IT 166 Lab 8

NumPy

Objectives

- Be able to use NumPy functions to solve problems in Python.

Preparation

- Launch the Jupyter notebook.
- Rename the notebook page as “lab8”.
- Solution to one problem should occupy one cell.

Please provide solutions to the problems below.

Problem 1

Use NumPy’s random number generator to create two one-dimensional arrays that have the same size. Create the third array based on the sum of the first two arrays. Find out the maximum value, the minimum value, the sum and the mean of the third array. In addition, find out the number of negative values using NumPy methods.

Requirements

- Round the value to the nearest hundredth for maximum, minimum, sum, and mean.
- Do not use loops.

Expected outcome:

```
The maximum is: 2.53
The minimum is: -3.73
The sum is: 0.85
The mean is: 0.02
The number of negative values is: 24
```

Problem 2

Use NumPy's random number generator to create a two-dimensional array (matrix) with the size of 5 by 4. Find out the maximum value and the minimum value for each row and column, respectively, using NumPy's methods. Use slicing to return a sub-matrix that has the shape of 3 by 3. The sub-matrix should be a slice of the original matrix's lower right corner.

Requirement

- Do not use loops.

Expected outcome:

```
The original matrix:
[[-0.51373126  0.46485833  1.06457611  0.43061197]
 [ 0.51865803  0.49556617 -0.31360386 -1.82972146]
 [-1.37862047 -2.64920942 -1.06687806  1.7668747 ]
 [ 0.00599944  1.26478725  1.14934367  0.24129907]
 [ 1.56476518  1.11108426 -0.48779628  0.15126816]]
The maximum values for each row: [1.06457611 0.51865803 1.7668747  1.26478725 1.564765
18]
The maximum values for each column: [1.56476518 1.26478725 1.14934367 1.7668747 ]
The minimum values for each row: [-0.51373126 -1.82972146 -2.64920942  0.00599944 -0.4
8779628]
The minimum values for each column: [-1.37862047 -2.64920942 -1.06687806 -1.82972146]
The sub-matrix:
[[-2.64920942 -1.06687806  1.7668747 ]
 [ 1.26478725  1.14934367  0.24129907]
 [ 1.11108426 -0.48779628  0.15126816]]
```

Problem 3

Use NumPy's random number generator to create a two-dimensional array (matrix) with the size of 10 by 10. Find out the sum of all the positive values and the sum of all the negative values, using NumPy's methods.

Requirements

- Round the results to the nearest hundredth.
- Do not use loops.

Expected outcome:

```
The sum of all the positive values is 46.52
The sum of all the negative values is -37.17
```