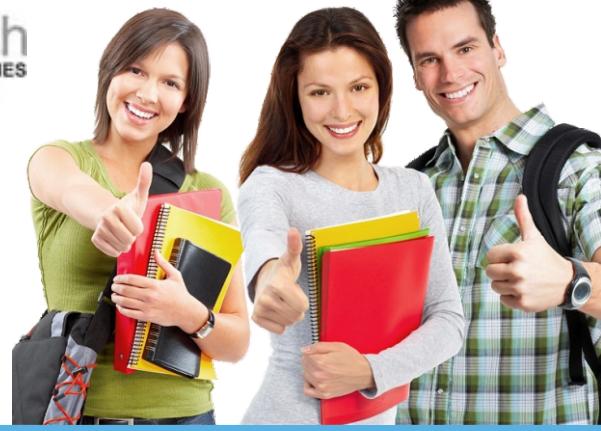


# Data Science



## 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
- Parsing string to int, float

### 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, range
- Dict, set, frozenset

## **String Handling**

- What is string
- String representations
- Unicode string
- String functions, methods
- 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 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 v/s 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

## **Regular Expressions(Regex)**

- Need of regular expressions
- Re module
- Functions /methods related to regex
- Meta characters & special sequences

## **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

## **ADV PYTHON**

### **NUMPY:**

- Creating NumPy arrays
- Indexing and slicing in NumPy
- Downloading and parsing data
- Creating multidimensional arrays
- NumPy Data types
- Array tributes
- Indexing and Slicing
- Creating array views copies
- Manipulating array shapes I/O

### **SCIPY:**

- Introduction to SciPy
- Create function
- modules of SciPy

### **PANDAS:**

- Using multilevel series
- Series and Data Frames
- Grouping, aggregating
- Merge DataFrames
- Generate summary tables
- Group data into logical pieces
- Manipulate dates
- Creating metrics for analysis
- Data wrangling
- Merging and joining
- Analytics Vidhya dataset-Loan Prediction Problem
- Data Mugging using Pandas
- Building a Predictive Model

## MATPLOTLIB:

- Scatter plot
- Bar charts, histogram
- Stack charts
- Legend title Style
- Figures and subplots
- Plotting function in pandas
- Labelling and arranging figures
- Save plots

## SEABORN:

- Style functions, Color palettes
- Distribution and Categorical plots
- Regression plots
- Axis grid objects

# SQL Using MySQL

## Introduction to RDBMS

- What is Relational Database Package
- Difference between SQL & Database
- Installing MySQL Server database

## SQL Basic

- DDL: Create, Alter, Drop, etc.
- DML: Insert, Update, Delete ,etc.
- DQL : Select
- Autoincrement field
- SQL Comments
- SQL Aliases
- Savepoint & rollback

## SQL Constraints

- Not NULL, Unique key
- Primary key, Check
- Default, Foreign key

## SQL Operators

- Arithmetic operators
- Logical operators
- Conditional operators
- Like, between, in operators

## SQL Clauses

- Order by
- Where
- Limit/top
- Group by
- having

## SQL Joins

- Inner Join
- Left Join
-

- Right Join
- Full Join

### **SQL View**

- creating view
- updating view
- fetching data from view

### **SQL Functions**

- String functions
- Aggregate functions
- Date & time functions

### **Stored Procedures & Functions**

- Understanding stored procedures and their key benefits
- Working with stored procedures
- Studying user-defined functions

### **Working with CSV Files:**

- How to write result to csv file
- How to read csv file

### **Python Database Connectivity**

- Database Drivers and connectors
- Creating connection object
- Understanding cursor object
- Executing SQL statements using cursor
- Fetching records from cursor
- Storing and retrieving Date and Time

## Statistics & Analytics

### **Introduction to Statistics**

- Sample or Population
- Measures of Central Tendency
- Arithmetic Mean
- Harmonic Mean
- Geometric Mean
- Mode
- Quartiles
- Variance & Standard Deviation
- Outliers

### **Data Distributions**

- Normal Distribution
- Uniform Distribution
- Exponential Distribution
- Right & Left Skewed Distribution
- Random Distribution
- Central Limit Theoremndard Deviation

# 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

## **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
- Dendrogram

# **Tableau**

## **Tableau - Home**

- Tableau - overview
- Tableau - environment setup
- Tableau - get started
- Tableau - navigation
- Tableau - design flow
- Tableau - file types
- Tableau - data types
- Tableau - show me
- Tableau - data terminology

## **Tableau – Data Sources**

- Tableau - custom data view
- Tableau - data sources
- Tableau - extracting data
- Tableau - fields operations
- Tableau - editing metadata
- Tableau - data joining
- Tableau - data blending

## **Tableau – Work Sheet**

- Tableau - add worksheets
- Tableau - rename worksheet
- Tableau - save & delete worksheet
- Tableau - reorder worksheet
- Tableau - paged worksheet

## **Tableau – Calculation**

- Tableau - operators
- Tableau - functions
- Tableau - numeric calculations
- Tableau - string calculations
- Tableau - date calculations
- Tableau - table calculations
- Tableau - Iod expressions

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## **Tableau –Sorting & Filter**

- Tableau – basic sorting
- Tableau – basic filters
- Tableau – quick filters
- Tableau - context filters
- Tableau – filters operations

## **Tableau – Charts**

- Tableau – bar chart
- Tableau – line chart
- Tableau - pie chart
- Tableau - crosstab
- Tableau - scatter plot
- Tableau - bubble chart
- Tableau - bullet graph
- Tableau - box plot
- Tableau - tree map
- Tableau - histogram
- Tableau - motion charts
- Tableau - waterfall charts
- Tableau - dashboard

## **Text Analysis**

- Install NLTK
- Tokenize words
- Tokenizing sentences
- Stop words customization
- Stemming and Lemmatization
- Feature Extraction
- Sentiment Analysis
- Count Vectorizer
- TfIdfVectorizer
- Naive Bayes Algorithms

## **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

## **Projects**

- One project using Python & SQL
- One project using Python & ML
- One Dashboard using Power bi

**Introduction to AI**

**Introduction to Deep Learning**