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## Prerequisites

This certification is intended for candidates with both technical and non-technical backgrounds. Data science and software engineering experience are not required; however, some general programming knowledge or experience would be beneficial. Candidates should have fundamental knowledge of Machine Learning(ML) and Artificial Intelligence(AI) concepts and related Microsoft Azure services.

## Why to do it?

This certificate provides you an opportunity to demonstrate the knowledge of common ML and AI workloads and how to implement them on Azure cloud. Azure AI Fundamentals can be used to prepare for other Azure role-based certifications like Azure Data Scientist Associate or Azure AI Engineer Associate. It will add value to your skill set and expertise if you into job roles like AI Engineer, Data Scientist, Developer, Solutions Architect etc.

## Exam, Languages & Price

To get this certificate you need to pass 'Exam AI-900', which is available in English, Japanese, Chinese(Simplified), Korean, German, French and Spanish. Price is based on the country in which the exam is proctored. In the USA it's for \$99 USD and in India it's for ₹3696 INR.

In exam, you will get 60 minutes to answer around 53 multiple choice questions. To pass the exam, you will need to score 700 points out of 1000. I got 890 points, [Link to my certification badge](#)

## Skills Measured

Skill	Weightage
Describe AI workloads and considerations	15-20%
Describe fundamental principles of machine learning on Azure	30-35%
Describe features of computer vision workloads on Azure	15-20%
Describe features of Natural Language Processing (NLP) workloads on Azure	15-20%
Describe features of conversational AI workloads on Azure	15-20%

## Learning Path

There are two ways to prepare for this exam. You can either self-teach using free online resources or can go for instructor led path. In this article I will list all the required resources from Microsoft Learn to clear this exam. Remember objective should be to achieve the necessary knowledge instead of just clearing certifications. If you google it, you will find tons of material with question and answers for this exam. But that won't help you to gain necessary knowledge!! In machine learning terminology, use all the learning material as 'training data' and use online question dumps as your 'test data'. Remember if you use 'test data' during training then it may result in good score but will definitely fail in real life scenarios!

Below are the learning resources for each of the section mentioned in skill measured table. At the end of each learning resource there is knowledge check section, to test your understanding of a particular module.

For doing the labs you can use free Azure subscription. Since some options wasnt available for Indian region I used USA regions for my labs. And please be patient its painfully slow!!

## Describe AI workloads and considerations



This section has around 15 to 20 % weightage in exam. It tests candidates ability to identify features of common AI workloads like below,

- 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

Apart from identifying the common AI workload this section also expect candidates to 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

Suggested online resource is as below

- Module: [Get started with artificial intelligence on Azure](#)

- Time required: Around 30 Mins.
- Exercise/Lab: None

## Sample Questions

Below are few of the sample questions with multiple choice options. These questions are from Microsoft online learning path, in exam also you will get similar questions like below.

### Set 1: Describe AI workloads and considerations

1. You want to create a model to predict sales of ice cream based on historic data that includes daily ice cream sales totals and weather measurements. Which Azure service should you use?

- ☐ Azure Machine Learning
- ☐ QnA Maker
- ☐ Text Analytics

2. 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?

- ☐ Azure Bot Service
- ☐ Custom Vision
- ☐ Computer Vision

3. You are designing an AI application that uses computer vision to detect cracks in car windshields, and warns drivers when a windshield should be repaired or replaced. When tested in good lighting conditions, the application successfully detects 99% of dangerously damaged glass. Which of the following statements should you include in the application's user interface?

- ☐ When used in good lighting conditions, this application can be used to identify potentially dangerous cracks and defects in windshields. If you suspect your windshield is damaged, even if the application does not detect any defects, you should have it inspected by a professional.
- ☐ This application detects damage in your windshield. If the application detects a defect, have the windshield replaced or repaired. If no defect is detected, you're good to go!
- ☐ This application detects damage in any glass surface, but you must accept responsibility for using it only in appropriate lighting conditions.

For answers please refer [Answers](#)

## Describe fundamental principles of machine learning on Azure



This section has around 30 to 35 % weightage in exam. It tests candidates ability to identify common machine learning types, describe core machine learning concepts, identify core tasks in creating a machine learning solution and to describe capabilities of no-code machine learning with Azure Machine Learning.

Identify common machine learning types

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

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

Identify core tasks in creating a machine learning solution

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

Describe capabilities of no-code machine learning with Azure Machine Learning:

- Automated Machine Learning UI
- Azure Machine Learning designer

Suggested online resource is as below

- Module 1: [Use automated machine learning in Azure Machine Learning](#)
- Module 2: [Create a Regression Model with Azure Machine Learning designer](#)
- Module 3: [Create a classification model with Azure Machine Learning designer](#)
- Module 4: [Create a Clustering Model with Azure Machine Learning designer](#)
- Time required: Around 3 Hr 30 Mins.
- Exercise/Lab: Each module contains the lab which can be done using free Azure subscription.

## Sample Questions

Below are few of the sample questions with multiple choice options. These questions are from Microsoft online learning path, in exam also you will get similar questions like below.

### Set 1: Use automated machine learning in Azure Machine Learning

1. An automobile dealership wants to use historic car sales data to train a machine learning model. The model should predict the price of a pre-owned car based on its make, model, engine size, and mileage. What kind of machine learning model should the dealership use automated machine learning to create?

- ☐ Classification
- ☐ Regression
- ☐ Time series forecasting

2. A bank wants to use historic loan repayment records to categorize loan applications as low-risk or high-risk based on characteristics like the loan amount, the income of the borrower, and the loan period. What kind of machine learning model should the bank use automated machine learning to create?

- ☐ Classification
- ☐ Regression
- ☐ Time series forecasting

3. You want to use automated machine learning to train a regression model with the best possible  $R^2$  score. How should you configure the automated machine learning experiment?

- ☐ Set the Primary metric to  $R^2$  score
- ☐ Block all algorithms other than GradientBoosting
- ☐ Enable featurization

## Set 2: Create a Regression Model with Azure Machine Learning designer

1. You are creating a training pipeline for a regression model, using a dataset that has multiple numeric columns in which the values are on different scales. You want to transform the numeric columns so that the values are all on a similar scale based relative to the minimum and maximum values in each column. Which module should you add to the pipeline?

- ☐ Select Columns in a Dataset
- ☐ Normalize Data
- ☐ Clean Missing Data

2. You use Azure Machine Learning designer to create a training pipeline and an inference pipeline for a regression model. Now you plan to deploy the inference pipeline as a real-time service. What kind of compute target should you create to host the service?

- ☐ Compute Instance
- ☐ Compute Cluster
- ☐ Inference Cluster

## Set 3: Create a classification model with Azure Machine Learning designer



1. You are using Azure Machine Learning designer to create a training pipeline for a binary classification model. You have added a dataset containing features and labels, a Two-Class Decision Forest module, and a Train Model module. You plan to use Score Model and Evaluate Model modules to test the trained model with a subset of the dataset that was not used for training. Which additional kind of module should you add?

- ☐ Join Data
- ☐ Split Data
- ☐ Select Columns in Dataset

2. You use an Azure Machine Learning designer pipeline to train and test a binary classification model. You review the model's performance metrics in an Evaluate Model module, and note that it has an AUC score of 0.3. What can you conclude about the model?

- ☐ The model can explain 30% of the variance between true and predicted labels.
- ☐ The model predicts accurately for 70% of test cases.
- ☐ The model performs worse than random guessing.

3. You use Azure Machine Learning designer to create a training pipeline for a classification model. What must you do before deploying the model as a service?

- ☐ Create an inference pipeline from the training pipeline
- ☐ Add an Evaluate Model module to the training pipeline
- ☐ Clone the training pipeline with a different name

## Set 4: Create a Clustering Model with Azure Machine Learning designer

1. You are using an Azure Machine Learning designer pipeline to train and test a K-Means clustering model. You want your model to assign items to one of three clusters. Which configuration property of the K-Means Clustering module should you set to accomplish this?

- ☐ Set Number of Centroids to 3
- ☐ Set Random number seed to 3
- ☐ Set Iterations to 3

2. You use Azure Machine Learning designer to create a training pipeline for a clustering model. Now you want to use the model in an inference pipeline. Which module should you use to infer cluster predictions from the model?

- ☐ Score Model
- ☐ Assign Data to Clusters
- ☐ Train Clustering Model

For answers please refer [Answers](#)

## Describe features of computer vision workloads on Azure



This section has around 15 to 20 % weightage in exam. It tests candidates ability to identify common types of computer vision solutions and using Azure tools and services to solve them.

Identify common types of computer vision solution:

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

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

Suggested online resource is as below

- Module 1: [Analyze images with the Computer Vision service](#)
- Module 2: [Classify images with the Custom Vision service](#)
- Module 3: [Detect objects in images with the Custom Vision service](#)
- Module 4: [Detect and analyze faces with the Face service](#)
- Module 5: [Read text with the Computer Vision service](#)
- Module 6: [Analyze receipts with the Form Recognizer service](#)
- Time required: Around 3 Hr.
- Exercise/Lab: Each module contains the lab which can be done using free Azure subscription.

## Sample Questions

Below are few of the sample questions with multiple choice options. These questions are from Microsoft online learning path, in exam also you will get similar questions like below.

### Set 1: Analyze images with the Computer Vision service

1. You want to use the Computer Vision service to analyze images. You also want to use the Text Analytics service to analyze text. You want developers to require only one key and endpoint to access all of your services. What kind of resource should you create in your Azure subscription?

- ☐ Computer Vision
- ☐ Cognitive Services
- ☐ Custom Vision

2. You want to use the Computer Vision service to identify the location of individual items in an image. Which of the following features should you retrieve?

- ☐ Objects
- ☐ Tags
- ☐ Categories

3. You want to use the Computer Vision service to analyze images of locations and identify well-known buildings. What should you do?

- ☐ Retrieve the objects in the image.
- ☐ Retrieve the categories for the image, specifying the celebrities domain
- ☐ Retrieve the categories for the image, specifying the landmarks domain

### Set 2: Classify images with the Custom Vision service

1. You plan to use the Custom Vision service to train an image classification model. You want to create a resource that can only be used for model training, and not for prediction. Which kind of resource should you create in your Azure subscription?

- ☐ Custom Vision
- ☐ Cognitive Services
- ☐ Computer Vision

2. You train an image classification model that achieves less than satisfactory evaluation metrics. How might you improve it?

- ☐ Reduce the size of the images used to train the model.
- ☐ Add a new label for "unknown" classes.
- ☐ Add more images to the training set.

3. You have published an image classification model. What information must you provide to developers who want to use it?

- ☐ Only the project ID.
- ☐ The project ID, the model name, and the key and endpoint for the prediction resource
- ☐ The project ID, iteration number, and the key and endpoint for the training resource.

### Set 3: Detect objects in images with the Custom Vision service

1. Which of the following results does an object detection model typically return for an image?

- ☐ A class label and probability score for the image
- ☐ Bounding box coordinates that indicate the region of the image where all of the objects it contains are located
- ☐ A class label, probability, and bounding box for each object in the image

2. You plan to use a set of images to train an object detection model, and then publish the model as a predictive service. You want to use a single Azure resource with the same key and endpoint for training and prediction. What kind of Azure resource should you create?

- ☐ Cognitive Services
- ☐ Custom Vision
- ☐ Computer Vision

## Set 4: Detect and analyze faces with the Face service

1. You plan to use Face to detect human faces in an image. How does the service indicate the location of the faces it detects?

- ☐ A pair of coordinates for each face, indicating the center of the face
- ☐ Two pairs of coordinates for each face, indicating the location of the eyes
- ☐ A set of coordinates for each face, defining a rectangular bounding box around the face

2. What is one aspect that may impair facial detection?

- ☐ Smile expression
- ☐ Extreme angles
- ☐ Fast shutter speed

3. You want to use Face to identify named individuals. What must you do?

- ☐ Use the Computer Vision service - Face cannot perform facial recognition
- ☐ Use Face to retrieve age and emotional state for each person
- ☐ Use Face to create a group containing multiple images of each named individual, and train a model based on the group

## Set 5: Read text with the Computer Vision service

1. You want to extract text from images and then use the Text Analytics service to analyze the text. You want developers to require only one key and endpoint to access all of your services. What kind of resource should you create in your Azure subscription?

- ☐ Computer Vision
- ☐ Cognitive Services
- ☐ Text Analytics

2. You plan to use the Computer Vision service to read text in a large PDF document. Which API should you use?

- ☐ The Read API
- ☐ The OCR API
- ☐ The Recognize Text API

## Set 6: Analyze receipts with the Form Recognizer service

1. You plan to use the Form Recognizer pre-built receipt model. Which kind of Azure resource should you create?
  - ☐ Computer Vision resource
  - ☐ Form Recognizer or Cognitive Services resource
  - ☐ Only Form Recognizer resource
2. You are using the Form Recognizer service to analyze receipts that you have scanned into JPG format images. What is the maximum file size of JPG file you can submit to the pre-built receipt model?
  - ☐ 2 MB
  - ☐ 50 MB
  - ☐ 200 MB

For answers please refer [Answers](#)

## Describe features of Natural Language Processing (NLP) workloads on Azure



This section has around 15 to 20 % weightage in exam. It tests candidates ability to identify features of common NLP Workload Scenarios and required Azure tools to solve them.

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

Identify Azure tools and services for NLP workloads

- Identify capabilities of the Text Analytics service
- Identify capabilities of the Language Understanding Intelligence Service (LUIS)

- Identify capabilities of the Speech service
- Identify capabilities of the Translator Text service

Suggested online resource is as below

- Module 1: [Analyze text with the Text Analytics service](#)
- Module 2: [Recognize and synthesize speech](#)
- Module 3: [Translate text and speech](#)
- Module 4: [Create a language model with Language Understanding](#)
- Time required: Around 2 Hr.
- Exercise/Lab: Each module contains the lab which can be done using free Azure subscription.

## Sample Questions

Below are few of the sample questions with multiple choice options. These questions are from Microsoft online learning path, in exam also you will get similar questions like below.

### Set 1: Analyze text with the Text Analytics service

1. You want to use the Text Analytics service to determine the key talking points in a text document. Which feature of the service should you use?

- ☐ Sentiment analysis
- ☐ Key phrase extraction
- ☐ Entity detection

2. You use the Text Analytics service to perform sentiment analysis on a document, and a score of 0.99 is returned. What does this score indicate about the document sentiment?

- ☐ The document is positive.
- ☐ The document is neutral.
- ☐ The document is negative.

3. When might you see **NaN** returned for a score in Language Detection?

- ☐ When the score calculated by the service is outside the range of 0 to 1
- ☐ When the predominant language in the text is mixed with other languages
- ☐ When the language is ambiguous

## Set 2: Recognize and synthesize speech

1. You plan to build an application that uses the Speech service to transcribe audio recordings of phone calls into text, and then submits the transcribed text to the Text Analytics service to extract key phrases. You want to manage access and billing for the application services in a single Azure resource. Which type of Azure resource should you create?

- ☐ Speech
- ☐ Text Analytics
- ☐ Cognitive Services

2. You want to use the Speech service to build an application that reads incoming email message subjects aloud. Which API should you use?

- ☐ Speech-to-Text
- ☐ Text-to-Speech
- ☐ Translate

## Set 3: Translate text and speech

1. You are developing an application that must take English input from a microphone and generate a real-time text-based transcription in Hindi. Which service should you use?

- ☐ Translator Text
- ☐ Speech
- ☐ Text Analytics

2. You need to use the Translator Text service to translate email messages from Spanish into both English and French. What is the most efficient way to accomplish this goal?

- ☐ Make a single call to the service; specifying a "from" language of "es", a "to" language of "en", and another "to" language of "fr".
- ☐ Make a single call to the service; specifying a "from" language of "es", and a "to" language of "en-fr".
- ☐ Make two calls to the service; one with a "from" language of "es" and a "to" language of "en", and another with a "from" language of "es" and a "to" language of "fr"

## Set 4: Create a language model with Language Understanding



1. You need to provision an Azure resource that will be used to author a new Language Understanding application. What kind of resource should you create?

- ☐ Text Analytics
- ☐ Language Understanding
- ☐ Cognitive Services

2. You are authoring a Language Understanding application to support an international clock. You want users to be able to ask for the current time in a specified city, for example "What is the time in London?". What should you do?

- ☐ Define a "city" entity and a "GetTime" intent with utterances that indicate the city intent.
- ☐ Create an intent for each city, each with an utterance that asks for the time in that city.
- ☐ Add the utterance "What time is it in city" to the "None" intent.

3. You have published your Language Understanding application. What information does a client application developer need to get predictions from it?

- ☐ The endpoint and key for the application's prediction resource
- ☐ The endpoint and key for the application's authoring resource
- ☐ The Azure credentials of the user who published the Language Understanding application

For answers please refer [Answers](#)

## Describe features of conversational AI workloads on Azure



This section has around 15 to 20 % weightage in exam. It tests candidates ability to identify common use cases for conversational AI and available Azure services for conversational AI.

Identify common use cases for conversational AI

- Identify features and uses for webchat bots
- Identify features and uses for telephone voice menus
- Identify features and uses for personal digital assistants
- Identify common characteristics of conversational AI solutions

Identify Azure services for conversational AI

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

Suggested online resource is as below

- Module 1: [Build a bot with QnA Maker and Azure Bot Service](#)
- Time required: Around 30 Mins.
- Exercise/Lab: Each module contains the lab which can be done using free Azure subscription.

## Sample Questions

Below are few of the sample questions with multiple choice options. These questions are from Microsoft online learning path, in exam also you will get similar questions like below.

Set 1: Build a bot with QnA Maker and Azure Bot Service

1. You want to create a model to predict sales of ice cream based on historic data that includes daily ice cream sales totals and weather measurements. Which Azure service should you use?

- ☐ Azure Machine Learning
- ☐ QnA Maker
- ☐ Text Analytics

2. 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?

- ☐ Azure Bot Service
- ☐ Custom Vision
- ☐ Computer Vision

3. You are designing an AI application that uses computer vision to detect cracks in car windshields, and warns drivers when a windshield should be repaired or replaced. When tested in good lighting conditions, the application successfully detects 99% of dangerously damaged glass. Which of the following statements should you include in the application's user interface?

- ☐ When used in good lighting conditions, this application can be used to identify potentially dangerous cracks and defects in windshields. If you suspect your windshield is damaged, even if the application does not detect any defects, you should have it inspected by a professional.
- ☐ This application detects damage in your windshield. If the application detects a defect, have the windshield replaced or repaired. If no defect is detected, you're good to go!
- ☐ This application detects damage in any glass surface, but you must accept responsibility for using it only in appropriate lighting conditions.

For answers please refer [Answers](#)

## linkcode

## Practice Exams

Its always a better idea to do few practice tests, before going for final exam. I have taken [Examtopics](#) practice test. I have also prepared my handwritten notes based on above learning path that I have refered before the final exam.

## Other Links

- [Link to Azure AI Fundamentals certification page](#)

- [Link to download certification skills outline](#)