Advanced Python Programming

Course Objective:

This course introduces students to data visualization in the field of exploratory data science using Python.

Learning Outcomes:

Upon completion of this course, students will be able to:

- Learn use of objects & classes and perform data handling using Numpy arrays
- Do data manipulation using Pandas

UNIT-1:

- Object Oriented Programming: classes, objects and methods.
- File and exception handling: File handling through libraries; Errors and exception handling.
- Array Manipulation using Numpy: Numpy array: Creating Numpy arrays, Data Types for Numpy arrays, Arithmetic with NumPy Arrays Basic Indexing and Slicing.

UNIT-2:

Data Manipulation using Pandas: Data Structures in Pandas: Series, DataFrame, Index objects, Loading data into Pandas data frame. Working with Data frames. Grouped and aggregate calculations.

Text Books:

- ✓ *McKinney W. Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media, 2018.*
- ✓ *Chen D. Y, Pandas for Everyone: Python Data Analysis, Pearson, 2018.*
- ✓ *Balaguruswamy E. Introduction to Computing and Problem Solving using Python, 2nd*
- ✓ *edition, McGraw Hill Education, 2018*

Lab: Advanced Python Programming

1. Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese".
2. Write a python program to demonstrate various kinds of inheritance.
3. Write a python program to catch following exception i) Value Error ii) Index Error iii) Name Error iv) Type Error v) Divide Zero Error
4. a) Create a numpy array from list, tuple with float type
   b) Python program to demonstrate slicing, integer and boolean array indexing
5. a) Write a python program to find min, max, sum, cumulative sum of array.
   b) Write a python program to demonstrate use of ndim, shape, size, dtype.
6. a) Write a python program to implement Pandas Series with labels.
   b) Create a Pandas Series from a dictionary.
   c) Creating a Pandas DataFrame.
   d) Write a program which makes use of following Pandas methods
      i) describe () ii) head() iii) tail()
7. a) Write a program that converts Pandas DataFrame and Series into numpy.array.

b) Write a program that demonstrates the column selection, column addition, and column deletion.
c) Write a program that demonstrates the row selection, row addition, and row deletion.
d) Get n-largest and n-smallest values from a particular column in Pandas dataFrame

8. a) Write a program which use pandas inbuilt visualization to plot following graphs:
   i. Histograms ii. Line plots iii. Scatter plots iv. Bar plots
   b) Write a program to demonstrate use of groupby() method.
9. a) Write a program to demonstrate pandas Merging, Joining and Concatenating
   b) Creating dataframes from csv and excel files.
10. Write a Python program using pandas that finds Missing Data and replace missing data.

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