

MACHINE LEARNING AND DEEP LEARNING

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PREREQUISITE

The participants are preferred to have some overview of **Python language**.

DURATION

5 days

COURSE OUTLINE

<Day 1>

- **Machine Learning Intro and Python Environment Setup**
 - Introduction to Artificial Intelligence and related Industry Use Cases
 - Basics of Data Science , Machine Learning and Deep Learning.
 - Setting up Anaconda & Python Notebooks.
 - Working on notebooks for Machine Learning
- **Python Basics**
 - Python Basic Data Types
 - Data Structures (List, Tuple, Dictionary)
 - Creating, accessing, and slicing tuples, lists and Dictionaries
 - Functions, Control Flow
 - Module and Packages
 - Errors and Exceptions
- **Python Mathematical Computation Libraries (Numpy) and Scientific (SciPY)**
 - Numpy Overview
 - Properties and types of Ndim Arrays
 - Accessing Array elements : Indexing, Slicing, Iteration, Indexing with Boolean Arrays
 - Basic operation on NDim Arrays
 - Shape Manipulation
 - Numpy Mathematical operations examples
 - Scipy Overview
 - Scipy Statistical sub package (T-Test, p-value, Anova etc)
 - Scipy Linear algebra computation
- **Data Manipulation and Exploratory Analysis (Pandas)**
 - Introduction to Pandas
 - Pandas Series
 - Pandas Data Frame
 - Pandas File Read and Write Support

- Data Operation, Summarization, Slicing & Dicing
- Data Cleaning Missing Values, Outliers
- Data Filtering
- **Data Visualization in Python (Matplotlib)**
 - Introduction to Data Visualization
 - Matplotlib Features
 - Bar Plot , Line Chart, Box Plot, Scatter Plot
 - Set Axis, Labels, and Legend Properties
 - Controlling axis labels and colors

<Day 2>

- **Supervised Machine Learning-1 (Scikit Learn)** - (Industry Use case Implementation with Model Tuning)
 - Introduction Machine Learning Life Cycle
 - Decision Tree Algorithms
 - Classification Tree
 - Regression Tree
 - Tree based Ensemble Learning
 - Random Forest
 - Gradient Boosting Trees
- **Model Evaluation, Improvements & Performance Metrics (Machine Learning lifecycle for Model Tuning)**
 - Data Split Practices
 - Cross Validation
 - K-Fold Validation
 - Confusion Matrix
 - ROC Curves
 - Mean Absolute/Square Errors & R-Square
 - Ensemble Learning
 - Model Selection and Finalization
 - Grid Search

<Day 3>

- **Supervised Machine Learning-2**
 - Support Vector Machine (SVM Model)
 - SVM Kernel Training
 - SVM Model hyper parameter Tuning

- K Nearest Neighbor (KNN Model)
- KNN Model Training
- **Regression Learning** (Industry Use case Implementation with Model Tuning)
 - Linear Regression
 - Logistic Regression
 - Regularization
 - Multiple Variables
 - Gradient Descent
 - Model Training and Validation
 - Model Hyper parameter tuning

<Day 4>

- **Unsupervised Learning - Clustering**
 - Hierarchical Clustering
 - K-Mean Clustering
 - Model Evaluation
- **Dimensionality Reduction**
 - Principal Component Analysis (PCA)
- **Recommender Engines**
 - Apriori Algorithms (Discovering Association Rules)
 - Market Basket Analysis (Cross Selling/ Up Selling)
 - Collaborative Filtering based Recommendation
- **Forecasting (Time Series Modeling)**
 - Trend and Seasonal Analysis
 - Different Smoothing Techniques
 - ARIMA Modeling
 - ETS Modeling

<Day 5>

- **Deep Learning Neural Network Modeling and Tuning** (Industry Use case Implementation with Model Tuning)
 - Multi Layer Perceptron Model
 - Cost Function Formation

- Back propagation and Gradient Descent Algorithm
 - ANN Model Training
 - Neural Network Hyper parameter Tuning
 - Industry Use Case using ANN Model
 - Convolutional Neural Network overview
 - Recurrent Neural Network overview
 - Tensorflow, Keras
 - ANN, CNN - Industry Use Case
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- **End to End ML and DL Implementation and Use Case specific discussions.**