Data Science and Artificial Intelligence with Python including Deep Learning and NLP

Learn Python like a Professional with complete hands-on in class room itself. Start from the basics and go all the way to creating your own applications in Python.

This course will include more than 20 assignments and evaluation checkpoints. We will also have 4 mid- way milestones project to make you comfortable with whatever is taught. Also, there will be a final project to give you a feel of real-life scenario and how it is to create a full application starting from scratch.

Section 1 – Introduction to Python

* What is Python and brief history
* Why Python and who use Python
* Discussion on Python 2 and 3
* Unique features of Python
* Discussion on various IDE’s
* Demonstration of practical use cases
* Python use cases using data analysis

Section 2 – Setting up and installations

* Installing python
* Setting up Python environment for development
* Installation of Jupyter Notebook
* How to access our course material using Jupyter
* Write your first program in python

Section 3 – Python object and data structures operations

* Introduction to Python objects
* Python built-in functions
* Number objects and operations
* Variable assignment and keywordsString objects and operations
* Print formatting with strings
* List objects and operations
* Tuple objects and operations
* Dictionary objects and operations
* Sets and Boolean
* Object and data structures assessment test

Section 4 – Python statements

* Introduction to Python statements
* If, elif and else statements
* Comparison operators
* Chained comparison operators
* What are loops
* For loops
* While loops
* Useful operators
* List comprehensions
* Statement assessment test
* Game challenge

Section 5 - UDF functions and methods

* Methods
* What are various types of functions
* Creating and calling user defined functions
* Function practice exercises
* Lambda Expressions
* Map and filter
* Nested statements and scope
* Args and kwargs
* Functions and methods assignment

Milestone Project (Making tic-tac-toe in python)

Section 6 - File and exception handling

* Process files using python
* Read/write and append file object
* File functions
* File pointer and operations
* Introduction to error handling
* Try, except and finally
* Python standard exceptions
* User defined exceptions
* Unit testing
* File and exceptions assignment

Section 7 - Python modules and packages

* Python inbuilt modules
* Creating UDM-User defined modules
* Passing command line arguments
* Writing packages
* Define PYTHONPATH
* \_\_name\_\_ and \_\_main\_\_

Section 8 – Object oriented programming

* Object oriented features
* Implement object oriented with Python
* Creating classes and objects
* Creating class attributes
* Creating methods in a class
* Inheritance
* Polymorphism
* Special methods for class

Assignment - Creating a python script to replicate deposits and withdrawals in a bank with appropriate classes and UDFs.

Section 9 - Advanced Python Modules

* Collections module
* Datetime
* Python debugger
* Timing your code
* Regular expressions
* StringIO
* Python decorators
* Python generators

Section 10 – Package installation and parallel processing

* Install packages on python
* Introduction to pip, easy install
* Multithreading
* Multiprocessing

POC - Implementing edit distance algorithm using python to give suggestions on mistypes.(like google suggestions)

Section 11 – Introduction to Machine learning with Python

* Understanding Machine Learning
* Scope of ML
* Supervised and Unsupervised learning
* Milestone Project – 2

Section 12 - Data Analysis with Python

* Introduction to data analysis
* Why Data analysis?
* Data analysis and Artificial intelligence bridge
* Introduction to Data Analysis libraries
* Data analysis introduction assignment challenge

POC - Integration maps with python using folium. (This project involves creation of html files using python to display location based pointers on maps)

Section 13 – Data analysis using Numpy

* Introduction to Numpy arrays
* Creating and applying functions
* Numpy Indexing and selection
* Numpy Operations
* Exercise and assignment challenge

Section 14 – Pandas and advanced analysis

* Pandas series
* Introduction to DataFrames
* Missing data
* Groupby
* Merging, joining and Concatenating
* Operations
* Data Input and Output
* Pandas in depth coding exercises

POC - Analysis of e-commerce dataset using pandas

POC - Getting insights on employee salaries data using data analysis in python

Section 15 – Data visualization with Python

* Plotting using Matplotlib

✓ Plotting Numpy arrays

✓ Plotting using object-oriented approach

✓ Subplots using matplotlib

✓ Matplotlib attributes and functions

✓ Matplotlib exercises

* Seaborn visualization

✓ Categorical Plot using Seaborn

✓ Distributional plots using Seaborn

✓ Matrix plots

✓ Grids

✓ Seaborn exercises

Project - Data capstone project to do analysis and visualizations on 911 emergency call data.

Project - Getting insights using python analysis and visualizations on finance credit score data.

Pandas built-in data visualization

Data visualization assignment

Section 16- Machine learning Algorithms

* Linear Regression with Python

✓ Introduction to Regression

✓ Exercise on Linear Regression using Scikit Learn Library

✓ Project on Linear regression using USA\_HOUSING data

✓ Evaluation of Linear regression using python visualizations

✓ Practice project for Linear regression

Classification algorithms

* Logistic regression with Python

✓ Regression vs classification

✓ Exercise on Logistic Regression using Scikit Learn Library

✓ Project on Logistic regression using Titanic dataset

✓ Handling missing values

✓ Handling categorical data

✓ Evaluation of model using confusion matrix and classification report

✓ Practice project on Logistic Regression using advertisement data set to predict appropriate advertisements for users.

* K- Nearest neighbors using Python

✓ Exercise on K- Nearest neighbors using Scikit Learn Library

✓ Project on Logistic regression using Dogs and horses’ dataset

✓ Getting the correct number of clusters

✓ Evaluation of model using confusion matrix and classification report

✓ Standard scaling problem

✓ Practice project on KNN algorithm.

* Decision tree and Random forest with python

✓ Intuition behind Decision trees

✓ Implementation of decision tree using a real time dataset

✓ Ensemble learning

✓ Decision tree and random forest for regression

✓ Decision tree and random forest for classification

✓ Evaluation of the decision tree and random forest using different methods

✓ Practice project on decision tree and random forest using social network data to predict if someone will purchase an item or not.

* Support vector machines

✓ Linearly separable data

✓ Non-linearly separable data

✓ SVM project with telecom dataset to predict the users portability

Principal component analysis

* PCA introduction
* Need for PCA
* Implementation to select a model on breast-cancer dataset.

Model evaluation

Bias variance trade-off

Accuracy paradox

CAP curve and analysis

* Clustering in unsupervised learning

✓ K-means clustering intuition

✓ Implementation of K-means with Python using mall customers data to implement clusters on the basis of spending and income.

✓ Hierarchical clustering intuition

✓ Implementation of Hierarchical clustering with python

* Association algorithms

✓ Apriori theory and explanation

✓ Market basket analysis.

✓ Implementation of Apriori

✓ Evaluation of association learning

POC - To make a model to predict the relationship between frequently bought products together on the given dataset from a supermarket..

* Natural Language processing with Deep Learning

✓ Introduction to Natural Language processing

✓ NLTK Python library.

✓ Exercise on NLTK

POC - Apply NLP techniques to understand reviews given by customers in a dataset and predict if a review is good/bad without human intervention.

✓ Neural Net and Deep Learning

✓ What is TensorFlow?

✓ TensorFlow Installation.

✓ TensorFlow basics.

✓ MNIST with Multilayer perceptron

✓ TensorFlow with Contrib Learn

✓ TensorFlow Exercise

✓ What is Keras?

✓ Keras Basics.

✓ Pipeline implementation using Keras.

✓ MNIST implementation with Keras.

Section 17 – REST APIs with flask and python

* REST principles
* Creating application endpoints
* Implementing endpoints
* Using Postman for API testing

Section- 18 REST API integration with databases for web app development

* CRUD operations on database.
* REST principles and connectivity to databases.
* Creating a web development API for login register and connecting it to database.
* Deploy the API on local server.

Final Project

* False alarm detection system
* Form extraction service