MACHINE LEARNING CS5710

CRN 30527

PROGRAMMING ASSIGNMENT 1

GITHUB LINK - <https://github.com/sathish-17-07/ML_5170_Summer2023_Assignments>

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.**

# question 1.a

randomVector = np.random.randint(1, 21, size=15)

# 1.a.1 Reshape the array to 3 by 5

reshapeArray = randomVector.reshape(3, 5)

#1.a.2 Print Array shape

print("Array Shape: ", reshapeArray.shape)

print(reshapeArray)

#1.a.3 Replace the max in each row by 0

reshapeArray[np.arange(reshapeArray.shape[0]), np.argmax(reshapeArray, axis=1)] = 0

print("replaced Max with 0 in each row\n",reshapeArray)

#Create a 2-dimensional array of size 4 x 3 (composed of 4-byte integer elements)

array = np.empty((4, 3), dtype=np.int32)

# Print array shape

print("Array shape:", array.shape)

# Print array type

print("Array type:", type(array))

# Print array data type

print("Array data type:", array.dtype)

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

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

array = np.array([[3, -2], [1, 0]])

eigenvalues, rightEigenvectors = np.linalg.eig(array)

# Print the eigenvalues

print("Eigenvalues:")

for eigenvalue in eigenvalues:

print(eigenvalue)

# Print the right eigenvectors

print("\nRight Eigenvectors:")

for i in range(len(rightEigenvectors)):

print("Eigenvector", i+1, ":", rightEigenvectors[:, i])

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

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

array = np.array([[0, 1, 2], [3, 4, 5]])

diagonalSum = np.trace(array)

print("Given Array\n", array)

print("Sum of the diagonal elements:", diagonalSum)

1. **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]]**

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

array = np.array([[1, 2], [3, 4], [5, 6]])

# Reshape the array to 3x2

reshapedArray1 = array.reshape(3, 2)

# Reshape the array to 2x3

reshapedArray2 = array.reshape(2, 3)

# Print the original array

print("Original array:\n")

print(array)

# Print the reshaped arrays

print("\nReshaped array 1 (3x2):\n")

print(reshapedArray1)

print("\nReshaped array 2 (2x3):")

print(reshapedArray2)

**2. 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**

# Problem solution 2.1, 2.2

import matplotlib.pyplot as plt

#input data

programmingLanguages = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']

popularity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]

# Creating a pie chart

plt.pie(popularity, labels=programmingLanguages, autopct='%1.1f%%')

plt.title('Popularity of the Programming Languages given below')

# Displaying the chart

plt.show()