3)a. Write python programs to implement statistical functions like Mean, Median, Variance, and Standard Deviation using numpy.

Program:

import numpy as np

a = np.array([[2,10,20],[80,43,31],[22,43,10]])

print("The original array:\n")

print(a)

print("\nThe minimum element among the array:",np.amin(a))

print("The maximum element among the array:",np.amax(a))

print("\nThe minimum elements with axis=0 ",np.amin(a,0))

print("The maximum elements with axis=0 ",np.amax(a,0))

print("\nThe minimum elements with axis=1 ",np.amin(a,1))

print("The maximum element with axis=1 ",np.amax(a,1))

print("Array:\n",a)

print("Mean of array :",np.mean(a))

print("Mean of array along axis 0:",np.mean(a,0))

print("Mean of array along axis 1:",np.mean(a,1))

print("\nMedian of array:",np.median(a))

print("\nMedian of array along axis 0:",np.median(a,0))

print("\nMedian of array along axis 1:",np.median(a,1))

print("Average of array along axis 1:",np.average(a,1))

print("Variance of array :",np.var(a))

print("Variance of array with axis=0 :",np.var(a,0))

print("Variance of array with axis=1 :",np.var(a,1))

print("Standard Deviation of array :",np.std(a))

print("Standard Deviation of array with axis=0 :",np.std(a,0))

print("Standard Deviation of array with axis=1 :",np.std(a,1))

Output:

The original array:

[[ 2 10 20]

[80 43 31]

[22 43 10]]

The minimum element among the array: 2

The maximum element among the array: 80

The minimum elements with axis=0 [ 2 10 10]

The maximum elements with axis=0 [80 43 31]

The minimum elements with axis=1 [ 2 31 10]

The maximum element with axis=1 [20 80 43]

Array:

[[ 2 10 20]

[80 43 31]

[22 43 10]]

Mean of array : 29.0

Mean of array along axis 0: [34.66666667 32. 20.33333333]

Mean of array along axis 1: [10.66666667 51.33333333 25. ]

Median of array: 22.0

Median of array along axis 0: [22. 43. 20.]

Median of array along axis 1: [10. 43. 22.]

Average of array along axis 1: [10.66666667 51.33333333 25. ]

Variance of array : 508.6666666666667

Variance of array with axis=0 : [1094.22222222 242. 73.55555556]

Variance of array with axis=1 : [ 54.22222222 434.88888889 186. ]

Standard Deviation of array : 22.55363976538303

Standard Deviation of array with axis=0 : [33.07902995 15.55634919 8.57645355]

Standard Deviation of array with axis=1 : [ 7.36357401 20.85398976 13.6381817 ]

3)b. Write python programs to implement statistical functions like Mean, Median, Variance, and Standard Deviation using numpy on dataset.

Program:

import numpy as np

dataset =np.genfromtxt('C:/Users/pc/Desktop/dataset.csv',delimiter=',')

print("The original array:\n")

print(dataset)

print("The rows & columns on dataset:", dataset.shape)

print("\nThe minimum element among the array:",np.amin(dataset))

print("The maximum element among the array:",np.amax(dataset))

print("\nThe minimum elements with axis=0 ",np.amin(dataset,0))

print("The maximum elements with axis=0 ",np.amax(dataset,0))

print("\nThe minimum elements with axis=1 ",np.amin(dataset,1))

print("The maximum element with axis=1 ",np.amax(dataset,1))

print("Mean of array :",np.mean(dataset))

print("Mean of array along axis 0:",np.mean(dataset,0))

print("Mean of array along axis 1:",np.mean(dataset,1))

print("\nMedian of array:",np.median(dataset))

print("\nMedian of array along axis 0:",np.median(dataset,0))

print("\nMedian of array along axis 1:",np.median(dataset,1))

print("Average of array along axis 1:",np.average(dataset,1))

print("Variance of array :",np.var(dataset))

print("Variance of array with axis=0 :",np.var(dataset,0))

print("Variance of array with axis=1 :",np.var(dataset,1))

print("Standard Deviation of array :",np.std(dataset))

print("Standard Deviation of array with axis=0 :",np.std(dataset,0))

print("Standard Deviation of array with axis=1 :",np.std(dataset,1))

Output:

The original array:

[[ 65.78331 112.9925 345.89 234.23 ]

[ 71.51521 136.4873 346.89 235.23 ]

[ 69.39874 153.0269 347.89 236.23 ]

[ 68.2166 142.3354 348.89 237.23 ]

[ 67.78781 144.2971 349.89 238.23 ]

[ 68.69784 123.3024 350.89 239.23 ]

[ 69.80204 141.4947 351.89 240.23 ]

[ 70.01472 136.4623 352.89 241.23 ]

[ 67.90265 112.3723 353.89 242.23 ]

[ 66.78236 120.6672 354.89 243.23 ]]

The rows & columns on dataset: (10, 4)

The minimum element among the array: 65.78331

The maximum element among the array: 354.89

The minimum elements with axis=0 [ 65.78331 112.3723 345.89 234.23 ]

The maximum elements with axis=0 [ 71.51521 153.0269 354.89 243.23 ]

The minimum elements with axis=1 [65.78331 71.51521 69.39874 68.2166 67.78781 68.69784 69.80204 70.01472

67.90265 66.78236]

The maximum element with axis=1 [345.89 346.89 347.89 348.89 349.89 350.89 351.89 352.89 353.89 354.89]

Mean of array : 197.51348449999995

Mean of array along axis 0: [ 68.590128 132.34381 350.39 238.73 ]

Mean of array along axis 1: [189.7239525 197.5306275 201.63641 199.168 200.0512275 195.53006

200.854185 200.149255 194.0987375 196.39239 ]

Median of array: 193.62845

Median of array along axis 0: [ 68.45722 136.4748 350.39 238.73 ]

Median of array along axis 1: [173.61125 185.85865 194.62845 189.7827 191.26355 181.2662 190.86235

188.84615 177.30115 181.9486 ]

Average of array along axis 1: [189.7239525 197.5306275 201.63641 199.168 200.0512275 195.53006

200.854185 200.149255 194.0987375 196.39239 ]

Variance of array : 11533.83509367655

Variance of array with axis=0 : [ 2.51218688 177.97972078 8.25 8.25 ]

Variance of array with axis=1 : [11904.40533048 10833.90953011 10609.12872161 11060.90167818

11127.85268899 11837.410653 11265.12134705 11502.09705744

12613.63227198 12462.07959084]

Standard Deviation of array : 107.3956940183197

Standard Deviation of array with axis=0 : [ 1.58498797 13.34090405 2.87228132 2.87228132]

Standard Deviation of array with axis=1 : [109.10731108 104.0860679 103.00062486 105.17082142 105.48863772

108.79986513 106.13727595 107.24783008 112.31042815 111.63368484]