

School of Computer Science Engineering and Technology

Course- BTech

Course Code- CSEL301

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Type- Core

Course Name-AIML

Semester- Odd

Batch- 5th Sem

1 - Lab Assignment No. 1.1

Objective: To use NumPy python library and perform various Pre-processing operations

Part A

1. Creating NumPy arrays (10)

- Check the version of NumPy and create 1D, 2D arrays.
- Check the data type and dimension of created arrays
- Find the size of each element in the arrays.
- Find the number of rows and columns of 2D array.
- An array of shape (2, 3) given, reshape the array into (3, 2).

2. Slicing of arrays (10)

- A 1D array is given as [4, 5, 6, 3, 9, 7]. Slice the array to get [6, 3, 9].
- A 2D array is given as [[1, 2, 3] [4, 5, 6]]. Slice the array to get [[1, 2]].

3. Join and splitting of NumPy Arrays (15)

- Concatenate two 1D arrays [4,5,6,7] and [3,4,1].
- Perform concatenation of two 2D arrays in row-by-row manner.
- Split the array [4, 5, 6, 3, 9,] into 3 sub-arrays.
- Split the array the 2D array [[1, 2, 3] [4, 5, 6],[7, 8, 9],[10, 11, 12]] into 3 sub-arrays.

4. Searching elements in an array (10)

- Given an array [1, 2, 3, 4, 5, 4, 4]. Find the index of element 4.
- Given a 2d array [[1, 2, 3],[4, 5, 6],[7, 8, 9],[10, 11, 12]]. Find the index of element 5.
- Given an array [1, 2, 3, 4, 5, 6, 7, 8], find out the indices of odd elements and even elements.

5. Sorting of Arrays (10)

- Sort the elements of given 1D array [6, 5, 1, 2, 9, 10, 36, 7] in ascending and descending order.
- Sort the elements of given 2D array [[5, 3, 7], [8, 10, 6], [40, -2, 7]] in ascending and descending order.

6. Random number generation in NumPy arrays (15)

- Generate a 1-D array containing 6 random integers from 0 to 20.
- Generate a 1-D array containing 5 random floats.
- Generate a 2-D array with 3 rows, each row containing 5 random integers from 0 to 50.
- Generate a 2-D array with 3 rows, each row containing 5 random numbers.
- Given a 1-D array [6, 5, 1, 2, 9, 10, 36, 7]. Shuffle the elements of the array randomly.
- Given a 2-D array [[1, 2, 3] [4, 5, 6][7, 8, 9] [10, 11, 12]]. Shuffle the elements of the array randomly.

Part B

- Go to UCI machine learning repository and download the wine-quality dataset (red and/or white) from the link <https://archive.ics.uci.edu/ml/datasets/Wine%2BQuality> (5)

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2. Read the dataset using `read_csv()` of pandas Lib and store it in variable `wine_data` (5)
3. Convert the `wine_data` into NumPy Array (5)
4. Check the shape (5)
5. Slicing the matrix: From the matrix `wine_data`, create a new variable: (15)
 - a) `Y`, which contains the last column (quality of wine) of `XY`. Print its shape.
 - b) `X`, all the other columns except last from `XY`. Print its shape.
6. Compute the following statistical values using NumPy in-built functions wherever possible. (15)
 - a) Mean for all columns in `X`.
 - b) Mode of the last column, `Y` (i.e., quality of wine)
 - c) Standard deviation for all columns in `X`.

Suggested Platform: Python: Azure Notebook/Google Colab Notebook.

Additional Operations

Following operations from NumPy library functions should also be revised/practiced for acquiring better implementation skills in yet to come labs. You can take your own data for this.

Array Creation: `arange()`, `identity()`, `zeros()`, `full`, `copy()`, `linspace()`

Array manipulation: `matmul()`, `multiply()`, `dot()`, `append()`, `concatenate()`, `insert()`, `unique()`, `delete()`, `reshape()`, `stack`, `vstack`, `hstack` etc.