

## AI ML Fundamentals

### Overview:

Learn Machine Learning principles with in-depth practical exposure to how projects are implemented at organizations in this Machine Learning course. You learn all about real-world applications of ML & the essentials of statistics and ML models

### Duration:

2-full-days (India: 9AM-4PM IST)

3-half-days (US: 8.30PM-12.30AM IST)

### Prerequisites:

- Basic knowledge of Statistics is good to have.

### What will you learn:

- Discuss machine learning algorithm types and develop an appreciation for their real-world applications
- Recognize the statistical principles that forms the foundation of ML
- Develop basic Supervised learning models
- Develop basic Unsupervised learning models
- Apply various methods for testing machine learning training models

### Course Outline:

#### Introduction to Artificial Intelligence

- Introduction to Artificial Intelligence
- Applications, Industries, and growth
- Data science and Machine Learning
- Techniques used for AI
- AI for Everything
- Different methods used for AI
- Tradition Methods & New Methods
- AI Agents
- Challenges in operating AI systems
- Building your AI strategy and roadmap

#### Fundamentals of Machine Learning

- Types of Learning
- Phases in a ML Project (CRSIP-DM Methodology)
- The three basic problems in ML (Regression, Classification, Clustering)
- Bias Variance Trade off
- Evaluating a ML Model
- Revisiting the ML concepts using this demo

## **Introduction to KNIME**

- Installation of KNIME
- Creating KNIME Workspace
- Ingesting data into KNIME environment
- Basic data manipulations
- Querying and Displaying data using KNIME
- Visualization in KNIME

## **Regression (Supervised Learning)**

- Understanding of Regression Problem Scenario
- Math behind Linear Regression (Ordinary Least Squares)
- Gradient Descent Algorithm
- Types of Regression (Simple Linear, Multiple, Polynomial)
- Evaluating a Regression Model (MSE, R Squared, Adj R Square)
- Predicting using a Regression Model
- Understanding and communicating the Regression Model to others
- Real life applications of Regression

## **Classification (Supervised Learning)**

- Understanding of Classification Problem Scenario
- Introduction to Logistic Regression
- Sigmoid function
- Evaluating a Logistic Regression Model (Accuracy, Sensitivity)
- Predicting using a Logistic Regression Model
- KNIME Demo of Logistic Regression Model
- Understanding Decision Trees
- Comparing models of Logistic Regression and Decision Trees
- Understanding Random Forest
- Real life applications of Classification

## **Clustering (Unsupervised Learning)**

- Significance of Unsupervised learning in ML
- Concept of distance measure (Euclidean distance, Manhattan distance)
- Introduction to Hierarchical Clustering
- Introduction to K Means Clustering
- Evaluating a Clustering output
- Demo of Hierarchical Clustering using KNIME
- Demo of K Means Clustering using KNIME
- Comparison of clusters from Hierarchical and K Means
- Real life applications of Clustering

## **Data Preprocessing**

- Issues in acquisition of data
- Issues in data quality
- Identifying and handling outliers

- Importance missing data and techniques to handle
- Understanding Normalization and standardization
- Sensitivity of ML methods to distance and need for rescaling data
- Handling Categorical Data (e.g. One Hot Encoding)
- Feature Engineering
- Curse of dimensionality, Dimensionality Reduction

### **Principle Component Analysis**

- Dimensionality Reduction, Data Compression
- Concept and Mathematical modelling
- Use Cases
- Programming using Python
- IRIS Data Analysis using PCA

### **Reinforcement Learning**

- Introduction to Reinforcement Learning
- Exact Methods
- Approximate Methods
- Real life applications of Reinforcement Learning

### **Introduction to Deep Learning**

- What is Deep Learning?
- Why Deep Learning?
- Feature Extraction
- Working of a Deep Network
- Types of Deep Networks
- Real life applications of Deep Learning

### **Introduction to Neural Networks**

- Artificial Neural Networks (ANN)
- Convolutional Neural Networks (CNN)
- Recurrent Neural Networks (RNN)

### **Natural Language Processing Overview**

- Introduction to Natural Language Processing
- NLP Example using Keras library