**Machine Learning (Assignment # 3) Spring, 2023**

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**Source Code:**

Source code for the assignment is provided in the link below:

<https://github.com/Vineetha-gourishetty/ML_Assignment3_Code_700745899>

**Video Link of the logic explanation:**

Explanation for each question is recorded in the below video link:

https://drive.google.com/file/d/1gYisHn2L1r\_jMH7jju2a5O72y\_5sZ-HH/view?usp=sharing

**Solution**

**Please find the solution of given questions below:**

**Question 1**

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.

**Solution 1**:

Text

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I have created a random vector using numpy inbuild function “random.randint” .This is used to generate random integers and the parameters specified are 1 and 21 where 1 is inclusive and 21 is exclusive with size passed as 15.

Inorder to reshape the array I used reshape inbuilt function from numpy library where the required matrix dimentions i.e., rows and columns and printed the reshaped array.

Inorder to replace the maximum values of each row to 0 from the reshaped matrix,I used arrange function and passed second parameter with the indexes of max values in each row which is derived from numpy.maxarg().

I also created 2-Dimentional array using np.zeros where 0 valued array is created and used array.shape, type(), array.dtype inorder to display shape type and datatype.

**b. Write a program to compute the eigenvalues and right eigenvectors of a given square array given below:**

**[[ 3 -2]**

**[ 1 0]]**

**Solution b:**

After initializing the square array with the given values, linalg.eig() is a builin function used in np to find eigen values and right eigen vectors of a particular array mentioned in the parameters.

**Graphical user interface, text, application

Description automatically generated**

c. Compute the sum of the diagonal element of a given array.

[[0 1 2]

[3 4 5]]

**Solution c**

After initializing the array with given values, sum of the diagonal elements is calculated using trace() inbuild function from numpy library.

**Graphical user interface, text

Description automatically generated with medium confidence**

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]]

**Solution d:**

After initializing the array with given values, the array is now reshaped using reshape inbuilt function where required array dimensions are specified as parameters and then they are displayed using print.

Graphical user interface, text, application

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**Question 2**

**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

Chart, pie chart

Description automatically generated

**Solution 2:**

Matplotlib library is used to generate all graphical representations for the data provided using few inbuild functions. Here, inorder to represent pie chart I have imported matplotlib and used plot.pie() where all the parameters are passed based on the requirement.

**Graphical user interface, text, application, email

Description automatically generated**

Below are the passed variables:

Popularity: dataset,

Programming\_languages are lables,

Explode is the set of values of percentage to highlight a pie from the chart (ex. Java is highlighted.

Shadow = True provides the shadow for the chart.

edgecolor is provided as black.

Plt.title is used to give a title to the graph.