**Assignment – 1**

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GIT HUB URL: <https://github.com/BharathKumar-Nakka/ML_Assignment_1.git>

Video link: https://drive.google.com/file/d/1yhpdfPteTEtSviqtaQMTi0VAQ1ZBeeQM/view

1. NumPy:

a. Using NumPy create random vector of size 15 having only Integers in the range 1-20.

1. Reshape the array to 3 by 5

2. Print array shape.

3. Replace the max in each row by 0

Create a 2-dimensional array of size 4 x 3 (composed of 4-byte integer elements), also print the shape, type, and data type of the array.

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Explanation:

* The program begins by generating a random array of 15 integers between 1 and 20 using the randint() function from the NumPy library.
* Next, the program transforms the 1-dimensional array into a 3x5 matrix using the reshape () function.
* The program identifies the maximum value in each row of the matrix by utilizing the argmax () function with the axis=1 parameter. It then applies advanced indexing from NumPy to replace the maximum value in each row with 0.
* Lastly, the program constructs a 2-dimensional array consisting of zeros, with a shape of 4x3 and a data type of int32, using the zeros () function from NumPy. It subsequently displays the shape, type, and data type of the array.

b. Write a program to compute the eigenvalues and right eigenvectors of a given square array given below: [[ 3 -2] [ 1 0]]

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Explanation:

* To begin, the program establishes a 2x2 square array by utilizing the array () method from NumPy.
* Subsequently, the program employs the eig() function from the NumPy linear algebra library to calculate the eigenvalues and right eigenvectors of the array.
* The resulting eigenvalues and eigenvectors are stored in the variable’s 'eigenvalues' and 'eigenvectors', respectively.
* Lastly, the program employs the print () function to display the computed eigenvalues and right eigenvectors.

c. Compute the sum of the diagonal element of a given array. [[0 1 2] [3 4 5]]

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Explanation:

* Initially, the program creates a 2x3 array by utilizing the array () method from NumPy.
* Next, the program employs the trace () method from the NumPy linear algebra library to calculate the sum of the diagonal elements in the array.
* The resulting sum of diagonal elements is stored in the variable 'sum\_of\_diagonal'.
* Finally, the program utilizes the print () function to display the computed sum of diagonal elements as a single integer.

d. Write a NumPy program to create a new shape to an array without changing its data.

Reshape 3x2:

[[1 2]

[3 4]

[5 6]]

Reshape 2x3:

[[1 2 3]

[4 5 6]]

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Explanation:

* To begin, the program generates a 3x2 array using the array () method from NumPy.
* Subsequently, the program applies the reshape () method from NumPy to reshape the original array into a 2x3 array.
* The reshaped array is stored in the variable 'reshaped\_array'.
* Finally, the program utilizes the print () function to display both the original and reshaped arrays on separate lines. The arrays are printed using the newline character (\n) along with their respective string representations.

**2. Matplotlib**

1. Write a Python programming to create a below chart of the popularity of programming Languages.

2. Sample data:

Programming languages: Java, Python, PHP, JavaScript, C#, C++

Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7

A screenshot of a computer

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Explanation:

* Initially, the program declares two lists: 'languages' and 'popularity'.
* The program determines the index of the language with the highest popularity by employing the max () function in combination with the index () method.
* A new list named 'explode' is created by the program to emphasize the most popular language.
* Using the 'explode' list and other relevant parameters, the program generates a pie chart representing the popularity data. The chart is titled "Popularity of Programming Languages" and is displayed using the show () function.