

ARTIFICIAL INTELLIGENCE SYLLABUS

- ❖ **Introduction to Deep Learning & AI**
- ❖ **Deep Learning: A revolution in Artificial Intelligence**
- ❖ Limitations of Machine Learning

- ❖ **What is Deep Learning?**
- ❖ Need for Data Scientists
- ❖ Foundation of Data Science
- ❖ What is Business Intelligence
- ❖ What is Data Analysis
- ❖ What is Data Mining

- ❖ **What is Machine Learning?**
- ❖ **Analytics vs Data Science**
- ❖ Value Chain
- ❖ Types of Analytics
- ❖ Lifecycle Probability
- ❖ Analytics Project Lifecycle
- ❖ Advantage of Deep Learning over Machine learning
- ❖ Reasons for Deep Learning
- ❖ Real-Life use cases of Deep Learning
- ❖ Review of Machine Learning

- ❖ **Data**
- ❖ Basis of Data Categorization
- ❖ Types of Data
- ❖ Data Collection Types
- ❖ Forms of Data & Sources
- ❖ Data Quality & Changes
- ❖ Data Quality Issues
- ❖ Data Quality Story
- ❖ What is Data Architecture
- ❖ Components of Data Architecture
- ❖ OLTP vs OLAP
- ❖ How is Data Stored?

- ❖ **Big Data**
- ❖ What is Big Data?

- ❖ 5 Vs of Big Data
- ❖ Big Data Architecture
- ❖ Big Data Technologies
- ❖ Big Data Challenge
- ❖ Big Data Requirements
- ❖ Big Data Distributed Computing & Complexity
- ❖ Hadoop
- ❖ Map Reduce Framework
- ❖ Hadoop Ecosystem

- ❖ **Data Science Deep Dive**
- ❖ What Data Science is
- ❖ Why Data Scientists are in demand
- ❖ What is a Data Product
- ❖ The growing need for Data Science
- ❖ Large Scale Analysis Cost vs Storage
- ❖ Data Science Skills
- ❖ Data Science Use Cases
- ❖ Data Science Project Life Cycle & Stages
- ❖ Data Acquisition
- ❖ Where to source data
- ❖ Techniques
- ❖ Evaluating input data
- ❖ Data formats
- ❖ Data Quantity
- ❖ Data Quality
- ❖ Resolution Techniques
- ❖ Data Transformation
- ❖ File format Conversions
- ❖ Anonymization

- ❖ **Python**
- ❖ Python Overview
- ❖ About Interpreted Languages
- ❖ Advantages/Disadvantages of Python pydoc.
- ❖ Starting Python
- ❖ Interpreter PATH
- ❖ Using the Interpreter
- ❖ Running a Python Script

- ❖ Using Variables
- ❖ Keywords
- ❖ Built-in Functions
- ❖ Strings Different Literals
- ❖ Math Operators and Expressions
- ❖ Writing to the Screen
- ❖ String Formatting
- ❖ Command Line Parameters and Flow Control.
- ❖ Lists
- ❖ Tuples
- ❖ Indexing and Slicing
- ❖ Iterating through a Sequence
- ❖ Functions for all Sequences

- ❖ **Operators and Keywords for Sequences**
- ❖ The xrange() function
- ❖ List Comprehensions
- ❖ Generator Expressions
- ❖ Dictionaries and Sets.

- ❖ **Numpy & Pandas**
- ❖ Learning NumPy
- ❖ Introduction to Pandas
- ❖ Creating Data Frames
- ❖ Grouping/Sorting
- ❖ Plotting Data
- ❖ Creating Functions
- ❖ Slicing/Dicing Operations

- ❖ **Deep Dive – Functions & Classes & Oops**
- ❖ Functions
- ❖ Function Parameters
- ❖ Global Variables
- ❖ Variable Scope and Returning Values. Sorting
- ❖ Alternate Keys
- ❖ Lambda Functions
- ❖ Sorting Collections of Collections
- ❖ Classes & OOPs

❖ **Statistics**

- ❖ What is Statistics
- ❖ Descriptive Statistics
- ❖ Central Tendency Measures
- ❖ The Story of Average
- ❖ Dispersion Measures
- ❖ Data Distributions
- ❖ Central Limit Theorem
- ❖ What is Sampling
- ❖ Why Sampling
- ❖ Sampling Methods
- ❖ Inferential Statistics
- ❖ What is Hypothesis testing
- ❖ Confidence Level
- ❖ Degrees of freedom
- ❖ what is pValue
- ❖ Chi-Square test
- ❖ What is ANOVA
- ❖ Correlation vs Regression
- ❖ Uses of Correlation & Regression

❖ **Machine Learning, Deep Learning & AI using Python**

- ❖ Introduction
- ❖ ML Fundamentals
- ❖ ML Common Use Cases
- ❖ Understanding Supervised and Unsupervised Learning Techniques

❖ **Clustering**

- ❖ Similarity Metrics
- ❖ Distance Measure Types: Euclidean, Cosine Measures
- ❖ Creating predictive models
- ❖ Understanding K-Means Clustering
- ❖ Understanding TF-IDF, Cosine Similarity and their application to Vector Space Model
- ❖ Case study

❖ **Implementing Association rule mining**

- ❖ What is Association Rules & its use cases?
- ❖ What is Recommendation Engine & it's working?
- ❖ Recommendation Use-case

- ❖ Case study

- ❖ **Understanding Process flow of Supervised Learning Techniques**
- ❖ Decision Tree Classifier
- ❖ How to build Decision trees
- ❖ What is Classification and its use cases?
- ❖ What is Decision Tree?
- ❖ Algorithm for Decision Tree Induction
- ❖ Creating a Decision Tree
- ❖ Confusion Matrix
- ❖ Case study

- ❖ **Random Forest Classifier**
- ❖ What is Random Forests
- ❖ Features of Random Forest
- ❖ Out of Box Error Estimate and Variable Importance
- ❖ Case study

- ❖ **Naive Bayes Classifier**
- ❖ Case study

- ❖ **Project Discussion**
- ❖ **Problem Statement and Analysis**
- ❖ Various approaches to solve a Data Science Problem
- ❖ Pros and Cons of different approaches and algorithms.

- ❖ **Linear Regression**
- ❖ Case study
- ❖ Introduction to Predictive Modeling
- ❖ Linear Regression Overview
- ❖ Simple Linear Regression
- ❖ Multiple Linear Regression

- ❖ **Logistic Regression**
- ❖ Case study
- ❖ Logistic Regression Overview
- ❖ Data Partitioning
- ❖ Univariate Analysis
- ❖ Bivariate Analysis

- ❖ Multicollinearity Analysis
- ❖ Model Building
- ❖ Model Validation
- ❖ Model Performance Assessment AUC & ROC curves
- ❖ Scorecard

- ❖ **Support Vector Machines**
- ❖ Case Study
- ❖ Introduction to SVMs
- ❖ SVM History
- ❖ Vectors Overview
- ❖ Decision Surfaces
- ❖ Linear SVMs
- ❖ The Kernel Trick
- ❖ Non-Linear SVMs
- ❖ The Kernel SVM

- ❖ **Time Series Analysis**
- ❖ Describe Time Series data
- ❖ Format your Time Series data
- ❖ List the different components of Time Series data
- ❖ Discuss different kind of Time Series scenarios
- ❖ Choose the model according to the Time series scenario
- ❖ Implement the model for forecasting
- ❖ Explain working and implementation of ARIMA model
- ❖ Illustrate the working and implementation of different ETS models
- ❖ Forecast the data using the respective model
- ❖ What is Time Series data?
- ❖ Time Series variables
- ❖ Different components of Time Series data
- ❖ Visualize the data to identify Time Series Components
- ❖ Implement ARIMA model for forecasting
- ❖ Exponential smoothing models
- ❖ Identifying different time series scenario based on which different Exponential Smoothing model can be applied
- ❖ Implement respective model for forecasting
- ❖ Visualizing and formatting Time Series data
- ❖ Plotting decomposed Time Series data plot
- ❖ Applying ARIMA and ETS model for Time Series forecasting

- ❖ Forecasting for given Time period
- ❖ Case Study

- ❖ **Machine Learning Project**
- ❖ **Machine learning algorithms Python**
- ❖ Various machine learning algorithms in Python
- ❖ Apply machine learning algorithms in Python

- ❖ **Feature Selection and Pre-processing**
- ❖ How to select the right data
- ❖ Which are the best features to use
- ❖ Additional feature selection techniques
- ❖ A feature selection case study
- ❖ Preprocessing
- ❖ Preprocessing Scaling Techniques
- ❖ How to preprocess your data
- ❖ How to scale your data
- ❖ Feature Scaling Final Project

- ❖ **Which Algorithms perform best**
- ❖ Highly efficient machine learning algorithms
- ❖ Bagging Decision Trees
- ❖ The power of ensembles
- ❖ Random Forest Ensemble technique
- ❖ Boosting – Adaboost
- ❖ Boosting ensemble stochastic gradient boosting
- ❖ A final ensemble technique

- ❖ **Model selection cross validation score**
- ❖ Introduction Model Tuning
- ❖ Parameter Tuning GridSearchCV
- ❖ A second method to tune your algorithm
- ❖ How to automate machine learning
- ❖ Which ML algo should you choose
- ❖ How to compare machine learning algorithms in practice

- ❖ **Text Mining& NLP**
- ❖ Sentimental Analysis
- ❖ Case study

- ❖ **PySpark and MLlib**
- ❖ Introduction to Spark Core
- ❖ Spark Architecture
- ❖ Working with RDDs
- ❖ Introduction to PySpark
- ❖ Machine learning with PySpark – MLlib

- ❖ **Deep Learning & AI using Python**
- ❖ **Deep Learning & AI**
- ❖ Case Study
- ❖ Deep Learning Overview
- ❖ The Brain vs Neuron
- ❖ Introduction to Deep Learning

- ❖ **Introduction to Artificial Neural Networks**
- ❖ The Detailed ANN
- ❖ The Activation Functions
- ❖ How do ANNs work & learn
- ❖ Gradient Descent
- ❖ Stochastic Gradient Descent
- ❖ Backpropagation
- ❖ Understand limitations of a Single Perceptron
- ❖ Understand Neural Networks in Detail
- ❖ Illustrate Multi-Layer Perceptron
- ❖ Backpropagation – Learning Algorithm
- ❖ Understand Backpropagation – Using Neural Network Example
- ❖ MLP Digit-Classifer using TensorFlow
- ❖ Building a multi-layered perceptron for classification
- ❖ Why Deep Networks
- ❖ Why Deep Networks give better accuracy?
- ❖ Use-Case Implementation
- ❖ Understand How Deep Network Works?
- ❖ How Backpropagation Works?
- ❖ Illustrate Forward pass, Backward pass
- ❖ Different variants of Gradient Descent

- ❖ **Convolutional Neural Networks**
- ❖ Convolutional Operation

- ❖ Relu Layers
- ❖ What is Pooling vs Flattening
- ❖ Full Connection
- ❖ Softmax vs Cross Entropy
- ❖ " Building a real world convolutional neural network for image classification"

- ❖ **What are RNNs – Introduction to RNNs**
- ❖ Recurrent neural networks rnn
- ❖ LSTMs understanding LSTMs
- ❖ long short term memory neural networks lstm in python

- ❖ **Restricted Boltzmann Machine (RBM) and Autoencoders**
- ❖ Restricted Boltzmann Machine
- ❖ Applications of RBM
- ❖ Introduction to Autoencoders
- ❖ Autoencoders applications
- ❖ Understanding Autoencoders
- ❖ Building a Autoencoder model

- ❖ **Tensorflow with Python**
- ❖ Introducing Tensorflow
- ❖ Introducing Tensorflow
- ❖ Why Tensorflow?
- ❖ What is tensorflow?
- ❖ Tensorflow as an Interface
- ❖ Tensorflow as an environment
- ❖ Tensors
- ❖ Computation Graph
- ❖ Installing Tensorflow
- ❖ Tensorflow training
- ❖ Prepare Data
- ❖ Tensor types
- ❖ Loss and Optimization
- ❖ Running tensorflow programs

- ❖ **Building Neural Networks using**
- ❖ **Tensorflow**
- ❖ Tensors
- ❖ Tensorflow data types

- ❖ CPU vs GPU vs TPU
- ❖ Tensorflow methods
- ❖ Introduction to Neural Networks
- ❖ Neural Network Architecture
- ❖ Linear Regression example revisited
- ❖ The Neuron
- ❖ Neural Network Layers
- ❖ The MNIST Dataset
- ❖ Coding MNIST NN
- ❖ **Deep Learning using**
- ❖ **Tensorflow**
- ❖ Deepening the network
- ❖ Images and Pixels
- ❖ How humans recognise images
- ❖ Convolutional Neural Networks
- ❖ ConvNet Architecture
- ❖ Overfitting and Regularization
- ❖ Max Pooling and ReLU activations
- ❖ Dropout
- ❖ Strides and Zero Padding
- ❖ Coding Deep ConvNets demo
- ❖ Debugging Neural Networks
- ❖ Visualising NN using Tensorflow
- ❖ Tensorboard

- ❖ **Transfer Learning using**
- ❖ **Keras and TFLearn**
- ❖ Transfer Learning Introduction
- ❖ Google Inception Model
- ❖ Retraining Google Inception with our own data demo
- ❖ Predicting new images
- ❖ Transfer Learning Summary
- ❖ Extending Tensorflow
- ❖ Keras
- ❖ TFLearn
- ❖ Keras vs TFLearn Comparison

- ❖ **Resume Preparation & Mock Interview**



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THANK YOU..

PHONE: +91 9765118884

EMAIL: rpbhole9@gmail.com