Data Science Professional

Course Highlights

Modules(Total 8)

- Python
- SQL (With MySQL)
- NOSQL (With MongoDB)
- Statistics
- Power BI
- Adv. Excel & VBA
- Machine Learning
- Deep Learning & Neural Networks (AI)

Projects(Total 8)

- 1 Project in Python & SQL
- 1 Dashboard/Report in power BI
- 3 Projects in ML
- 3 Projects in DL/AI

Duration

- Course duration: 8 months
- course validity: 1 Year

Python

Introduction To Python

- Why Python
- Application Areas of Python
- Python Implementations
  - Cpython
  - Jython
  - IronPython
  - PyPy
- Python Versions
- Installing Python
- Python Interpreter Architecture
  - Python Byte Code Compiler
  - Python Virtual Machine(PVM)

Writing and Executing First Python Program

- Using Interactive Mode
- Using Script Mode
    - General Text Editor and Command Window
    - IDLE Editor and IDLE Shell
- Understanding print() function
- How to compile python program explicitly

Python Language Fundamentals

- Character Set
- Keywords
- Comments
- Variables
- Literals
- Operators
- Reading input from console
- Type conversion

Python Conditional Statements

- If Statement
- If else Statement
- If elif Statement
- If elif else Statement
- Nested If Statement

Looping Statements

- While Loop
- For Loop
- Nested Loops
- Pass ,Break and Continue keywords

Standard Data Types

- int , float , complex
- bool , NoneType
- str , list , tuple
- dict , set , frozenset

String Handling

- What is string
- String representations
- Unicode String
- String Functions, Methods
- String Repetition and concatenation
- String Indexing and Slicing
- String Formatting

Python List

- Creating and Accessing Lists
- Indexing and Slicing Lists
- List Methods
- Nested Lists
- List Comprehension

Python Tuple

- Creating Tuple
- Accessing Tuple
- Immutability of tuple

Python Set

- How to create a set
- Iteration Over Sets
- Python Set Methods
- Python Frozenset

Python Dictionary

- Creating a Dictionary
- Dictionary Methods
- Accessing values from Dictionary
- Updating dictionary
- Iterating dictionary
- Dictionary Comprehension

Python Functions

- Defining a Function
- Calling a Function
- Types of Functions
- Function v/s Method
- Function Arguments
    - Positional arguments , Keyword arguments ,
    - Default arguments , Non default arguments ,
    - Arbitrary arguments ,Keyword Arbitrary arguments
- Function Return Statement
- Nested Function
- Function as argument
- Function as return statement
- Decorator function
- Closure
- map(),filter() ,reduce(),any() functions
- Anonymous or lambda Function

Modules & Packages

- Why Modules

- Script v/s Module
- Importing Module
- Standard & Third Party Modules
- Why Packages
- Understanding pip utility

File I/O

- Introduction to File Handling
- File modes
- Functions and methods related to File Handling
- Understanding with block

Object Oriented Programming

- Procedural v/s Object Oriented Programming
- OOP Principles
- Defining a Class & Object Creation
- Inheritance
- Encapsulation
- Polymorphism
- Abstraction
- Garbage Collection
- Iterator & Generator

Exception Handling

- Difference Between Syntax Errors and Exceptions
- Keywords used in Exception Handling
    - try , except , finally , raise , assert
- Types of Except Blocks
- User-defined Exceptions

GUI Programming

- Introduction to Tkinter Programming
- Tkinter Widgets
    - Tk , Label , Entry , TextBox , Buttons
    - Frame , messagebox , filedialogetc
- Layout Managers
- Event handling
- Displaying image

Multi-Threading Programming

- Multi-processing v/s Multi-threading
- Need of threads
- Creating child threads
- Functions /methods related to threads

- Thread synchronization and locking

Regular Expressions(Regex)

- Need of regular Expressions
- re module
- Functions /Methods related to regex
- Meta Characters & Special Sequences

SQL

Introduction to Database

- Database Concepts
- What is Database Package?
- Understanding Data Storage
- Relational Database (RDBMS) Concept

SQL (Structured Query Language)

- SQL Basics
- DML, DDL & DQL
- DDL: Create,Alter,Drop
- SQL Constraints:
  - NOT NULL, UNIQUE,
  - PRIMARY & FOREIGN KEY, COMPOSITE KEY
  - CHECK, DEFAULT
- DML: Insert, Update, Delete and Merge
- DQL : Select
- SELECT DISTINCT
- SQL WHERE
- SQL Operators
- SQL LIKE
- SQL ORDER BY
- SQL Aliases
- SQL Views
- SQL JOINS
  - INNER JOIN
  - LEFT (OUTER) JOIN
  - RIGHT (OUTER) JOIN

- FULL (OUTER) JOIN

MySQL Functions

- String Functions
  - CHAR_LENGTH
  - CONCAT
  - LOWER
  - REVERSE
  - UPPER
- Numeric Functions
  - MAX, MIN, SUM
  - AVG, COUNT, ABS
- Date Functions
  - CURDATE
  - CURTIME
  - NOW

Statistics & Analytics:

Introduction to Statistics

- Sample or Population
- Measures of Central Tendency
  - Arithmetic Mean
  - Harmonic Mean
  - Geometric Mean
  - Mode
  - Quartile
    - First quartile
    - Second quartile(Median)
    - Third quartile
  - Standard Deviation
- DataDistributions
  - Normal Distribution
  - Uniform Distribution
  - Right & Left Skewed Distribution

Hypothesis Testing

- Normality Test
- Central Limit Theorem
- Mean Test
  - T-test
  - Z-test
  - ANOVA test
- Chi Square Test
- Correlation and Covariance

Numpy Package

- Difference between list and numpy array
- Vector and Matrix operations
- Array indexing and slicing

Pandas Package

Introduction to pandas

- Labeled and structured data
- Series and DataFrame Objects

How to load datasets

- From excel
- From csv
- From html table

Accessing data from Data Frame

- at & iat
- loc & iloc
- head() & tail()

Exploratory Data Analysis (EDA)

- Describe()
- Groupby()
- Crosstab()
- boolean slicing / query()

Data Manipulation & Cleaning

- Map(),apply()

- Combining data frames
- Adding/removing rows & columns
- Sorting data
- Handling missing values
- Handling duplicacy
- Handling Data Error

Categorical Data Encoding

- Label Encoding
- One Hot Encoding

Handling Date and Time

Data Visualization using matplotlib and seaborn packages

- Scatter plot, lineplot, bar plot
- Histogram, pie chart,
- Jointplot, pairplot ,Heatmap
- Outlier detection using boxplot

POWER BI

INTRODUCTION TO POWER BI

- Introduction to Business Intelligence (BI)
- Various BI tools
- Introduction to Power BI
- Why Power BI
- Power BI Components
- Introduction of Power BI Desktop
- Installation of Power BI Desktop

DATA VISUALIZATION

- Understanding Power View and Power Map
- Data visualization techniques
- Page layout & Formatting
- Power BI Desktop visualization

- Formatting and customizing visuals
- Column chart, Pie chart, Donut chart,
- Scatter chart, Funnel chart
- Include & exclude
- Geographical data visualization using Maps
- Drill down
- Drill through
- Page navigations
- Bookmarks
- Selection pane to show/hide visuals
- Comparing volume and value-based analytics
- Combinations charts (dual axis charts)
- Filter pane
- Slicers
- Use of Hierarchies in drill down analysis
- Sync slicers
- Tooltips & custom tooltips
- Tables & matrix
- Conditional formatting on visuals

POWER BI SERVICE, PUBLISING & SHARING

- Introduction to Power BI Service
- Introduction of workspaces
- Dashboard
- Creating & Configuring Dashboards
- Dashboard theme
- Reports vs Dashboards
- Sharing reports & dashboards

DATA TRANSFORMATION – SHAPING & COMBINING DATA

- Shaping data using Power Query Editor
- Formatting data
- Transformation of data
- Understanding of Data types
- Naming conventions & best practices to consider
- Working with Parameters
- Merge Query
- Append Query
- Group by of data (aggregation of data)

- Duplicate & Reference tables
- Fill
- Pivot & Un-pivot of data
- Custom columns
- Conditional columns
- Replace data from the tables
- Split columns values
- Move columns & sorting of data
- Detect data type, count rows & reverse rows
- Promote rows as column headers
- Hierarchies in Power BI

DATA MODELING & DAX

- Introduction of relationships
- Creating relationships
- Cardinality
- Cross filter direction
- Use of inactive relationships
- Introduction of DAX
- Why DAX is used
- DAX syntax
- DAX functions
- Context in DAX
- Calculated columns using DAX
- Measures using DAX
- Calculated tables using DAX
- Learning about table, information, logical, text, iterator,
- Time intelligence functions (YTD, QTD, MTD)
- Cumulative values, calculated tables, and ranking and rank over groups
- Date and time functions

Machine Learning:

Introduction To Machine Learning

- Traditional v/s Machine Learning Programming
- Real life examples based on ML
- Steps of ML Programming
- Data Preprocessing revised
- Terminology related to ML

Supervised Learning

- Classification
- Regression

Unsupervised Learning

- clustering

KNN Classification

- Math behind KNN
- KNN implementation
- Understanding hyper parameters

Performance metrics

- Confusion Matrix
- Accuracy Score
- Recall & Precision
- F-1 Score
- R2 Score

Regression

- Math behind Regression
- Simple Linear Regression
- Multiple Linear Regression
- Polynomial Regression
- Boston Price Prediction
- Cost or Loss Functions
  - Mean absolute error
  - Mean squared error
  - Root mean squared error
  - Least Square Error
- Regularization

Logistic Regression for classification

- Theory of Logistic Regression
- Binary and Multiclass classification

- Implementing titanic dataset
- Implementing iris dataset
- Sigmoid and softmax functions

Support Vector Machines

- Theory of SVM
- SVM Implementation
- kernel,gamma,alpha

Decision Tree Classification

- Theory of Decision Tree
- Node Splitting
- Implementation with iris dataset
- Visualizing Tree

Ensemble Learning

- Random Forest
- Bagging and Boosting
- Voting Classifier

Model Selection Techniques

- Cross Validation
- Grid and Random Search for hyper parameter tuning

Recommendation System

- Content based technique
- Collaborative filtering technique
- Evaluating similarity based on correlation
- Classification-based recommendations

Clustering

- K-means Clustering
- Hierarchical Clustering
- Elbow technique
- Silhouette coefficient
- Dendogram

Text Analysis

- Install NLTK
- Tokenize words
- Tokenizing sentences
- Stop words customization

- Stemming and Lemmatization
- Feature Extraction
- Sentiment Analysis
- Count Vectorizer
- TfidfVectorizer
- Naive Bayes Algorithms
    - GaussianNB
    - MultinomialNB
    - BernoulliNB

Dimensionality Reduction

- Principal Component Analysis(PCA)

Open CV

- Reading images
- Understanding Gray Scale Image
- Resizing image
- Understanding Haar Classifiers
- Face , eyes classification
- How to use webcam in open cv
- Building image data set
- Capturing video
- Face classification in video

Deep Learning & Neural Network

Introduction To Artificial Neural Network

- What is Artificial Neural Network (ANN)?
- How Neural Network Works?
- Perceptron
- Multilayer Perceptron
- Feed Forward
- Back propagation

Introduction To Deep Learning

- What is Deep Learning?
- Deep Learning Packages
- Deep Learning Applications

- Building Deep Learning Environment
    - Installing Tensor Flow Locally
    - Understanding Google Colab

Tensor Flow Basics

- What is Tensorflow?
- Tensorflow 1.x V/S Tensorflow 2.x
- Variables, Constants
- Scalar, Vector, Matrix
- Operations using tensorflow
- Difference between tensorflow and numpy operations
- Computational Graph

Optimizers

- What does optimizers do?
- Gradient Descent (full batch and min batch)
- Stochastic Gradient Descent
- Learning rate , epoch

Activation Functions

- What does Activation Functions do?
- Sigmoid Function,
- Hyperbolic Tangent Function (tanh)
- ReLU –Rectified Linear Unit
- Softmax Function
- Vanishing Gradient Problem

Building Artificial Neural Network

- Using scikit implementation
- Using Tensorflow
- Understanding MNIST Dataset
- Initializing weights and biases
- Gradient Tape
- Defining loss/cost Function
- Train the Neural Network
- Minimizing the loss by adjusting weights and biases

Modern Deep Learning Optimizers and Regularization

- SGD with Momentum
- RMSprop
- AdaGrad

- Adam
- Dropout Layers and Regularization
- Batch Normalization

Building Deep Neural Network Using Keras

- What is Keras?
- Keras Fundamental For Deep Learning
- Keras Sequential Model and Functional API
- Solve a Linear Regression and Classification Problem with Example
- Saving and Loading a Keras Model

Convolutional Neural Networks (CNNs)

- Introduction to CNN
- CNN Architecture
- Convolutional Operations
- Pooling , Stride and Padding Operations
- Data Augmentation
- Building ,Training and Evaluating First CNN Model
- Model Performance Optimization
- Auto encoders for CNN
- Transfer Learning and Object Detection Using Pre-trained CNN Models
    - LeNet
    - AlexNet
    - VGG16
    - ResNet50
    - Yolo algorithm

Word Embedding

- What is Word Embedding?
- Word2Vec Embedding
    - CBOW
    - skipgram
- Keras Embedding Layers
- Visualize Word Embedding
- Google Word2Vec Embedding
- GloVe Embedding

Recurrent Neural Networks (RNNs)

- Introduction to RNN
- RNN Architecture

- Types of RNN
- Implementing basic RNN in tensorflow
- Need for LSTM and GRU
- Deep RNN/LSTM/GRU
- Text Classification Using LSTM
- Prediction for Time Series problem
- Bidirectional RNN/LSTM
- Seq-2-Seq Modeling
- Encoder-Decoder Model
- Attention Mechanism

Generative Adversarial Networks (GANs)

- Introduction to GAN
- Generator
- Discriminator
- Types of GAN
- Implementing GAN using Neural Network

Speech Recognition APIs

- Text To Speech
- Speech To Text
- Automate task using voice
- Voice Search on Web

Integration of ChatGPT API with Python

- Introduction to ChatGPT
- Understanding openai library
- Registering for an API key
- API documentation and resources
- Type of ChatGPT Models
- Generating Images from ChatGPT API
- Image Captioning using ChatGPT API
- Building a Chatbot with ChatGPT API and Python

Projects(Any Five)

- Stock Price Prediction Using LSTM
- Object Detection
- Attendance System Using Face Recognition
- Facial Expression and Age Prediction
- Chabot Application

- Neural Machine Translation
- Hand Written Digits& Letters Prediction
- Number Plate Recognition
- Gender Classification
- My Assistant for Desktop
- Suspect Detection using CCTV
- Hardware operations using gesture detection
- Cat v/s Dog Image Classification

Advanced Excel

Advanced Excel Course - Overview of the Basics of Excel

- Customizing common options in Excel
- Absolute and relative cells
- Protecting and un-protecting worksheets and cells

Working with Functions

- Writing conditional expressions (using IF)
- Using logical functions (AND, OR, NOT)
- Using lookup and reference functions (VLOOKUP, HLOOKUP, MATCH, INDEX)
- VlookUP with Exact Match, Approximate Match
- Nested VlookUP with Exact Match
- VlookUP with Tables, Dynamic Ranges
- Nested VlookUP with Exact Match
- Using VLookUP to consolidate Data from Multiple Sheets

Advanced Excel Course Data Validations

- Specifying a valid range of values for a cell
- Specifying a list of valid values for a cell
- Specifying custom validations based on formula for a cell

Advanced Excel Course Working with Templates

- Designing the structure of a template
- Using templates for standardization of worksheets

Advanced Excel Course Sorting and Filtering Data

- Sorting tables
- Using multiple-level sorting

- Using custom sorting
- Filtering data for selected view (AutoFilter)
- Using advanced filter options

Advanced Excel Course Working with Reports

- Creating subtotals
- Multiple-level subtotals
- Creating Pivot tables
- Formatting and customizing Pivot tables
- Using advanced options of Pivot tables
- Pivot charts
- Consolidating data from multiple sheets and files using Pivot tables
- Using external data sources
- Using data consolidation feature to consolidate data
- Show Value As (% of Row, % of Column, Running Total, Compare with Specific Field)
- Viewing Subtotal under Pivot
- Creating Slicers (Version 2010 & Above)

Advanced Excel Course More Functions

- Date and time functions
- Text functions
- Database functions
- Power Functions (CountIf, CountIFS, SumIF, SumIfS)

Advanced Excel Course Formatting

- Using auto formatting option for worksheets
- Using conditional formatting option for rows, columns and cells

Advanced Excel Course Macros

- Relative & Absolute Macros
- Editing Macro's

Advanced Excel Course WhatIf Analysis

- Goal Seek
- Data Tables
- Scenario Manager

Advanced Excel Course Charts

- Using Charts
- Formatting Charts
- Using 3D Graphs

- Using Bar and Line Chart together
- Using Secondary Axis in Graphs
- Sharing Charts with PowerPoint / MS Word, Dynamically
- (Data Modified in Excel, Chart would automatically get updated)

Advanced Excel Course New Features Of Excel

- Sparklines, Inline Charts, data Charts
- Overview of all the new features

Advanced Excel Course Final Assignment

- The Final Assignment would test contains questions to be solved at the end of the Course

VBA (VISUAL BASIC FOR APPLICATION) & MACROS

Create a Macro:

- Swap Values, Run Code from a Module, Macro Recorder, Use Relative References,
- FormulaR1C1, Add a Macro to the Toolbar, Macro Security, Protect Macro.

MsgBox:

- MsgBox Function, Input Box Function.

Workbook and Worksheet Object:

- Path and Full Name, Close and Open, Loop through Books and Sheets, Sales Calculator, Files in a Directory, Import Sheets, Programming Charts.

Range Object:

- Current Region, Dynamic Range, Resize, Entire Rows and Columns, Offset, From Active Cell to Last Entry, Union and Intersect, Test a Selection, Possible Football Matches, Font, Background Colors, Areas Collection, Compare Ranges.

Variables:

- Option Explicit, Variable Scope, Life of Variables.

If Then Statement:

- Logical Operators, Select Case, Tax Rates, Mod Operator, Prime Number Checker, Find Second Highest Value, Sum by Color, Delete Blank Cells.

Loop:

- Loop through Defined Range, Loop through Entire Column, Do Until Loop, Step Keyword, Create a Pattern, Sort Numbers, Randomly Sort Data, Remove Duplicates, Complex Calculations, Knapsack Problem.

Macro Errors:

- Debugging, Error Handling, Err Object, Interrupt a Macro, Macro Comments.

String Manipulation:

- Separate Strings, Reverse Strings, Convert to Proper Case, Count Words.

Date and Time:

- Compare Dates and Times, DateDif Function, Weekdays, Delay a Macro, Year Occurrences, Tasks on Schedule, Sort Birthdays.

Events:

- Before DoubleClick Event, Highlight Active Cell, Create a Footer Before Printing, Bills and Coins, Rolling Average Table
- .

Array:

- Dynamic Array, Array Function, Month Names, Size of an Array.

Function and Sub:

- User Defined Function, Custom Average Function, Volatile Functions, ByRef and ByVal.

Application Object:

- Status Bar, Read Data from Text File, Write Data to Text File.

ActiveX Controls:

- Text Box, List Box, Combo Box, Check Box, Option Buttons, Spin Button, Loan Calculator.

User form:

- User form and Ranges, Currency Converter, Progress Indicator, Multiple List Box Selections, Multicolumn Combo Box, Dependent Combo Boxes, Loop through Controls, Controls Collection, User form with Multiple Pages, Interactive User form

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Plot No. 366, 2nd Floor,
Kohat Enclave, Pitampura,
(Near- Kohat Metro Station)
Above Allahabad Bank,
New Delhi- 110034.
70-70-90-50-90

SOUTH EXTENSION (DELHI)
D-27,South Extension-1
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GURGAON
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