

Machine Learning Using Python



Python

Duration: 3.5 Months

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

Object Oriented Programming

- Procedural v/s object oriented programming
- OOP principles
- Defining a class & object creation
- Object attributes
- Inheritance
- Encapsulation
- Polymorphism

Exception Handling

- Difference between syntax errors and exceptions
- Keywords used in exception handling
 - try, except, finally, raise, assert
- Types of except blocks

Regular Expressions(Regex)

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

GUI Programming

- Introduction to tkinter programming
- Tkinter widgets
 - Tk, label, Entry, Textbox, Button
 - Frame, messagebox, filedialog etc
- 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

Statistics, Probability & 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

Probability Distributions

- Introduction to probability
- Conditional probability
- Normal distribution
- Uniform distribution
- Exponential distribution
- Right & left skewed distribution
- Random distribution
- Central limit theorem

Hypothesis Testing

- Normality test
- 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

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

- Math behind KNN
- KNN implementation
- Understanding hyper parameters

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
- Dendrogram

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
- Creating model for gender prediction

Projects

- Two project using Python & ML

Partners :



Java



development | consultancy | training

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