Data Edition

Tech-sisters

Python for Data Science

Data Structures and Algorithms

Python:

Python is an open source language which is very powerful but very easy to learn.

Its elegant syntax and dynamic typing together with its interpreted nature makes it an ideal language to use.

Download:

https://www.python.org/downloads/

Integrated Development Environment (IDE)

It is a software application that helps developers to developers to program a software code efficiently.

- Code editor
- Debugger
- Translator

To install a jupyter notebook

⇒ Pip install jupyter notebook
⇒ Install anaconda : https://www.anaconda.com/download/success

Visual Studio Code : https://code.visualstudio.com/

Then install jupyter notebook extension

Expressions, Operators and Procedures

Essentially **expressions** are combinations of values / variables / functions or other expressions

Example:

```
x  =   5
y  =  8
x+y
x*y
y/x
5+8
```

Operators are symbols or keywords that perform operations

Operators	Type
+, -, *, /, %	Arithmetic operator
<, <=, >, >=, ==, !=	Relational operator
&&, ||, !	Logical operator
&, |, <<, >>, -, ^	Bitwise operator
=, +=, -=, *=, %=	Assignment operator

Operators in Python

from: *geekforgeeeks*

Procedure/s is a set of instruction with defined steps to perform a specific task.

I/O functions

Output_function(*variable)*

```
print("Hello World!!")
```

```
 Hello World!!
```

Input_function(*instructions, input_area*)

```
input("Enter your name:")
```
Enter your name: [   ]

Import modules

A file containing a python code that can be reused severally through importing

```python
import os #operating system function
import sys #access to variables and functions
import math #mathematical functions
import random #pseudo-random numbers
import collection #counter -- additional data structures
import datetime
import urllib.request #fetching data from urls
```

Import Libraries

Collection of multiple modules

```python
import numpy as np #numericals
import pandas as pd #dataframe
import matplotlib #visualization
import sklearn #machine learning
import tensorflow as tf #deep learning
import nltk #Natural Language Processing
import sqlalchemy #databases connection
```

Both modules and libraries are ways for organizing and packaging code for reusability

DATA STRUCTURES AND ALGORITMS

Data structures and algorithms are basic principles that are used to solve simple and complex programming problems.

Software development/engineering: industries use these skills to optimize their systems, enhance code performance and also manage large scale data effectively.

Proficiency in data structures helps in efficient storage and organization of data while algorithms ensure the solutions are optimized.

Application of these concepts is witnessed in Machine Learning, AI, Data analytics.

Data Structures

Data structures is the format of storing data on a computer, making it easier to access, retrieve or modify.

Importance of Data structures

Data organization: they organize data in a logical manner

Data Abstraction: allows programmers to focus on the logical aspects of data manipulation.

Reusability: Common data structures can be reused in multiple applications

Efficient Data Management: Data structures enable efficient storage and retrieval of data, reduce processing and improving performance.

Algorthm optimization: The choice of appropriate data structure can significantly impact the efficiency of algorithms that operate on the data.

Application of Data structures

❖ Solving shortest problems
❖ Search through large data sets easily
❖ Implementation of dynamic memory allocation

Types of Data Structures

List

Tuples

Dictionaries

Set

Stacks

Queues

Linked lists

Algorithm

Termed as a set of rules that simply form a procedure or formula to solve a problem

Some problems are famous enough to have a name

Some algorithms are famous enough that they have a name