 to 1), the better the model is performing

Module2 Lab Demo 03 Classification model with Azure ML Designer.mp4

https://docs.microsoft.com/en-us/learn/modules/create-classification-model-azure-machine-learning-designer/evaluate-model

Data scientists use metrics like precision and recall to assess classification model performance.

If you move the threshold all the way to the left (0), the Recall metric becomes 1, and if you move it all the way to the right (1), the Recall metric becomes 0.

Clustering Model Evaluation

Average Distance to Other Center: This indicates how close, on average, each point in the cluster is to the centroids of all other clusters.
Average Distance to Cluster Center: This indicates how close, on average, each point in the cluster is to the centroid of the cluster.
Number of Points: The number of points assigned to the cluster.
Maximal Distance to Cluster Center: The maximum of the distances between each point and the centroid of that point's cluster. If this number is high, the cluster may be widely dispersed. This statistic in combination with the **Average Distance to Cluster Center** helps you determine the cluster's *spread*.

Module2 Lab Demo 04 Clustering model with Azure ML Designer.mp4

https://docs.microsoft.com/en-us/learn/modules/create-clustering-model-azure-machine-learning-designer/evaluate-model

Evaluate Model result visualization

Rows 4 Columns 5

Result Description	Average Distance to Other Center	Average Distance to Cluster Center	Number of Points	Maximal Distance to Cluster Center
Evaluation For Cluster No.0	0.474466	0.206466	29	0.439019
Evaluation For Cluster No.1	0.71393	0.239279	47	0.712971
Evaluation For Cluster No.2	0.532098	0.280928	27	0.555512
Combined Evaluation	0.598843	0.240958	103	0.712971

11:42 22:26

Deploy a predictive service

1. **Azure Container Instance (ACI):** This type of compute is created dynamically, and is useful for development and testing.
2. **Azure Kubernetes Service (AKS):** Provides better scalability and security at production.

Connect to your deployed service from a client application using:

- The REST endpoint for your service
- The Primary Key for your service

Module2 Lab Demo 03 Classification model with Azure ML Designer.mp4

https://docs.microsoft.com/en-us/learn/modules/create-classification-model-azure-machine-learning-designer/deploy-service

Question:

Where in the pipeline do you split data?
Why and how do you do that?

Answer:

The percentage split is the available technique to split the data

Module2 Lab Demo 02 Regression Model with Azure ML Designer.mp4

Question:

The following is the confusion matrix for your classification model.
Do you understand what these numbers represent?

Answer:

True Positives

False Positives

False Negatives

True Negatives

Automated Machine Learning is the process of automating the time consuming, iterative tasks of machine learning model development. It allows data scientists, analysts, and developers to build ML models with high scale, efficiency, and productivity all while sustaining model quality.

During training, Azure Machine Learning creates a number of pipelines in parallel that try different algorithms and parameters for you. The service iterates through ML algorithms paired with feature selections, where each iteration produces a model with a training score. The higher the score, the better the model is considered to "fit" your data. It will stop once it hits the exit criteria defined in the experiment.

Azure Machine Learning Designer

To use the Azure Machine Learning designer, you create a pipeline that you will use to train a machine learning model. This pipeline starts with the dataset from which you want to train the model.

Azure Machine Learning Designer

In the panel on the left, expand the Data Transformation section, which contains a wide range of modules you can use to transform data before model training.

To apply your data transformations, you need to run the pipeline as an experiment.

Different Modules

Create and run a training pipeline

The price label the model will predict is a numeric value, so we need to train the model using a regression algorithm (Linear Regression).
To test the trained model, we need to use it to score the validation dataset.
When the experiment run has completed, select the Evaluate Model module and use the Visualize icon to view the results.

Question:

What is Microsoft transparency principle for responsible AI?
How does it apply to the Azure Automated Machine Learning?

Answer: Transparency AI Principle

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.

https://docs.microsoft.com/en-us/learn/modules/get-started-ai-fundamentals/7-understand-responsible-ai

Home > Experiments > mslearn-bike-rental > Run 3 > Run 7

Run 7 Completed

Refresh | Deploy | Download | Explain model | Cancel

Success: Explainability run successfully created. You can view the run status in the "Child r

Details | Model | Explanations (preview) | Metrics | Data transforr

Model summary

Algorithm name
MaxAbsScaler, LightGBM

Hyperparameters
View hyperparameters

Normalized root mean squared error
0.08049 View all other metrics

values of the selected feature affect prediction.

Top 1-4 features

Dependence plots require the evaluation dataset and local feature importance array.

Module2 Lab Demo 01a Train a ML Model.mp4

37:28 41:39

3. Describe features of computer vision workloads on Azure (15-20%)

3A.Identify common types of computer vision solution:

- Identify features of image classification solutions
- Identify features of object detection solutions
- Identify features of optical character recognition solutions
- Identify features of facial detection, facial recognition, and facial analysis solutions

3. Describe features of computer vision workloads on Azure (15-20%)

3B. Identify Azure tools and services for computer vision tasks

- Identify capabilities of the Computer Vision service
- Identify capabilities of the Custom Vision service
- Identify capabilities of the Face service
- Identify capabilities of the Form Recognizer service

Computer Vision Services

Image classification

Object detection

Semantic segmentation

Image analysis

Face detection, analysis, and recognition

Optical character recognition (OCR)

Computer vision - The capability of software to interpret the world visually through cameras, video, and images.

Service	Capabilities
Computer Vision	You can use this service to analyze images and video, and extract descriptions, tags, objects, and text.
Custom Vision	Use this service to train custom image classification and object detection models using your own images.
Face	The Face service enables you to build face detection and facial recognition solutions.
Form Recognizer	Use this service to extract information from scanned forms and invoices.

https://docs.microsoft.com/en-us/learn/modules/get-started-ai-fundamentals/4-understand-computer-vision

Custom Vision Service

Use this service to train custom image classification and object detection models using your own images.

Image classification

Image classification is a machine learning technique in which the object being classified is an image, such as a photograph.

As with any form of classification, creating an image classification solution involves training a machine learning model using a set of existing data for which the class is already known. In this case, the existing data consists of a set of categorized images. Digital images are made up of an array of pixel values, and these are used as features to train the model based on the known image classes.

https://docs.microsoft.com/en-us/learn/modules/classify-images-custom-vision/1-introduction

Classification

Object Detection

For exam, you do not need to know how to implement custom AI service. You only need to know how to identify the service!

Why Custom Vision Service?

It is easier and quicker than writing your own model training code, and enables people with little or no machine learning expertise to create an effective image classification solution

You can use the following TWO Azure resources for Custom Vision:

- **Custom Vision:** A dedicated resource for the custom vision service, which can be training, a prediction, or both resources.
- **Cognitive Services:** A general cognitive services resource that includes Custom Vision along with many other cognitive services. You can use this type of resource for training, prediction, or both.

Azure resources for Custom Vision

- The simplest approach is to use a general Cognitive Services resource for both training and prediction. This means you only need to concern yourself with one endpoint (the HTTP address at which your service is hosted) and key (a secret value used by client applications to authenticate themselves).
- If you choose to create a Custom Vision resource, you will be prompted to choose training, prediction, or both - and it's important to note that if you choose "both", then two resources are created - one for training and one for prediction.
- It's also possible to take a mix-and-match approach in which you use a dedicated Custom Vision resource for training, but deploy your model to a Cognitive Services resource for prediction. For this to work, the training and prediction resources must be created in the same region.

https://docs.microsoft.com/en-us/learn/modules/classify-images-custom-vision/2-azure-image-classification

Custom Vision All In One

Customize and embed state-of-the-art computer vision for specific domains. Build frictionless customer experiences, optimize manufacturing processes, accelerate digital marketing campaigns -- and more. No machine learning expertise is required. Learn more

Create options: Both | Training | Prediction

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * : Azure for Students

Resource group * : AI900Demo
Create new

Name * : UCCE-ai900-customvision

Training Resource

Select pricing and location for Training Resource

Training location * : (US) West US 2

Training pricing tier (Learn More) * : Standard S0 (10 Transactions per second)

Prediction Resource

Select pricing and location for Prediction Resource

Prediction location * : (US) West US 2

Prediction pricing tier (Learn More) * : Free F0 (2 Transactions per second, 10K Transactions per month)

Module3 Lab Demo 02 Classify Images with the Custom Vision Service.mp4

Exercise - Create an image cla | ucalgarycustomvision - Micros

portal.azure.com/#@uofc.onmicrosoft.com/resource/subscriptions/dc7c27f5-255f-47d3-8259-e80368e1afed/resourcegroups/UCCEA

Microsoft Azure | Search resources, services, and docs (G+/)

Home > Microsoft.CognitiveServicesCustomVision > ucalgarycustomvision

ucalgarycustomvision | Quick start
Cognitive Services

13:31 — 29:40

Search (Cmd+/)

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems

Resource Management

- Quick start
- Keys and Endpoint
- Encryption
- Pricing tier
- Networking
- Identity
- Billing By Subscription
- Properties
- Locks

Monitoring

- Alerts
- Metrics
- Diagnostic settings

Explore the Quickstart guidance to get up and running with Custom Vision.

1 Get the API Key to authenticate your applications and start sending calls to the service.

All Custom Vision calls require a key. The key can be found in the Keys and Endpoint section in the left pane. Specify the key eit in the Custom Vision client (SDK).

API Key

2 Try the service in the Custom Vision portal- requires API Key

Use the Custom Vision portal to quickly try the API without writing code. You can use the Custom Vision SDKs to implement all when you are ready to build your application.

Custom Vision portal

3 Make a web API call - requires API Key and location.

Use the sample code in these quickstarts to begin integrating the Custom Vision service into your applications to recognize the images. The API key and the location can be found in the Keys and Endpoint section in the left tab.

C# Quickstart
Python Quickstart
NodeJS Quickstart
Java Quickstart
Go Quickstart

Custom Vision Model Training

- You can perform these tasks in the Custom Vision portal, or if you have the necessary coding experience you can use one of the Custom Vision service programming language-specific software development kits (SDKs).
- One of the key considerations when using images for classification, is to ensure that you have sufficient images of the objects in question and those images should be of the object from many different angles.

https://docs.microsoft.com/en-us/learn/modules/classify-images-custom-vision/2-azure-image-classification

Model evaluation – Evaluation Metrics

- **Precision:** What percentage of the class predictions made by the model were correct? For example, if the model predicted that 10 images are oranges, of which eight were actually oranges, then the precision is 0.8 (80%).
- **Recall:** What percentage of class predictions did the model correctly identify? For example, if there are 10 images of apples, and the model found 7 of them, then the recall is 0.7 (70%).
- **Average Precision (AP):** An overall metric that takes into account both precision and recall).

Custom Vision: Using the model for prediction

To use your model, client application developers need the following information:

- **Project ID:** The unique ID of the Custom Vision project you created to train the model.
- **Model name:** The name you assigned to the model during publishing.
- **Prediction endpoint:** The HTTP address of the endpoints for the prediction resource to which you published the model (not the training resource).
- **Prediction key:** The authentication key for the prediction resource to which you published the model (not the training resource).

https://docs.microsoft.com/en-us/learn/modules/classify-images-custom-vision/2-azure-image-classification

Custom Vision: Demo

Module3 Lab Demo 02 Classify Images with the Custom Vision Service.mp4

Module3 Lab Demo 03 Detect Objects in Images with the Custom Vision Service.mp4

https://docs.microsoft.com/en-us/learn/modules/classify-images-custom-vision/

https://docs.microsoft.com/en-us/learn/modules/detect-objects-images-custom-vision/

Face Services I

Face detection: Detects human faces in an image and returns the rectangle coordinates of their locations. Optionally, face detection can extract a series of face-related attributes, such as head pose, gender, age, emotion, facial hair, and glasses.

Face verification: Check the likelihood that two faces belong to the same person and receive a confidence score.

https://docs.microsoft.com/en-us/azure/cognitive-services/face/concepts/face-detection

Face Services 2

Face identification / Identify People

The Identify API also starts with Detection and answers the question, "Can this detected face be matched to any enrolled face in a database?"

Find similar faces: Does face matching between target face and a set of candidate faces, finding a smaller set of faces that look similar to the target face.

And these images are the candidate faces:

https://docs.microsoft.com/en-us/azure/cognitive-services/face/concepts/face-recognition

Face Services 3

Face grouping

Provide service a set of unknown faces, it will automatically divide them into several groups based on similarity.

https://gallery.azure.ai/MachineLearningAPI/Face-APIs-3

Face Services - Demo

Module3 Lab Demo 04 Detect and Analyze Faces with the Face Service.mp4

Face Detection - detect human faces

Analyze facial attributes - analyze facial features and expressions to suggest age and emotional state

https://docs.microsoft.com/en-us/learn/modules/detect-analyze-faces

Face Services - Demo

Module3 Lab Demo 04 Detect and Analyze Faces with the Face Service.mp4

Find similar faces - The face IDs that are created for each detected face are used to individually identify face detections. You can use these IDs to compare a detected face to previously detected faces and find faces with similar features.

https://docs.microsoft.com/en-us/learn/modules/detect-analyze-faces

Face Services - Demo

Module3 Lab Demo 04 Detect and Analyze Faces with the Face Service.mp4

1. Create a person group
2. Register multiple photographs of each person
3. Train Face to recognize each person
4. Identify recognized face in image

Recognize faces - inplementing a *facial recognition* solution in which you train Face to recognize a specific person's face. This can be useful in a variety of scenarios, such as automatically tagging photographs of friends in a social media application, or using facial recognition as part of a biometric identity verification system.

https://docs.microsoft.com/en-us/learn/modules/detect-analyze-faces

Optical Character Recognition (OCR)

A common computer vision challenge is to detect and interpret text in an image. This kind of processing is often referred to as optical character recognition (OCR).

The Computer Vision cognitive service provides support for OCR tasks:
OCR API: can be use to read text in multiple languages, this API can be used synchronously, and works well when you need to detect and read a small amount of text in an image.
Read API: optimized for larger documents, this API is used asynchronously, and can be used for both printed and handwritten text.

Use this service in Azure by creating either a Computer Vision resource or a Cognitive Services resource (use Key and Endpoint).

OCR API - Demo

Enables you to synchronously analyze an image and read any text it contains. In this case, you have an advertising image for Northwind Traders retail company that includes some text.

```
computervision_client.recognize_printed_text_in_stream(image_stream)
```

Module3 Lab Demo 05 Read Text with the Computer Vision Service.mp4

https://docs.microsoft.com/en-us/learn/modules/read-text-computer-vision/

READ API - Demo

Allow text recognition mode that optimized the operation for printed and handwritten text.

1. Wait for the analysis operation to complete.
2. Retrieve the results of the analysis.

Module3 Lab Demo 05 Read Text with the Computer Vision Service.mp4

https://docs.microsoft.com/en-us/learn/modules/read-text-computer-vision/

Form Recognizer - Demo

Applies advanced machine learning to accurately extract text, key/value pairs, tables and structures from documents. Specifically designed for extraction of information from forms, such as purchase orders or invoices, with a semantic understanding of what the fields in the form represent.

https://docs.microsoft.com/en-us/learn/modules/analyze-receipts-form-recognizer/

Question:

What type of computer vision service is used below?

Image classification
Object Detection
Optical Character Recognizer (OCR)
Semantic Segmentation
Image Analysis
Face Detection

Answer

What type of computer vision service is used below?

Image classification
Object Detection
Optical Character Recognizer (OCR)
Semantic Segmentation
Image Analysis
Face Detection

Question:

You want to train a model that classifies images of dogs and cats based on a collection of your own digital photographs.

Which Azure service should you use?

Custom Vision Service

Computer Vision Service

Answer:

You want to train a model that classifies images of dogs and cats based on a collection of your own digital photographs.

Which Azure service should you use?

Custom Vision Service

Computer Vision Service

Question:

You want to detect person with glasses. Which Azure service should you use?

Face Verification Service

Face Detection Service

Custom Vision Service

Computer Vision Service

Answer:

You want to detect person with glasses. Which Azure service should you use?

Face Verification Service

Face Detection Service

Custom Vision Service

Computer Vision Service

Question:

Which Azure AI service should you use to extract text automatically from scanned invoices?

OCR

Text Analytics

Form Recognizer

Answer:

Which Azure AI service should you use to extract text automatically from scanned invoices?

OCR

Text Analytics

Form Recognizer

4. Describe features of Natural Language Processing (NLP) workloads on Azure (15-20%)

4A. Identify features of common NLP Workload Scenarios

- Identify features and uses for key phrase extraction
- Identify features and uses for entity recognition
- Identify features and uses for sentiment analysis
- Identify features and uses for language modeling
- Identify features and uses for speech recognition and synthesis
- Identify features and uses for translation

4. Describe features of Natural Language Processing (NLP) workloads on Azure (15-20%)

4B. Identify Azure tools and services for NLP workloads

- Identify capabilities of the Text Analytics service
- Identify capabilities of the Language Understanding service (LUIS)
- Identify capabilities of the Speech service
- Identify capabilities of the Translator Text service

Natural Language Processing (NLP) is a branch of artificial intelligence (AI) that deals with written and spoken language. You can use NLP to build solutions that extracting semantic meaning from text or speech, or that formulate meaningful responses in natural language.

The Text Analytics service is a cloud-based service that provides advanced natural language processing over raw text for **sentiment analysis**, **key phrase extraction**, **named entity recognition**, and **language detection**.

Natural language processing -The capability for a computer to interpret written or spoken language and respond in kind.

Service	Capabilities
Text Analytics	Use this service to analyze text documents and extract key phrases, detect entities (such as places, dates, and people), and evaluate sentiment (how positive or negative a document is).
Translator Text	Use this service to translate text between more than 60 languages.
Speech	Use this service to recognize and synthesize speech, and to translate spoken languages.
Language Understanding Intelligent Service (LUIS)	Use this service to train a language model that can understand spoken or text-based commands.

https://docs.microsoft.com/en-us/learn/modules/get-started-ai-fundamentals/5-understand-natural-language-process

Language Detection - Demo

```
text_analytics_client.detect_language(documents=reviews)
```

Module4 Lab Demo 01 Analyze Text with the Text Analytics Service.mp4

```
review3.txt
Good location and helpful staff, but on a busy road.
The Lombard Hotel, San Francisco, USA
8/16/2018
We stayed here in August after reading reviews. We were very pleased with location, just behind Chestnu
Marina district was lovely to wander through, very interesting houses. Make sure to walk to the San Fra
the city. On a bus route and easy to get into centre. Rooms were clean with plenty of room and staff we
have a room furthest away from traffic noise.

review2.txt
Tired hotel with poor service
The Royal Hotel, London, United Kingdom
5/6/2018
This is a old hotel (has been around since 1950's) and the room furnishings are average - becoming a bi
r office rooms to check in for my flight home. The website says it's close to the British Museum, but i

review1.txt
Good Hotel and staff
The Royal Hotel, London, UK
3/2/2018
Clean rooms, good service, great location near Buckingham Palace and Westminster Abbey, and so on. We t
which is part of the same group and is Indian ( West coast so plenty of fish) with a Michelin Star. We
en, lounge, bedroom and enormous bathroom. Thoroughly recommended.
```

02:56 26:08

```
review3.txt
 - Language: English
 - Code: en
 - Score: 1.0

review2.txt
 - Language: English
 - Code: en
 - Score: 1.0

review1.txt
 - Language: English
 - Code: en
 - Score: 1.0

review4.txt
 - Language: English
 - Code: en
 - Score: 1.0
```

The service returns language identifiers with a score that indicates the strength of the analysis.

https://docs.microsoft.com/en-us/learn/modules/analyze-text-with-text-analytics-service/

Key Phrase Extraction - Demo

Allow you to quickly identify the main points in a collection of documents.

```
text_analytics_client.key_phrases(documents=reviews)
```

Module4 Lab Demo 01 Analyze Text with the Text Analytics Service.mp4

```
review3.txt
Good location and helpful staff, but on a busy road.
The Lombard Hotel, San Francisco, USA
8/16/2018
We stayed here in August after reading reviews. We were ver
y pleased with location, just behind Chestnut Street, a cos
mopolitan and trendy area with plenty of restaurants to cho
ose from. The
Marina district was lovely to wander through, very interest
ing houses. Make sure to walk to the San Francisco Museum o
f Fine Arts and the Marina to get a good view of Golden Gat
e bridge and the city. On a bus route and easy to get into
centre. Rooms were clean with plenty of room and staff were
friendly and helpful. The only down side was the noise from
Lombard Street so ask to have a room furthest away from tra
ffic noise.
```

```
review3.txt

Key Phrases:
        helpful staff
        Lombard Street
        Good location
        Chestnut Street
        Lombard Hotel
        Marina district
        traffic noise
        San Francisco Museum of Fine Arts
        good view of Golden Gate bridge
        trendy area
        USA
        city
        bus route
        busy road
        centre
        restaurants
        Rooms
        interesting houses
        reviews
```

11:39 26:08

https://docs.microsoft.com/en-us/learn/modules/analyze-text-with-text-analytics-service/

Sentiment Analysis - Demo

It is the process of determining whether a piece of writing is positive, negative or neutral.

```
sentiment_analysis.documents[review_num].score
```

Module4 Lab Demo 01 Analyze Text with the Text Analytics Service.mp4

```
review3.txt : positive (0.9999995231628418)
review2.txt : negative (5.662441253662109e-07)
review1.txt : positive (0.9999973773956299)
review4.txt : negative (2.0623207092285156e-05)
```

```
review3.txt
Good location and helpful staff, but on a busy road.
The Lombard Hotel, San Francisco, USA
8/16/2018
We stayed here in August after reading reviews. We were ver
y pleased with location, just behind Chestnut Street, a cos
mopolitan and trendy area with plenty of restaurants to cho
ose from. The
Marina district was lovely to wander through, very interest
ing houses. Make sure to walk to the San Francisco Museum o
f Fine Arts and the Marina to get a good view of Golden Gat
e bridge and the city. On a bus route and easy to get into
centre. Rooms were clean with plenty of room and staff were
friendly and helpful. The only down side was the noise from
Lombard Street so ask to have a room furthest away from tra
ffic noise.
```

Confidence scores range from 1 to 0. Scores closer to 1 indicate a higher confidence in the label's classification, while lower scores indicate lower confidence.

https://docs.microsoft.com/en-us/learn/modules/analyze-text-with-text-analytics-service/

Named Entity Recognition - Demo

Entities are things that might be mentioned in text that reference some commonly understood type of item. For example, a location, a person, or a date.

Module4 Lab Demo 01 Analyze Text with the Text Analytics Service.mp4

```
text_analytics_client.entities(documents=reviews)
```

```
review3.txt
 - Location: Lombardy (https://en.wikipedia.org/wiki/Lombardy)
 - Organization: Lombard Hotel
 - Location: San Francisco (https://en.wikipedia.org/wiki/San_Francisco)
 - Organization: USA
 - DateTime: 8/16/2018
 - DateTime: August
 - Location: Chestnut Street (Philadelphia) (https://en.wikipedia.org/wiki/Chestnut_Street_(Philadelphia))
 - Location: Marina District, San Francisco (https://en.wikipedia.org/wiki/Marina_District,_San_Francisco)
 - Location: Marina
 - Organization: San Francisco Museum of Fine Arts
 - Organization: Museum of Fine Arts, Boston (https://en.wikipedia.org/wiki/Museum_of_Fine_Arts,_Boston)
 - Location: Golden Gate Bridge (https://en.wikipedia.org/wiki/Golden_Gate_Bridge)
 - Organization: Golden Gate
 - Location: Lombard Street (San Francisco) (https://en.wikipedia.org/wiki/Lombard_Street_(San_Francisco))
```

18:39 26:08

```
review3.txt
Good location and helpful staff, but on a busy road.
The Lombard Hotel, San Francisco, USA
8/16/2018
We stayed here in August after reading reviews. We were ver
y pleased with location, just behind Chestnut Street, a cos
mopolitan and trendy area with plenty of restaurants to cho
ose from. The
Marina district was lovely to wander through, very interest
ing houses. Make sure to walk to the San Francisco Museum o
f Fine Arts and the Marina to get a good view of Golden Gat
e bridge and the city. On a bus route and easy to get into
centre. Rooms were clean with plenty of room and staff were
friendly and helpful. The only down side was the noise from
Lombard Street so ask to have a room furthest away from tra
ffic noise.
```

https://docs.microsoft.com/en-us/learn/modules/analyze-text-with-text-analytics-service/

Speech recognition :

Taking the spoken word and converting it into data that can be processed - often by transcribing it into a text representation. The software typically uses multiple types of model, including:

1. An acoustic model that converts the audio signal into phonemes
2. A language model that maps phonemes to words, usually using a statistical algorithm that predicts the most probable sequence of words based on the phonemes.

Use case of speech recognition:

- Providing closed captions for recorded or live videos
- Creating a transcript of a phone call or meeting
- Automated note dictation
- Determining intended user input for further processing

Speech synthesis

Converting text to speech, requires the following information:

1. The text to be spoken.
2. The voice to be used to vocalize the speech.

Use case of speech synthesis:

- Generating spoken responses to user input.
- Creating voice menus for telephone systems.
- Reading email or text messages aloud in hands-free scenarios.
- Broadcasting announcements in public locations, such as railway stations or airports.

To build software that can interpret audible speech and respond verbally, you can use the Speech cognitive service in Azure. To use your cognitive services resource, client applications need:

1. **authentication key**
2. **location**

```
cog_key = 'ed17aa910bfd458cb2bece7caeb383fd'
cog_location = 'westus2'
```

Speech recognition - Demo

Suppose you want to build a home automation system that accepts spoken instructions, such as "turn the light on" or "turn the light off". Your application needs to be able to take the audio-based input (your spoken instruction), and interpret it by transcribing it to text that it can then parse and analyze.

```
speech_recognizer = SpeechRecognizer(speech_config, audio_config)

# Use a one-time, synchronous call to transcribe the speech
speech = speech_recognizer.recognize_once()
```

light-off.wav

https://docs.microsoft.com/en-us/learn/modules/recognize-synthesize-speech/

Speech synthesis - Demo

Assume your home automation system has interpreted a command to turn the light on. An appropriate response might be to acknowledge the command verbally as well as actually performing the commanded task!

```
# Get text to be spoken
response_text = 'Turning on.'

# Configure speech synthesis
speech_config = SpeechConfig(cog_key, cog_location)
speech_synthesizer = SpeechSynthesizer(speech_config)

# Transcribe text into speech
result = speech_synthesizer.speak_text(response_text)
```

https://docs.microsoft.com/en-us/learn/modules/recognize-synthesize-speech/

Translation - Demo

Use Azure cognitive services - translating text or speech between languages.

Translating Text

```
Hello How are you? -> こんにちは、元気ですか。

Hello -> Bonjour
```

Module4 Lab Demo 03 Translate Text and Speech.mp4

Speech Translation

```
# Show translated text
print(result)

Hello. -> Hola.
```

English to Spanish

https://docs.microsoft.com/en-us/learn/modules/translate-text-with-translation-service/

Language Understanding (LUIS)

To work with Language Understanding, you need to take into account three core concepts: utterances, entities, and intents.

An **utterance** is an example of something a user might say, and which your application must interpret. *"Switch the fan on.", "Turn on the light."*

An **entity** is an item to which an utterance refers, e.g. Fan, Light.

An **intent** represents the purpose, or goal, expressed in a user's utterance. e.g. the intent is to turn a device on; so in Language Understanding application, you might define a TurnOn intent that is related to these utterances.

https://docs.microsoft.com/en-us/learn/modules/create-language-model-with-language-understanding/1-introduction

Language Understanding (LUIS)

Intent	Related Utterances	Entities
CheckWeather	"What is the weather for today?"	today (datetime)
	"Give me the weather forecast"	
	"What is the forecast for Paris?"	Paris (location)
	"What will the weather be like in Seattle tomorrow?"	Seattle (location), tomorrow (datetime)

https://docs.microsoft.com/en-us/learn/modules/create-language-model-with-language-understanding/1-introduction

Language Understanding (LUIS) - Demo

How to create an effective LUIS app

1. Design your schema
2. Build your model
3. Improve your app

Create a schema that matches your real-world scenario.

Create an intent for each action your bot can perform.
Use entities to collect data needed to complete that action.

Example schema — Determine your bot's capabilities; create corresponding intents; add example utterances, and create entities to collect data. Create additional entities for each type of information collected.

Bot action:	Purchase airline tickets	Reserve rental cars	Make hotel reservations
Intent:	bookFlight	rentCar	reserveHotel
Example utterances:	"Book a flight to Seattle" "Buy 3 tickets to New York" "book a flight to Rio on Contoso Air" "get me a flight to Rio next week"	"Book a car on July 1 from Seattle" "reserve a car in New York"	"find hotels in Seattle from May 1-5" "reserve a hotel room in New York"

App Assets
Intents
Entities

switch_on

Machine learning features

Intents
Entities
Prebuilt Domains
Improve app performance
Review endpoint utterances
Features
Patterns

List items | Examples | Roles

List entities represent a fixed, closed set of related words alc

Import values | Delete

Normalized values ↑	Synonyms
Type in a list item ...	
fan	AC
light	lamp

Module4 Lab Demo 04 Create a Language Model with Language Understanding.mp4

Language Understanding (LUIS) - Demo

Module4 Lab Demo 04 Create a Language Model with Language Understanding.mp4

https://docs.microsoft.com/en-us/learn/modules/create-language-model-with-language-understanding/

Question:
Which area of AI that deals with creating software that understands written and spoken language?

Natural Language Processing
Conversational AI
Bot
Computer Vision

Answer:
Which area of AI that deals with creating software that understands written and spoken language?

Natural Language Processing
Conversational AI
Bot
Computer Vision

5. Describe features of conversational AI workloads on Azure (15-20%)

5A. Identify common use cases for conversational AI

- Identify features and uses for webchat bots
- Identify common characteristics of conversational AI solutions

5B. Identify Azure services for conversational AI

- Identify capabilities of the QnA Maker service
- Identify capabilities of the Azure Bot service

Conversational AI

Organizations are turning to artificial intelligence (AI) solutions that make use of AI agents, commonly known as bots to provide a first-line of automated support through the full range of channels that we use to communicate.

Bots can be designed to work across multiple channels, including email, social media platforms, and even voice calls.

To implement QnA bot, you need:

- A knowledge base of question and answer pairs - usually with some built-in natural language processing model to enable questions that can be phrased in multiple ways to be understood with the same semantic meaning
- A bot service that provides an interface to the knowledge base through one or more channels.

https://docs.microsoft.com/en-us/learn/modules/build-faq-chatbot-qna-maker-azure-bot-service

Conversational AI in Azure

Service	Capabilities
QnA Maker	This cognitive service enables you to quickly build a *knowledge base* of questions and answers that can form the basis of a dialog between a human and an AI agent.
Azure Bot Service	This service provides a platform for creating, publishing, and managing bots. Developers can use the *Bot Framework* to create a bot and manage it with Azure Bot Service - integrating back-end services like QnA Maker and LUIS, and connecting to channels for web chat, email, Microsoft Teams, and others.

Bots can be the basis of AI solutions for:

- Customer support for products or services.
- Reservation systems for restaurants, airlines, cinemas, and other appointment based businesses.
- Health care consultations and self-diagnosis.
- Home automation and personal digital assistants.

https://docs.microsoft.com/en-us/learn/modules/get-started-ai-fundamentals/6-understand-conversational-ai

QnA Maker service is a cognitive service in Azure that enables you to quickly create a knowledge base, either by entering question and answer pairs or from an existing document or web page. It uses some built-in natural language processing capabilities to interpret questions and find appropriate answers.

Create a QnA Bot

Step1: Create a QnA service resource in Azure

Step2: Create a QnA Maker Knowledge Base – Sign in QnA Maker portal https://qnamaker.ai and create a knowledge base

Step3: Connect your QnA service to your Knowledge Base

Step4: Populate/ edit the Knowledge Base – you can use FAQ document and some pre-defined responses. You can add custom question-and-answer pairs to supplement these

Step5: Train and Test the Knowledge Base

Step6: Publish the knowledge base - client applications require:

- The knowledge base ID
- The knowledge base endpoint
- The knowledge base authorization key

Step7: Build a bot with the Azure Bot Service

Step8: Access the Bot through a Channel

- when your bot is ready to be delivered to users, you can connect it to multiple channels
- users can interact with it through web chat, email, Microsoft Teams, and other common communication media

QnA Bot - Demo

Module5 Lab Demo 01 Build a Bot with QnA Maker and Azure Bot Service.mp4

QnA Maker

Microsoft

Azure Service

An AI service that enables you to go from semi-structured content to bot in minutes

Create

Create

QnA Maker

* Basics Tags Review + create

Project details

Subscription	Azure for Students
Resource group	AI900Demo
Name	ucce-ai900-qna-maker
Pricing tier	F0

Azure Search details - for data

Azure Search location	West US 2
Azure Search pricing tier	F

App Service details - for runtime

App name	ucce-ai900-qna-maker
Website location	West US 2

App insights details - for telemetry and chat logs

App insights	Disabled

Create a QnA service resource in Azure

Connect your QnA service to your KB.

After you create an Azure QnA service, refresh this page and then select your Azure service using the options below

Refresh

* Microsoft Azure Directory ID

University of Calgary

* Azure subscription name

Azure for Students

* Azure QnA service

ucce-ai900-qna-maker

* Language

English

Connect your QnA service to your Knowledge Base

https://docs.microsoft.com/en-us/learn/modules/build-faq-chatbot-qna-maker-azure-bot-service

QnA Bot - Demo

STEP 3

Name your KB.
The knowledge base name is for your reference and you can change it at anytime.

* Name

Margie's Travel KB

STEP 4

Populate your KB.
Extract question-and-answer pairs from an online FAQ, product manuals, or other files. Supported formats are .tsv, .pdf, .doc, .docx, .xlsx, containing questions and answers in sequence. Learn more about knowledge base sources. Skip this step to add questions and answers manually after creation. The number of sources and file size you can add depends on the QnA service SKU you choose. Learn more about QnA Maker SKUs.

☐ **Enable multi-turn extraction from URLs, .pdf or .docx files.** Learn more.

URL

https://github.com/MicrosoftDocs/ai-fundamentals/raw/master/data/qna_bot/margies_faq.d

+ Add URL

14:39 36:27

File name

Populate/ edit the Knowledge Base

STEP 5

Create your KB
The tool will look through your documents and create a knowledge base for your service. If you are not using an existing document, the tool will create an empty knowledge base table which you can edit.

Create your KB

Create your Knowledge Base

Hang tight, this should only take a minute...

Crawling your content, extracting QnA pairs, creating knowledge base for your data.

https://docs.microsoft.com/en-us/learn/modules/build-faq-chatbot-qna-maker-azure-bot-service

QnA Bot - Demo

Module5 Lab Demo 01 Build a Bot with QnA Maker and Azure Bot Service.mp4

Margie's Travel KB (Publisher) | EDIT | PUBLISH | SETTINGS | Save and train | ← Test

You can add alternative phrasing and re-train your KB

Knowledge base

Search the KB | 98 QnA pairs | + Add QnA pair | View options

Enable rich editor

1 2 3 4 5 ... 10 Next >

Question	Answer
Source: https://github.com/MicrosoftDocs/ai-fundamentals/raw/master/data/qna_bot/margies_faq.docx	
Why Margie's Travel? + Add alternative phrasing	Margie's Travel is a full-service travel agent, with years of experience in the worldwide tourism industry. + Add follow-up prompt
What services do you provide? + Add alternative phrasing	Margie's Travel can help arrange flights, accommodation, airport transfers, excursions, visas, travel insurance, and currency exchange. + Add follow-up prompt
What destinations do you offer? + Add alternative phrasing	We can arrange travel anywhere in the world, but we specialize in trips to Dubai, Las Vegas, London, New York, and San Francisco. + Add follow-up prompt

https://docs.microsoft.com/en-us/learn/modules/build-faq-chatbot-qna-maker-azure-bot-service

QnA Bot - Demo

Test your KB

Publish you KB

Module5 Lab Demo 01 Build a Bot with QnA Maker and Azure Bot Service.mp4

https://docs.microsoft.com/en-us/learn/modules/build-faq-chatbot-qna-maker-azure-bot-service

QnA Bot - Demo

Success! Your service has been deployed. What's next?

You can always find the deployment details in your service's settings.

Create Bot

Create Bot

View all your bots on the Azure Portal.

Use the below HTTP request to call your Knowledgebase. Learn more.

Postman Curl

```
POST /knowledgebases/cc3ef2e6-c61e-41e8-b706-62c9b36d736b/generateAnswer
Host: https://ucce-ai900-qna-maker.azurewebsites.net/qnamaker
Authorization: EndpointKey adf96bfa-cb75-4ef6-b1c3-bfef93c3c6b0
Content-Type: application/json
{"question":"<Your question>"}
```

Need to fine-tune and refine? Go back and keep editing your service.

Edit Service

Web App Bot

Bot Service

Bot handle *
MargieTravel

Subscription *
Azure for Students

Resource group *
AI900Demo
Create new

Location *
West US 2

Pricing tier (View full pricing details)
F0 (10K Premium Messages)

App name *
MargieTravel
.azurewebsites.net

SDK language *
C# Node.js

QnA Auth Key *
adf96bfa-cb75-4ef6-b1c3-bfef93c3c6b0

*App service plan/Location
ucce-ai900-qna-maker/West US 2

QnA Bot - Demo

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Web App Bot created, click

Name	Type
margietravel	Web App Bot
margietravel	App Service
ucce-ai900-qna-maker	Cognitive Services
ucce-ai900-qna-maker	App Service plan
ucce-ai900-qna-maker	App Service
ucceai900qnamaker-askmm2xjtx4ob6i	Search service

https://docs.microsoft.com/en-us/learn/modules/build-faq-chatbot-qna-maker-azure-bot-service

QnA Bot - Demo

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Click Channels, and create Web Chat

QnA Bot - Demo

Module5 Lab Demo 01 Build a Bot with QnA Maker and Azure Bot Service.mp4

Configure Web Chat

+ Add new site

Default Site

Default Site | Disable

Secret keys

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX Show | Regenerate

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX Show | Regenerate

Embed code

```
<iframe
src='https://webchat.botframework.com/embed/margietravel?
s=YOUR_SECRET_HERE'  style='min-width: 400px; width: 100%; min-
height: 500px'></iframe>
```

Copy

Learn more about advanced customization options for Web Chat

Paste this code to HTML

https://docs.microsoft.com/en-us/learn/modules/build-faq-chatbot-qna-maker-azure-bot-service

QnA Bot - Demo

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QnA - ICT 901 005 - (Continuin

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Add dates and restrictions...

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A minute ago

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A minute ago

How to access D2L?

Just now

To access course D2L, please follow the guide https://conted.ucalgary.ca/info/d2llogin.jsp Please contact student services if you require assistance. Phone: 403 220 2866, Email: conted@ucalgary.ca

Just now

how many questions in exam?

Just now

Type your message

Question

You have a frequently asked questions (FAQ) word document. You need to create a conversational support system based on the FAQ. Which service should you use?

QnA Maker
Text Analytics
Computer Vision
Language Understanding (LUIS)

Question

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Text Analytics
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Language Understanding (LUIS)

QnA Maker is a cloud-based API service that lets you create a conversational question-and-answer layer over your existing data. Use it to build a knowledge base by extracting questions and answers from your semi-structured content, including FAQs, manuals, and documents.