

Machine Learning

Course Duration: 7 days/ 48 hours

Course Outline:

The Content given below may be customized according to the participant level, span of training and their special requirement. The below content is a standard content for Artificial Intelligence & Soft Computing, which we make use while delivering trainings at all the reputed Institutes, Universities and for corporate training.

- 1. Introduction & Basics of AI (2 Hours)**
 - Introduction to Artificial Intelligence
 - Applications of AI
 - Different methods used for AI
 - Tradition Methods & New Methods

- 2. Programming Language - (Python) (6 Hours)**
 - Working with Software Environment
 - Variables, Lists, Vectors, Matrices & Arrays
 - Control Structures – If else, for and while loop
 - Functions & Subroutines
 - Object oriented Programming
 - Miscellaneous Functions & their applications
 - Data Management in R/ Python
 - Concepts of Text Mining and practical application in R and Python

- 3. Agent Environment & Algorithms for Intelligent Systems (5 Hours)**
 - Single Agent & Multiagent Environment
 - Model based, utility based and learning agents
 - Simulated Annealing
 - Constraint Satisfaction Problems

Case Study & Hands on

 1. 8 Queen Problem
 2. Simulated Annealing Example

- 4. Machine Learning – Neural Network Analysis (15 Hours)**
 - Introduction to Machine Learning
 - Applications of Machine Learning
 - Artificial Intelligence & Machine Learning
 - Machine Learning application/ Result interpretation in R and Python
 - Database Mining & Machine Learning
 - Supervised Learning Introduction & Examples
 - Unsupervised Learning Introduction & Examples
 - Linear Regression & implementation
 - Introduction to Gradient Descent Algorithm
 - Linear Algebra review

- Multivariable Linear Regression
- Introduction to Neuron
- Introduction to Network Architecture
- Designing Neural Network Model
- Model Representation Methods
- Weights & Activation Functions
- Single Layer Neural Network
- Multilayer Neural Network Architecture
- Training the Network
- Backward Propagation Training
- Using the Network
- Importing & Exporting Network
- Importing & Exporting Training Data
- Dynamic Neural Network

Case study & Hands On:

1. Single Perceptron Model (Straight Line Hypothesis Training)
2. Curve Training / Multilayer Training
3. XOR Example
4. Advance Classification Examples

5. Machine Learning – Clustering

(4 Hours)

- Various Clustering Algorithms
- K Means Clustering
- C Means Clustering
- Principal Component Analysis
- Using PCA for Data Clustering

6. Machine Learning – SVM & Natural Language Processing

(6 Hours)

- Introduction to SVM
- Decision Boundary and Hyper plane
- Minimization of Cost function for optimized hyperplane
- Support Vector for Classification - Parameters
- Support Vector for Regression – Parameters

Case study & Hands On:

1. Character Recognition
2. Cancer Recognition
3. Regression Problem Example

7. Fuzzy Logic

(8 Hours)

- Introduction to Fuzzy Logic
- Fuzzy Set Theory & Fuzzy sets
- Working with Fuzzy logic Algorithm
- Fuzzy Inference System
- Problem Formulation
- Fuzzification – creating fuzzy sets
- Membership Function

- Rule Base
- Defuzzification
- Mamdani&Sugeno Methods
- Fuzzy Clustering
- Fuzzy C Means Clustering
- Fuzzy K Means Clustering
- Introduction to image analysis

Case study & Hands On:

1. Tipping Problem
2. Washing Machine Problem
3. Fuzzy C means Clustering Examples 1
4. Fuzzy C means Clustering Example 2
5. Fuzzy K Means Clustering Example

8. Genetic Algorithm

(8 Hours)

- Working with Genetic Algorithm
- Getting started with Genetic Algorithm
- Reproduction, Crossover & Mutation
- Fitness Function
- Defining Fitness Function
- Permutation & Combinations
- Working with GA Examples
- Banking example
- Telecom example
- Model Validation

Case study & Hands On:

1. GA Example 1
2. GA Example 2