UNIVERSITY OF AGDER

Numpy

Lecture 5

Agenda

- Exercise recap
- Numpy
- Install Numpy in PyCharm

Exercise review - Largest product in a series

The four adjacent digits in the 1000-digit number that have the greatest product are 9 x 9 x 8 x 9 = 5832.

- Find the five adjacent digits in the 1000-digit number that has the greatest product. What is the value of this product?
- Find the product which is closest to 7777. What is the value of this product?
- What is the number of unique products?

Numpy

- *“Numpy is the fundamental package for scientific computing with Python”*
- https://docs.scipy.org/doc/numpy/index.html
- Provides a powerful N-dimensional array
- The go-to-tool when doing numerical computing in Python
- Numpy quickstart tutorial:
- https://docs.scipy.org/doc/numpy/user/quickstart.html
- Import numpy:

```
import numpy as np
```

Install numpy in PyCharm

- Open PyCharm
- Press *PyCharm / file* in the menu bar
- Go to *preferences / settings*
- On the left, select *project:<your-project-name>*
- Select *project interpreter*
- Click on the *+* (pluss) button
- Search for and install **numpy**

A look at the Numpy array

- Unlike Python lists, Numpy arrays can only hold a single data type
- An array containing integers:

```
a = np.array([[1,2,3],[4,5,6]], dtype=int)
```

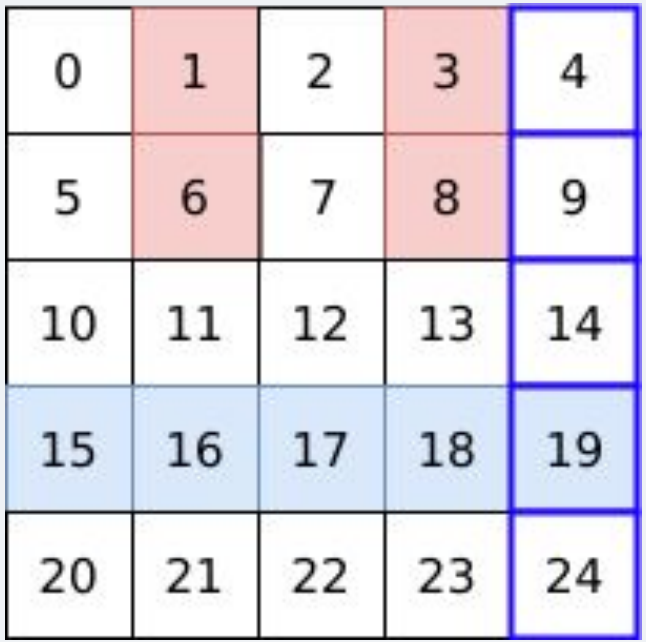
- Frequently used array attributes:
  - `a.shape`
  - `a.ndim`
  - `a.size`
  - `a.dtype`

Indexing and slicing

- Selecting values, columns, and rows.
- Works much like standard Python.
- Create array:

```
a = np.arange(25).reshape(5, 5)
```

- `a[3]  # Select row`
- `a[:, -1]  # Select column`
- `a[(1,2), 1::2]  # Red values`



Indexing and slicing - Try it

- Create array like so:

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```

- Select highlighted values.

0	1	2	3	4
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10	11	12	13	14
15	16	17	18	19
20	21	22	23	24

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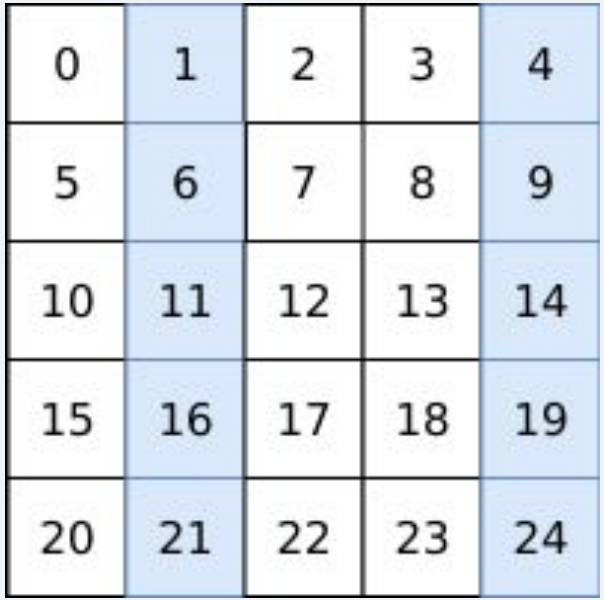

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Playtime

Download the file *numpy_numbers.txt* from Canvas.

Convert it into a numpy array.

- Which row has the greatest sum (adding all the numbers in a row)? What is the value of this sum?
- What is the single greatest value in the array?
- What column has the greatest sum?
- Remove the outermost values. What is the sum of the remaining numbers?