9. Library - NumPy

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1. Introduction

Install Numpy

Windows

```bash
pip install numpy
```

Macbook

```bash
pip3 install numpy
```

What is NumPy?

- NumPy stands for *Numerical Python*.
- NumPy is a Python library used for working with arrays.
- It also has functions for working in domain of linear algebra, fourier transform, and matrices.
- It is an open source project and you can use it freely.

Why Use NumPy?

- In Python we have lists that serve the purpose of arrays, but they are slow to process.
- *NumPy aims to provide an array object that is up to 50x faster than traditional Python lists*.
- The array object in NumPy is called `ndarray`, it provides a lot of supporting functions that make working with `ndarray` very easy.
- Arrays are very frequently used in data science, where speed and resources are very important.

2. Create a basic array

```
>>> import numpy as np
>>> np.array([1, 2, 3])
array([1, 2, 3])
```

3. Indexing and slicing

4. Operations - 1: Basic

5. Operations - 2: Broadcasting

6. Conditionals used in NumPy

7. Statistical calculations

- min
- max
- sum
- standard deviation - `std`
- percentiles (Q_1, Q_2 (median), Q_3,) - `np.percentile(data, perc)`

1. Given the following to lists, one includes the student names, another one includes the ages of the students. Try to get the students whose ages are greater than 20.

```
names = ['Jack', 'Mark', 'Mary', 'Jenny', 'April', 'Jin']
ages = [23, 18, 21, 19, 22, 19]
```

2. Given the following grades about homework, project, exam_1 and exam_2, and the weights for the three assignments are 20%, 20%, 30%, and 30%, try to calculate the percentage of A (>=90), B (<90 and >=80), C (<80 and >=70), D (<70 and >=60), and F(<60).

```
homework = [81, 83, 89, 98, 70, 71, 72, 91, 80, 61, 50]
project = [90, 92, 85, 82, 84, 86, 83, 79, 70, 81, 60]
exam_1 = [83, 70, 78, 90, 82, 88, 68, 59, 59, 75, 77]
exam_2 = [82, 73, 60, 65, 95, 88, 68, 59, 62, 75, 50]
```

References

- https://numpy.org/doc/stable/user/absolute_beginners.html
- https://www.w3schools.com/python/numpy/numpy_intro.asp

End