



Haldia Institute of Technology

Department of Computer Science & Engineering [AIML]

Course Name- Machine Learning using Azure Cloud

Course Duration- 35 hrs.

About this Course

Machine learning is at the core of artificial intelligence, and many modern applications and services depend on predictive machine learning models. Training a machine learning model is an iterative process that requires time and compute resources. Automated machine learning can help make it easier. In this course, you will learn how to use Azure Machine Learning to create and publish models without writing code.

Learning Objectives

- Gaining command over Data Science and Machine Learning Models through Azure ML.
- Understand the intuition and concepts of Machine Learning algorithms
- Build Machine Learning models within minutes
- Choose the correct Machine Learning Algorithm using a cheat sheet
- Deploy production-grade Machine Learning algorithms

Course Outcomes

- Prepare data for use by an Azure Machine Learning Studio experiment
- Train a machine learning model in Azure Machine Learning Studio
- Deploy a model trained in Azure Machine Learning Studio to make predictions
- Prepare data for use by an Azure Machine Learning Workbench experiment
- Train a machine learning model in Azure Machine Learning Workbench
- Deploy a model trained in Azure Machine Learning Workbench to make predictions

Prerequisites

- Basic Mathematics

Course Details

❖ **COURSE INTRODUCTION** [1L]

- Create Your Free Azure Account.

❖ **Basics of Machine Learning** [2L]

- What You Will Learn in This Section.
- Why Machine Learning is the Future?
- What is Machine Learning?
- Understanding various aspects of data - Type, Variables, Category.
- Common Machine Learning Terms - Probability, Mean, Mode, , Range.
- Types of Machine Learning Models - Classification, Regression, Clustering etc.

❖ **Getting Started with Azure ML** [1L]

- You Will Learn in This Section?
- What is Azure ML and high level architecture.
- Azure ML Experiment Workflow
- Azure ML Cheat Sheet for Model Selection.

❖ **Azure Machine Learning with Studio Designer**

- What this Section Covers?

❖ **Set-up Azure Machine Learning Workspace** [3L]

- Understand the AzureMLService Architecture.
- Create the AzureML Workspace.
- View and Manage Workspace Settings.
- Overview of New AzureML Studio.
- What is AzureML Datastore and Dataset?
- Create and Register a Datastore.
- Create a Dataset.
- Explore the AzureML Dataset.
- Understanding the AzureML Compute Resources.
- Create a Compute Cluster and Compute Instance.

❖ **Run Experiments and Train Model** [1L]

- What is an AzureML Pipeline?
- Create a Pipeline using AzureML Designer
- Submit the Designer Pipeline run

❖ **Deploy and consume the models** [2L]

- Important Update before you begins next video.
- Create an Inference Pipeline
- Deploy a real-time endpoint using Designer
- Create a batch inference pipeline using Designer
- Run a Batch Inference Pipeline from Designer
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❖ **Data Processing using AzureML Designer** [3L]

- Important update - AzureML Designer UI Changes
- Get Data to the workspace
- Import Data to the workspace from external sources
- Edit Metadata - Column Names
- Understanding the Run
- Edit Metadata - Data Type
- Export Data to the Blob Storage
- Add Columns to the Dataset
- Add Rows to the Dataset
- Normalization of Data Part 1
- Normalization of Data Part 2
- Clean Missing Data
- Partition and Sample Data Part 1
- Partition and Sample Data Part 2

❖ **Classification**

[4L]

- What is Logistic Regression
- Two Class Logistic Regression - Problem Statement
- Data Preparation for Two Class Classification
- Train the Model for Logistic Regression
- Evaluate the Model Part 1
- Evaluate the Model - Confusion Matrix
- Evaluate the Model - AUC ROC
- Parameters of Two Class Logistics Regression
- What is Decision Tree?
- Ensemble Learning in Decision Tree
- Bagging and Boosting in Decision Tree
- Hands On - Train the Two Class Boosted Decision Tree
- Evaluate and Compare Decision Tree output

❖ **Regression using AzureML Designer**

[4L]

- What is Linear Regression?
- Ordinary Least Square and Common Errors
- Hands On - Automobile Price Predictions Data Analysis
- Hands On - Automobile Price Predictions Data Processing
- Hands On - Automobile Price Predictions Train Model
- Hands On - Automobile Price Predictions Evaluate
- R-Squared or Coefficient of Determination
- Math Behind Gradient Descent
- Gradient Descent Explained
- Online or Stochastic Gradient Descent
- Experiment - Linear Regression using Online Gradient Descent
- Evaluate Linear Regression using Online Gradient Descent

❖ **Designer/Classic Studio Vs. Pandas and Scikit-learn**

[4L]

- A note on Anaconda and Spyder.
- What this section is about?
- Pandas - Import Data for Experiments.
- Pandas - Import Data Part 2.
- Select Columns using Pandas.
- Select Columns By drop method.
- Add columns and rows.
- Clean Missing Data.
- Edit Metadata of columns using Pandas.
- Create Summary Statistics using describe.
- Clip Values - Remove Outliers using Constants.
- Clip Values - Remove Outliers with Percentiles.
- Convert and Save a delimited file using Pandas.
- Data Normalization.
- Label Encoding of String Categorical data.
- Why Hot encoding is required?
- Hot Encoding using Pandas get_dummies.
- Split The Data for training and testing.
- Build Logistic Regression using Python - Part 1.
- Build Logistic Regression using Python - Part 2.

❖ **Azure Machine Learning with AzureML SDK** [1L]

- Introduction to AzureML SDK

❖ **Set-up Azure Machine Learning Workspace** [2L]

- Create AzureML Workspace using SDK
- Verify the Workspace and Write the Workspace Config File
- Create and Register a Datastore using AzureML SDK
- Create and Register a Dataset using SDK
- Access Workspace, Datastore and Datasets using SDK
- Pandas Dataframe and AzureML Dataset conversions
- Upload local data to storage account via datastore

❖ **Run Experiments and Train Models** [4L]

- Problem Statement - Run a sample experiment and log values
- Run a sample experiment using AzureML SDK - Part 1
- Run a sample experiment using AzureML SDK - Part 2
- Run a script in Azureml environment - Part 1
- Run a script in Azureml environment - Part 2
- Run a script in Azureml environment - Part 3
- Run a script in Azureml environment - Part 4
- Run a script in Azureml environment - Part 5
- Exam Coverage So far
- Train and Run a Model Script in AzureML Part 1
- Train and Run a Model Script in AzureML Part 2

- Train and Run a Model Script in AzureML Part 3
- Train and Run a Model Script in AzureML Part 4
- Train and Run a Model Script in AzureML Part 5
- Provisioning Compute Cluster using SDK
- Automate Model Training using AzureML SDK
- Automate Model Training - Define Pipeline Steps
- Automate Model Training - Define Run Configuration
- Automate Model Training - Define Build and Run
- Detour - Command Line Arguments
- Automate Model Training - Create Dataprep Step
- Automate Model Training - Create Training Step
- Run the pipeline and see the results

❖ Using Python Scripts in AzureML Designer [2L]

- Simple Python Script in Designer.
- Execute Python Script using Zip Bundle.
- Execute Python Script using Zip Bundle - Hands on.