Live Online Instructor-led Training
on
Machine Learning, AI & Its Applications

Total Duration: 30 Hours (10-days)
3-Hours / Per day

Training Highlights

- 30+ Hours live online Instructor-led Hands-on based learning with Projects.
- **Training includes:** Soft copy of Training material, Training PPT's, Project code & Training Recording.
- Training **certificate of completion** will be provided to each Attendee.

Projects included in Training

- Hands-on session on Python Libraries & Data processing.
- **Project 1:** House price prediction using Linear Regression.
- **Project 2:** Diabetics prediction using Logistic regression.
- **Project 3:** Customer churn prediction using Decision tree & Random Forest.
- **Project 4:** Auto mpg data set analysis using ANN-Regression.
- **Project 5:** Predict Titanic Survivors using Artificial Neural Network classification.
- Applying different algorithms to solve business problems and benchmark the results.

Course Content [30 Hours]

AI - INTRODUCTION

- What is Artificial Intelligence
- What is Data Science & Machine Learning
- Machine Learning vs. Data Science vs. AI
- How leading companies are harnessing the power of Data Science with Python?
- Different phases of a typical Analytics/Data Science projects and role of python
- Machine Learning flow to code
- Regression vs. Classification
- Features, Labels, Class
- Supervised Learning, Semi-Supervised and Unsupervised Learning
- Cost Function and Optimizers
- Discussion on Various ML Learnings

PYTHON ESSENTIALS (CORE)

- Introduction to installation of Anaconda
- Introduction to Python Editors & IDE's (Anaconda, Spyder, Jupyter etc…)
- Understand Jupyter notebook & Customize Settings
- Overview of Python- Starting with Python
- Python data types: Primitive
- Core built-in data structures – Lists, Tuples, Dictionaries
- String, String built-in methods
- Data manipulation tools(Operators, Functions, Packages, control structures, Loops, arrays etc)
- Python UDFs – def keywords

ACCESSING/IMPORTING AND EXPORTING DATA USING PYTHON MODULES

- Concept of Packages/Libraries - Important packages(NumPy, SciPy, Pandas)
- Importing Data from various sources (CSV, txt, excel, access etc)
- Exporting Data to various formats

DATA MANIPULATION & PREPROCESSING – CLEANSING

- Cleansing Data with Pandas
- Data Manipulation steps(Sorting, filtering, duplicates, merging, appending, subsetting, derived variables, sampling, Data type conversions, renaming, formatting etc)
- Stripping out extraneous information
- Scaling and Normalizing data
- Pre-processing and Formatting data
- Feature selection – RFE, Correlation etc

DATA ANALYSIS – VISUALIZATION USING PYTHON

- Introduction exploratory data analysis
- Descriptive statistics, Frequency Tables and summarization
- Univariate Analysis (Distribution of data & Graphical Analysis)
- Bivariate Analysis(Cross Tabs, Distributions & Relationships, Graphical Analysis)
- Creating Graphs- Bar/pie/line chart/histogram/ boxplot/ scatter/ density etc

DATA VISUALIZATION ON WORLD MAP

- Data Visualization
- Seaborn
- Matplotlib
- Google Maps Visualization
- Plotly
- Coronavirus 2019-20 Visualization on World Map
- Time series Plot of Novel Covid19 Data
- Graphs - Visualization and Comparison
- Time series plot of Deaths / Confirmed/ Active Cases of COVID 19

LINEAR REGRESSION

- Regression Problem Analysis
- Mathematical modelling of Regression Model
- Gradient Descent Algorithm
- Use cases
- Regression Table
- Model Specification
- L1 & L2 Regularization
- Optimizers
- Polynomial Linear Regression
- Data sources for Linear regression
- Multivariate Regression Model
- Parameters & Hyperparameters
- Cost Function & Cost Optimizer: Gradient Descent Algorithm
- R Squared & Adj. Squared
- Model Predictions
- Model Accuracy
- Graphical Plotting

LOGISTIC REGRESSION

- Assumptions
- Reason for the Logit Transform
- Logit Transformation
- Hypothesis
- Variable and Model Significance
- Maximum Likelihood Concept
- Odds Ratio and Interpretation
- Null Vs Residual Deviance
- ROC Curve
- Model Specification
- Case for Prediction Probe
- Model Parameter Significance Evaluation
- Optimization of threshold value
- Estimating the Classification Model Hit Ratio

- Isolating the Classifier for Optimum Results

RANDOM FOREST & DECISION TREE ALGORITHM:

- Concept and Working Principle
- Mathematical Modelling
- Optimization Function Formation
- Analysis of Classification Problem case
- Role of Entropy, Gini Index and Information Gain in Decision Trees
- Analysis of Regression Problem case
- Use Cases & Programming using Python
- Decision Trees – CART, CD5.0
- Overfitting and Pruning
- Ensemble Learning

CLUSTERING – K Means and Hierarchical

- Unsupervised Learning
- Clustering Introduction
- K-Means Clustering
- Handling K-Means Clustering
- Maths behind KMeans Clustering – Centroids
- K Means from scratch
- Mean shift Introduction
- Dynamically weight
- Elbow Method – Picking K in K-Means
- Hierarchical Clustering
- Types – Agglomerative and Divisive
- Dendrogram
- **Project: Intruder Detection**
- **Classification problems & best predictive out of all**

AI & Neural Networks

- Introduction to AI
- Introduction to Neural Networks
- Supervised Learning with Neural Networks
- Concept of AI/Machine Learning
- Classification, Regression
- Basics of statistics - probability distributions
- Correlation, Normalization, Scaling, Feature Selection

Single & Multi-layered Neural Networks

- Perceptron
- Concept of Single Neuron
- Logic gates
- Inputs, weights, biases

- Various **activation functions** in neural networks – Unit Step, Sigmoid, ReLu, Softmax, and hyperbolic functions
- Single Layer Perceptron
- Regression & Classification concepts
- Introduction to Multilayer Neural Network
- Concept of Deep neural networks
- Multi-layer perceptron
- Capacity and Overfitting
- Neural network hyperparameters
- **Backpropagation convergence**
- Forward propagation, overfitting, hyperparameters.
- Training of neural networks
- The various techniques used in training of artificial neural networks
- Gradient descent rule
- Perceptron learning rule
- Tuning learning rate
- Stochastic process
- Optimization techniques
- Regularization techniques
- Regression techniques Lasso L1, Ridge L2
- Vanishing gradients
- Unsupervised pre-training, Xavier initialization, vanishing gradients.

TENSORFLOW & KERAS

- TensorFlow library for AI
- Keras – High Level TensorFlow API
- Getting started with TensorFlow
- Installation & Setting up TensorFlow
- TensorFlow Data Structures
- Tensor board – Visualization

Regression - Linear Regression with Single Neuron

- Learning Algorithm
- Linear Regression – Theory
- Feature selection - Correlation
- XOR – XNOR Gates
- Input Matrix & Output Labels
- Activation Function
- Training A single perceptron
- Model Optimizers - Parameters and Hyperparameters
- Multiple Linear Regression
- Overfitting - Regularization – L1 & L2

CNNs (Convolutional Neural Networks)

- Convolutional Neural Network
- Understanding the architecture and use-cases of CNN
- Pooling Layer
- How to visualize using CNN
- How to fine-tune a convolutional neural network
- What is transfer learning
- Kernel filter, Feature maps, and pooling
- Deploying convolutional neural networks in TensorFlow

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Who can attend?

- Training is best suitable for Engineering college faculty, Research scholar, Student & Working IT Professional.

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