MACHINE LEARNING (CS-5710)

ASSIGNMENT - 3

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Git hub Link: - https://github.com/NeerajKumarKajuluri/ML-Assignment-3

Video Link: -https://drive.google.com/file/d/1Qsn1JTOckICMy-NxSNyBwq-x-5ONxzr9/view?usp=share_link

1. NumPy:

```
In [35]: import numpy as np
         y=np.random.randint(1,20,15)
         len(y)

Out[35]: 15
```

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.

```
In [38]: reshaped=y.reshape((3, 5))
         reshaped

Out[38]: array([[ 9, 10, 10,  3,  2],
                [19, 18, 12,  7, 15],
                [ 1,  1, 14,  1, 11]])

In [39]: reshaped.shape

Out[39]: (3, 5)

In [55]: reshaped

Out[55]: array([[ 9,  0,  0,  3,  2],
                [ 0,  0, 12,  7,  0],
                [ 1,  1,  0,  1,  0]])

In [54]: max_ind = np.argmax(reshaped, axis=1)
         row_ind = np.arange(reshaped.shape[0])
         multi_ind = np.array([row_ind, max_ind])
         linear_ind = np.ravel_multi_index(multi_ind, reshaped.shape)
         reshaped.reshape((-1))[linear_ind] = 0
         reshaped

Out[54]: array([[ 9,  0,  0,  3,  2],
                [ 0,  0, 12,  7,  0],
                [ 1,  1,  0,  1,  0]])
```

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

[[3 -2]

[1 0]]

```
In [67]: m = np.array([[3, -2],
                       [1, 0]])

In [68]: w, v = np.linalg.eig(m)

In [69]: print("Eigen values of the given square array:\n",w)

Eigen values of the given square array:
 [2. 1.]

In [70]: print("Right eigenvectors of the given square array:\n",v)

Right eigenvectors of the given square array:
 [[0.89442719 0.70710678]
 [0.4472136  0.70710678]]
```

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

[[0 1 2]

[3 4 5]]

```
In [73]: n_array = np.array([[0, 1, 2],
                             [3, 4, 5]])

trace = np.trace(n_array)
print("\nTrace of given matrix:")
print(trace)

Trace of given matrix:
4
```

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]]

```
In [73]: n_array = np.array([[0, 1, 2],
                            [3, 4, 5]])

         trace = np.trace(n_array)
         print("\nTrace of given matrix:")
         print(trace)
```

```
Trace of given matrix:
4
```

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

```
In [78]: import matplotlib.pyplot as plt

         programming_languages = 'Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++'
         popularity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]
         colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728", "#9467bd", "#8c564b"]
         # exploding the first slice
         explode = (0.1, 0, 0, 0,0,0)

         plt.pie(popularity, explode=explode, labels=programming_languages, colors=colors,
         autopct='%1.1f%%', shadow=True, startangle=140)

         plt.axis('equal')
         plt.show()
```