

Industry 4.0 : Artificial Intelligence, Data Science & Machine Learning with Python

PTN-107

Duration: 5 days; Instructor-led

Time: 9:00 AM – 5:00 PM

ABOUT THIS COURSE

Machine Learning, Artificial Intelligence and Deep Learning training program discusses the latest machine learning algorithms while also covering the common threads that can be used in the future for learning a wide range of algorithms. The course is a complete package that will help learners build their skillsets and meet the demand of the ML-AI industry which is growing by leaps and bounds in recent years.

This course on Machine Learning, Deep Learning and Artificial Intelligence goes beyond the theoretical concepts of the technology like regression, clustering, classification, etc. and discusses their applications as well.

OBJECTIVES

You will learn:

- Introduction to Machine Learning, Artificial Intelligence, and Deep learning
- Supervised and unsupervised learning concepts and modelling
- Solving business problems using Artificial Intelligence and Machine Learning
- Machine Learning algorithms

PREREQUISITES

Participants in this Machine Learning online course should have:

- Familiarity with the fundamentals of Python programming

AUDIENCE

There is an increasing demand for skilled machine learning engineers across all industries, making this Machine Learning certification course well-suited for participants at the intermediate level of experience. We recommend this Machine Learning training course for the following professionals in particular:

- Developers aspiring to be a data scientist or machine learning engineer
- Analytics managers who are leading a team of analysts
- Business analysts who want to understand data science techniques
- Information architects who want to gain expertise in machine learning algorithms
- Analytics professionals who want to work in machine learning or artificial intelligence
- Graduates looking to build a career in data science and machine learning
- Experienced professionals who would like to harness machine learning in their fields to get more insights

COURSE CONTENTS

Module 1: Introduction to Artificial Intelligence and Machine Learning

- Artificial Intelligence
- What is Machine Learning?
- Machine Learning algorithms
- Supervised Versus Unsupervised Learning
- Machine Learning Algorithms
 - Regression
 - Classification
 - Clustering
- Applications of Machine Learning
- Machine learning examples
- Setting up Anaconda & Python Notebooks.
- Working on notebooks for Data Science

Module 2: Techniques of Machine Learning

- Supervised learning
- Unsupervised learning

Module 3: Mathematics & Statistics Refresher

- Concepts of linear algebra
- Euclidean and Non-Euclidean geometry
- Introduction to Calculus
- Probability, Conditional Probability, Bayes Theorem
- Distributions, CDF, PDF
- Mean, Median, Mode
- Variance & Correlation,
- Standard Deviation, quartiles, percentiles
- Variable Relationships & Estimation
- Hypothesis Testing

Module 4: Accessing/Importing and Exporting Data

- Importing Data from various sources (Csv, txt, excel...etc)
- Viewing Data objects
- Exporting Data to various formats
- Important python modules: numpy, pandas, scipy etc.

Module 5: Introduction to NumPy, Pandas

- Create arrays using NumPy
- Perform various operations on arrays and manipulate them
- Indexing slicing and iterating
- Read & write data from text/CSV files into arrays and vice-versa
- Create Series and Data Frames in Pandas
- Data structures & index operations in pandas

- Importing and exporting data
- Indexing and slicing of data structures in pandas
- Reading and Writing data from Excel/CSV formats into Pandas

Module 6: Data Cleaning- Manipulation

- Basic Functionalities of a data object
- Merging of Data objects
- Concatenation of data objects
- Types of Joins on data objects
- Exploring a Dataset
- Analysing a dataset
- Data Manipulation steps (sorting, filtering, duplicates, merging, appending, derived variables, sampling, Data type, conversions, renaming, formatting etc)
- Data manipulation tools (Operators, Functions, Packages, control structures, Loops, arrays etc)
- Python Built-in Functions (Text, numeric, date, utility functions)
- Normalizing data
- Formatting data

Module 7: Data Analysts-Visualization

- Introduction exploratory data analysis
- Descriptive statistics, Frequency Tables and summarization
- Univariate Analysis (Distribution of data & Graphical Analysis)
- Bivariate Analysis (Distributions & Relationships, Graphical Analysis)
- Creating Graphs-
 - Bar plot
 - Pie plot
 - Count plot
 - Line chart
 - Histogram
 - Boxplot
 - Scatter
 - Density
 - Violine Plot
 - Swarm plot
 - Distplot
 - Pair plot
 - Heatmap
- Important Packages for Data Visualisations
 - Matplotlib
 - Seaborn
 - Plotly
 - Cufflinks

SUPERVISED LEARNING:

Module 8: Linear Regression

- Introduction- Applications
- Assumptions of Linear Regression
- Building Linear Regression Model
- Understanding standard metrics
- (Variable significance, R-square/Adjusted R-square, Global hypothesis ,etc)
- Assess the overall effectiveness of the model
- Validation of Models
- Interpretation of Results- Business Validation
- Implementation on new data

Module 9: Logistic Regression

- Introduction- Applications
- Linear Regression Vs. Logistic Regression
- Building Logistic Regression Model
- Understanding standard model metrics
- Confusion matrix, accuracy score
- Standard Business Outputs
- Interpretation of Results- Business Validation
- Implementation on new data

Module 10: Time Series Forecasting

- Introduction -Applications
- Time Series Components (Trend, Seasonality, Cyclicity and Level) and Decomposition
- Classification of Techniques
- Basic Techniques- Averages, Smoothing, etc
- Advanced Techniques- AR Models, ARIMA, etc

Module 11: Decision Trees

- Decision Trees - Introduction-Applications
- Construction of Decision Trees through Simplified Examples
- Generalizing Decision Trees; Information Content and Gain Ratio; Dealing with Numerical variables; other
- Measures of Randomness
- Pruning a Decision Tree; Cost as a consideration
- Decision Trees – Validation
- Over fitting- Best Practices to avoid

Module 12: Ensemble Learning

- Concept of Ensembling
- Manual Ensembling Vs. Automated Ensembling
- Methods of Ensembling (Stacking, Mixture of Experts)
- Bagging (Logic, Practical Applications)
- Random forest (Logic, Practical Applications)
- Boosting (Logic, Practical Applications)
- Ada Boost
- Gradient Boosting Machines (GBM)
- XGBoost

Module 13: Naive Bayes

- Concept of Conditional Probability
- Bayes Theorem and Its Applications
- Naive Bayes for classification
- Applications of Naive Bayes in Classifications

Module 14: Model Evaluation, Improvements & Performance Metrics

- Data Split Practices
- Cross Validation
- K-Fold Validation
- Confusion Matrix
- ROC Curves
- Mean Absolute/Square Errors & R-Square
- Ensemble Learning & Model Stacking

Module 15: Kernel Learning

- Support Vector Machines
- Principal Component Analysis
- Ridge Regression
- Spectral Clustering

Module 16: Support Vector Machines

- Motivation for Support Vector Machine & Applications
- Support Vector Regression
- Support vector classifier (Linear & Non-Linear)
- Interpretation of Outputs and Fine tune the models with hyper parameters
- Validating SVM models

Module 17: Unsupervised Learning: Segmentation

- What is segmentation & Role of ML in Segmentation?
- Clustering algorithms
- Concept of Distance and related math background
- K-Means Clustering, Elbow method
- Hierarchical Clustering

Module 18: Natural Language Processing

- What is NLP & How to solve NLP problems
- NLP Feature Engineering & Modelling
- How to process any raw data file
 - Tokenizing, remove stopwords, speech tagging
 - Stemming, Lemmatizing, CountVectorizer, Wordcloud
- Build models for solving practical read world problems.

Module 19: Deep Learning - Artificial Neural Networks (ANN)

- Motivation for Neural Networks and Its Applications
- Perceptron and Single Layer Neural Network, and Hand Calculations
- Learning In a Multi Layered Neural Net: Back-Propagation and Conjugant Gradient Techniques
- Introducing & Using Tensorflow
- Neural Networks for Regression
- Neural Networks for Classification
- Interpretation of Outputs and Fine tune the models with hyper parameters
- Validating ANN models

Module 20: End to End ML Implementation and Use Case specific discussions