Numpy Practice Questions

Relevel
by Unacademy

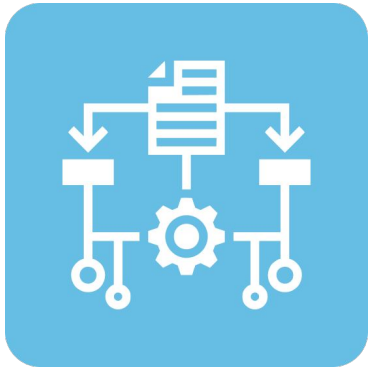
Basic Operations

Getting Started:

1. Import numpy library in your Jupyter Notebook. Create a numpy array from the list [45,56,78,87,98].
2. Get the type of the numpy array (created earlier) with type function and also print the numpy array.
3. Create 2 numpy arrays as well as lists of size 1000000. Perform element wise addition on both arrays and lists and compare the computational time needed to perform the same.

Basic Operations

Vectorization, Typecasting, Matrix Creation, Padding and using some inbuilt functions:



4. Create a numpy array from python list having elements 1,4,9,3,2.
5. Create a matrix having all the elements as 0 having 3 rows and 5 columns.
6. Create a matrix having all the elements as 1 having 3 rows and 3 columns having integer data type values.
7. Create a matrix having all the elements as 8 having 4 rows and 4 columns having integer data type values.
8. Create a matrix having all the elements as 'Hello' having 4 rows and 4 columns having integer data type values.
9. Create a numpy array with values [3,5,"NAas",6] and demonstrate that values of a numpy array are always of the same data type.
10. Create a numpy array of 3 rows and 4 columns filled with random normal values.

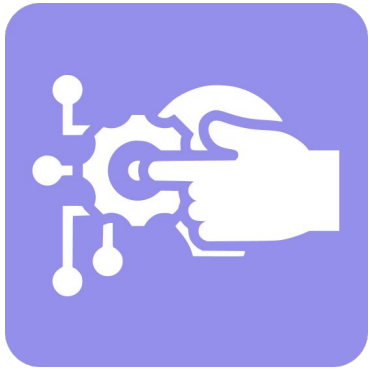
Basic Operations

Vectorization, Typecasting, Matrix Creation, Padding and using some inbuilt functions:

11. Create a numpy array of 2 rows and 3 columns filled with random values on a scale of 0 to 1.
12. Create a numpy array of 3 dimensions having 3 elements in every axis filled with random normal values. Also, demonstrate that if we specify the same seed in np.random.seed() we would be getting the same values in everyone's laptop.
13. Create a numpy array of 3 rows and 4 columns within some minimum and maximum values.
14. Use arange() function to get the values starting from a number upto a certain value separated by a constant step size.
15. Create a simple 1d numpy array from python list [1,2,3,4,5] and pad/add boundary to that numpy array with three 0s on left and two 7s at right.

Basic Operations

Vectorization, Typecasting, Matrix Creation, Padding and using some inbuilt functions:

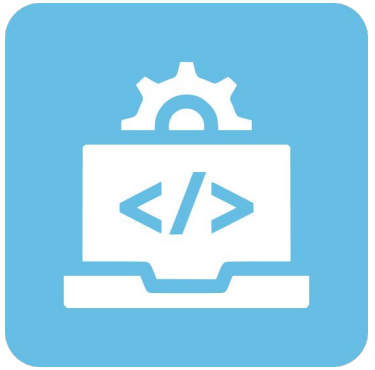


16. Create a simple 1d numpy array from python list [1,2,3,4,5] and pad/add a boundary to that numpy array with 'linear_ramp' mode having three values added on left and two values added at right.
17. Create a simple 1d numpy array from python list [1,2,3,4,5] and pad/add a boundary to that numpy array with maximum value having three values added on left and right.
18. Create a numpy array of shape (5, 5) with values ranging from 0 to 25 and flatten that array using np.ravel() function.
19. Create a numpy array with a list [1,2,1,3,1,5,6,3,5,3,6,9,0,2] and count the number of times 1 and 5 are occuring.
20. Get today's date, yesterday's date and tomorrow's date through numpy.
21. Create a numpy array with Name, Class and Height as the features and then sort the array according to height of students.

Basic Operations

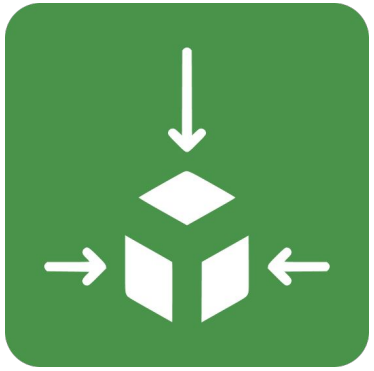
Vectorization, Typecasting, Matrix Creation, Padding and using some inbuilt functions:

22. Write a program to get the indices of sorted elements in a numpy array. **(Sorting)**
23. Write a program (using numpy) to compute the outer product and cross product of two vectors. **(Algebra Questions)**
24. Write a program to get the sum of diagonal elements of a numpy array using np.trace() and np.diagonal() both. **(Algebra Questions)**
25. Create a simple numpy array with np.arange() function having 16 elements. Change the shape of the actual array to (4,2,2). **(Array Reshaping)**
26. Create a numpy array having integers divisible by 4 and less than 100. **(Custom Sequence)**
27. Write a code to get common values in 2 numpy arrays.



Basic Operations

Vectorization, Typecasting, Matrix Creation, Padding and using some inbuilt functions:

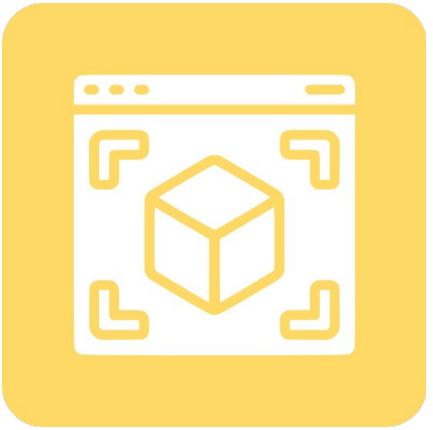


28. Check the data type of above two arrays and convert the data type to floating points.
29. Write a code to get numbers from 0 to 50 using np.arange(). Get the first 20 elements in the given array. Also, get all the elements from the 2nd row. Also, get the element at position (1, 2). **(Slicing)**

Basic Operations

Getting properties of a numpy array with use of some Statistical functions:

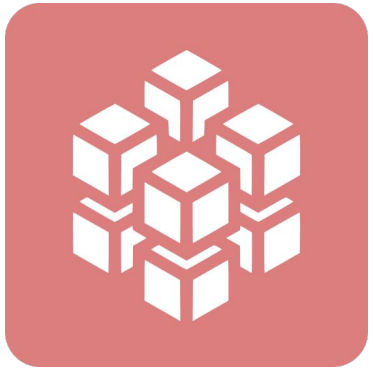
30. Get the number of dimensions from a numpy array. **(Matrix Basics)**
31. Get the number of rows and columns of a dataframe using shape argument. **(Matrix Basics)**
32. Get the total number of elements in a numpy array using size argument. **(Matrix Basics)**
33. Get the minimum and maximum values in a numpy array using min() and max() function. **(Matrix Basic Functions)**



Questions for lambda, map, filter and reduce functions and indexing

1. Create a 2D array with shape (7, 7). Keep 1 on the border and remaining values should be filled with 0. **(Indexing Question)(Application of np.pad())**
2. Create an array of random integer values with shape (3, 3). Add a boundary of width 2 around the actual array filled with value 0. **(Hint : Use np.pad()) (Indexing Question)(Application of np.pad())**
3. Create a checkerboard pattern with 0s and 1s in an numpy array object. Size of the checkerboard has to be (8, 8). **(Difficult question on application)**
4. Create 2 random matrices with shape (2, 3) and (3, 5). Perform matrix multiplication. **(Basic Arithmetic Operation in Matrix)**
5. We have marks of a particular student in Physics, Chemistry, Mathematics and Biology in a tuple format as follows :
    a. ('Physics', 92), ('Chemistry', 97), ('Maths', 95), ('Biology', 85)

    You are expected to sort the tuples in ascending order of the marks in different subjects using lambda function. **(Lambda Function Example)**



Questions for lambda, map, filter and reduce functions and indexing

6. Extract the current datetime in python and store it in a separate object. Using lambda function, extract year, month, date and time for the same. **(Lambda Function Example)**
7. Write a code in python to change the case of words in a list to upper using map function. **(String Operations in numpy)**
8. You are working in an Ed-Tech organization as a Data Analyst. There was an entrance examination and the cut-off for that exam was 80. Using the filter function in python, please provide the marks of students who cleared the exam.

   Sample data : [66, 90, 68, 59, 76, 60, 88, 74, 81, 65, 92, 85] **(Filter Function Example)**
9. In the above question, also try to get the maximum marks scored by the students using reduce function. **(Reduce function Example)**

Image Processing in Numpy

Numpy array :

A numpy array is a grid of values, all of the same type, and is indexed by a tuple of nonnegative integers. The number of dimensions is the rank of the array; the shape of an array is a tuple of integers giving the size of the array along each dimension.

Numpy ndarray :

Ndarray is the n-dimensional array object defined in the numpy which stores the collection of the similar type of elements. In other words, we can define a ndarray as the collection of the data type (dtype) objects. The ndarray object can be accessed by using the 0 based indexing.

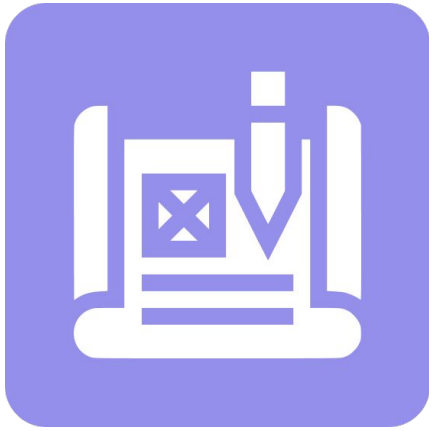
Image Processing in Numpy :

Opening an Image : To open an image, we are using the open() method from the PIL Image module. Similarly, we can use the matplotlib library to read and show images. It uses an image module for working with images. It offers two useful methods imread() and imshow()

Image Processing in Numpy

Getting Negative of the Image : Converting a color image to a negative image is very simple. You to perform only 3 steps for each pixel of the image -

- First, get the RGB values of the pixel
- Calculate new RGB values using R = 255 – R, G = 255 – G, B = 255- B
- Finally, save the new RGB values in the pixel

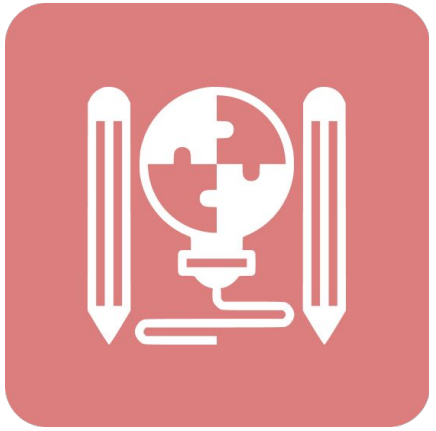


RGB Vectors : Every image is made up of pixels and every pixel in turn has color intensity values for 3 vectors RGB. Minimum color intensity value is 0 and maximum color intensity value is 255.

Gray Scale Conversion : Gray Scale conversion takes place by taking the weighted mean value of RGB value of the image.

Practice Questions

1. From the PIL library import Image and ImageOps function and open the given image in python and convert the given image data into a numpy array.
2. Get the dimensions, shape and data type of elements in a numpy array.
3. Convert that multi-dimensional array into Image again and save that image.
4. Flatten the given numpy array using np.ravel() function.
5. Make some changes to the color intensity values and display the image using show() function.
6. Get the histogram for pixel intensity values.
7. Flip a given image upside down and sideways.
8. Crop the given image.
9. Get the gray image of the actual image and pad that gray image with black spaces.
10. Get the negative of gray image.



Thank You