Name: - Sagar Bhatia Section: -B

Course: - MCA Student id: -20711069

**LAB ASSIGNMENT\_3:**

Programs on Python functions and file handling

**Question – 1: Write a program to sort a numPy array using a function.**

CODE: -

import numpy as nm

from numpy.core.fromnumeric import sort

def sorting(array):

  return sort(array)

arr = nm.array([7, 5, 8, 0, 1, 3, 6, 4, 2])

print("Original array: ")

print(arr)

sorted\_Array = sorting(arr)

print("Sorted array: ")

print(sorted\_Array)

OUTPUT:

Original array:

[7 5 8 0 1 3 6 4 2]

Sorted array:

[0 1 2 3 4 5 6 7 8]

**Question -2: Write a program to add two matrices using function.**

CODE: -

import numpy as np

def addmatrix(matrix1, matrix2):

  matrix = np.add(matrix1, matrix2)

  print("Sum of the two matrix: ")

  print()

  print(matrix)

arr1 = np.array([[1, 5, 23],

   [34, 165, 76]])

arr2 = np.array([[54, 5, 54],

     [21, 67, 5]])

addmatrix(arr1, arr2)

OUTPUT:

Sum of the two matrix:

[[ 55 10 77]

[ 55 232 81]]

**Question – 3: Write a program to demonstrate the usage of file handling in Python.**

CODE:

# Creating the file and opening in the write mode.

file1 = open("FirstFile.txt", "w")

txt = "My name is Sagar Bhatia. "

file1.write(txt)

# Closing the file

file1.close()

# opening the file in the reading mode.

file1 = open("FirstFile.txt", "r")

content = file1.read()

print(content)

file1.close()

# opening thee file in the append mode.

file1 = open("FirstFile.txt", "a")

txt2 = "\nCurrently I am studying in the GEHU.\nI am perusing MCA."

file1.write(txt2)

file1.close()

# reading the whole file using loop.

file1 = open("FirstFile.txt", "r")

print("-------------------------------------------------")

for line in file1:

    print(line)

file1.close()

# counting the no of line in the file.

file1 = open("FirstFile.txt", "r")

linecount = 0

word = []

wordcount = 0

char = []

charCount = 0

for line in file1:

    linecount += 1

    word = line.split(" ")

    wordcount += len(word)

    for i in word:

      charCount += len(i)

print("----------------------------------------------------")

print("Number of line in a file: ")

print(linecount)

print("Number of word in a file: ")

print(wordcount)

print("Number of character in a file: ")

print(charCount)

OUTPUT:

My name is Sagar Bhatia.

-------------------------------------------------

My name is Sagar Bhatia.

Currently I am studying in the GEHU.

I am perusing MCA.

----------------------------------------------------

Number of line in a file:

3

Number of word in a file:

17

Number of character in a file:

67

**Question – 4: Write a program to demonstrate the usage of different element wise array functions.**

CODE: -

import numpy as np

arr = np.array([1, 2, 3, 4, 5, 56, 7, 8, 9, 17, 12])

print("Original array: ")

print(arr)

# Adding new element in the array using append function

arr2 = np.append(arr, [43, 543, 654, 232, 895])

print("Array after appending new element: ")

print(arr2)

# Calculating the sum of the array:

sumofarray = np.sum(arr2)

print("Sum of a new array: ")

print(sumofarray)

# Calculating the length of a new array;

length = np.shape(arr2)

print("Length of a array: ")

print(length)

# Calculating the mean of a array:

print("Mean of the array")

mean = np.mean(arr2)

print(mean)

# Calculating the median of a array:

print("Median of the array: ")

median = np.median(arr2)

print(median)

# finding the max of the array:

print("Max of the array: ")

maximum = np.max(arr2)

print(maximum)

# finding the min of the array:

print("Min of the array: ")

minimum = np.min(arr2)

print(minimum)

OUTPUT:

Original array:

[ 1 2 3 4 5 56 7 8 9 17 12]

Array after appending new element:

[ 1 2 3 4 5 56 7 8 9 17 12 43 543 654 232 895]

Sum of a new array:

2491

Length of a array:

(16,)

Mean of the array

155.6875

Median of the array:

10.5

Max of the array:

895

Min of the array:

1

**LAB\_ASSIGNMENT\_4:**

Programs on NumPy:

**Question 1: - Write a program to perform basic arithmetic operations in a NumPy array.**

CODE: -

import numpy as np

arr1 = np.array([6, 4, 42, 54, 32, 67, 31, 6])

arr2 = np.array([54, 34, 23, 21, 23,58, 9, 17])

print("Sum of the data of arr1 using numpy: ")

sumofarray = np.sum(arr1)

print(sumofarray)

print("Sum of two array using numpy: ")

addition = np.add(arr1, arr2)

print(addition)

print("subtraction of the two array: ")

subtraction = np.subtract(arr1, arr2)

print(subtraction)

print("Multiplication of the two array: ")

multiplication = np.multiply(arr1, arr2)

print(multiplication)

print("Division of the two matrix: ")

division = np.divide(arr1, arr2)

print(division)

OUTPUT:

Sum of the data of arr1 using numpy:

242

Sum of two array using numpy:

[ 60 38 65 75 55 125 40 23]

subtraction of the two array:

[-48 -30 19 33 9 9 22 -11]

Multiplication of the two array:

[ 324 136 966 1134 736 3886 279 102]

Division of the two matrix:

[0.11111111 0.11764706 1.82608696 2.57142857 1.39130435 1.15517241

3.44444444 0.35294118]

**Question -2: Write a program to illustrate the indexing and slicing operations in NumPy arrays.**

CODE: -

import numpy as np

arr1 = np.array([56, 6, 76, 54, 35, 6, 31, 5, 32, 45])

print("Slicing of the numpy array: ")

print(arr1[3:7])

print("Indexing of the numpy arrays")

print(arr1[5])

OUTPUT:

Slicing of the numpy array:

[54 35 6 31]

Indexing of the numpy arrays

6

**Question – 3: Write a program to implement a single random walk with 1000 steps using the built-in random module**

CODE: -

import random

import numpy as np

import matplotlib.pyplot as plt

prob = [0.05, 0.95]

start = 2

positions = [start]

rr = np.random.random(1000)

downp = rr<prob[0]

upp = rr>prob[1]

for idownp, iupp in zip(downp, upp):

down = idownp and positions[-1] > 1

up = iupp and positions[-1] < 4

positions.append(positions[-1] - down + up)

plt.plot(positions)

plt.show()