Lab work

Correlation:

For this we use numpy and matplot

1. Create an array of NumPy through the array function.
2. Apply all the functions:

- **ndarray.ndim:** the dimension number of the array. It's called rank in Python.
- **ndarray.shape:** the dimension of the array. It's a series of numbers whose length is determined by the dimension（ndim）of the array. For example, the shape of a one-dimensional array with length n is n. And the shape of an array with n rows and m columns is n,m.
- **ndarray.size:** the number of all elements in the array.
- **ndarray.dtype:** the type of the element in the array, such as numpy.int32, numpy.int16, or numpy.float64.
- **ndarray.itemsize:** the size of each element in the array, in bytes.

3. Create a specific array

zeros: used to create an array whose elements are all 0

- **ones:** used to create an array whose elements are all 1
- **empty:** used to create uninitialized data. so the content is undefined.
- **arange:** used to create an array by specifying the scope and step-length • **linespace:** used to create an array by specifying the range and the number of elements • **random:** used to generate random numbers

4. Shape and operation

reshape: used to generate a new array based on the existing array and the specified shape • **vstack:** used to stack multiple arrays in vertical direction (the dimensions of the array must be matched)

- **hstack:** used to stack multiple arrays in horizontal direction (the dimensions of the array must be matched)
- **hsplit:** used to split the array horizontally
- **vsplit:** used to split the array vertically

5. Index

• Create a one-dimensional array first. Its content is integers in the interval of [100,200). 6. Mathematics

- amin, amax, average , sum, sin

- sqrt(arr))#Returns the square root of each element
- exp(arr)) #Returns the exponentials of each element
- sin(arr)) #Returns the sin of each element
- cos(arr)) #Returns the cosine of each element
- log(arr)) #Returns the logarithm of each element
- sum(arr)) #Returns the sum total of elements in the array • std(arr))

7. Random Number

The four usages are:

- to generate 20 random numbers, each of which is between **[0.0, 1.0)**
- to generate a random number based on the specified **shape**
- to generate a specified number (such as 20) of random integers within the specified range (such as **[0, 100)**)
- to disorder the sequence of the existing data (**[0, 1, 2, ..., 19]**) randomly