

```
In [1]: # Statistical Operations on ndarray
```

```
In [2]: import numpy as np
```

```
In [3]: a=np.array([[10,15,25],[35,14,12],[36,28,19]])  
print(a,type(a),a.shape)
```

```
[[10 15 25]  
 [35 14 12]  
 [36 28 19]] <class 'numpy.ndarray'> (3, 3)
```

```
In [4]: maxv=np.amax(a)  
print("Max Element= ",maxv)
```

```
Max Element= 36
```

```
In [5]: print(a)  
maxv=np.amax(a)  
colmax=np.amax(a,axis=0)  
rowmax=np.amax(a,axis=1)  
print("Col Max Elements",colmax)  
print("Row Max Elements",rowmax)  
print("Max Element= ",maxv)
```

```
[[10 15 25]  
 [35 14 12]  
 [36 28 19]]  
Col Max Elements [36 28 25]  
Row Max Elements [25 35 36]  
Max Element= 36
```

```
In [6]: print(a)  
minv=np.amin(a)  
colmin=np.amin(a,axis=0)  
rowmin=np.amin(a,axis=1)  
print("Col Min Elements",colmin)  
print("Row Min Elements",rowmin)  
print("Min Element= ",minv)
```

```
[[10 15 25]  
 [35 14 12]  
 [36 28 19]]  
Col Min Elements [10 14 12]  
Row Min Elements [10 12 19]  
Min Element= 10
```

```
In [8]: #Calculating mean of ndarray (Formula: mean= Sum of Elements/Number of Element  
print(a)  
m=np.mean(a)  
print("mean= ",round(m,2))
```

```
[[10 15 25]  
 [35 14 12]  
 [36 28 19]]  
mean= 21.56
```

```
In [9]: a=np.array([[2,1],[3,4]])  
print(a)
```

```
[[2 1]  
 [3 4]]
```

```
In [14]: m=np.mean(a)  
colmean=np.mean(a,axis=0)  
rowmean=np.mean(a,axis=1)  
print("mean= ",round(m,2))  
print("column mean= ",colmean)  
print("row mean= ",rowmean)
```

```
mean= 2.5  
column mean= [2.5 2.5]  
row mean= [1.5 3.5]
```

```
In [15]: #Calculate median of ndarray (Formula: Median=Arrange Elements in Ascending Order  
# If Elements are Even--> Take sum of two elements in middle and Divide by 2)  
a=np.array([[10,15,25],[35,14,12],[36,28,19]])  
print(a,type(a),a.shape)
```

```
[[10 15 25]  
 [35 14 12]  
 [36 28 19]] <class 'numpy.ndarray'> (3, 3)
```

```
In [16]: med=np.median(a)  
colmed=np.median(a,axis=0)  
rowmed=np.median(a,axis=1)  
print("Median= ",med)  
print("Column Median= ",colmed)  
print("Row Median= ",rowmed)
```

```
Median= 19.0  
Column Median= [35. 15. 19.]  
Row Median= [15. 14. 28.]
```

```
In [17]: a=np.array([[2,1],[3,4]])  
print(a)
```

```
[[2 1]  
 [3 4]]
```

```
In [18]: med=np.median(a)
colmed=np.median(a,axis=0)
rowmed=np.median(a,axis=1)
print("Median= ",med)
print("Column Median= ",colmed)
print("Row Median= ",rowmed)
```

```
Median= 2.5
Column Median= [2.5 2.5]
Row Median= [1.5 3.5]
```

```
In [20]: # Calculate Variance of ndarray
# Variance= sqr(xi-mean) / total number of elements
# here 'xi' represents each element of matrix.
```

```
In [21]: a=np.array([[2,1],[3,4]])
print(a)
```

```
[[2 1]
 [3 4]]
```

```
In [22]: v=np.var(a)
colvar=np.var(a,axis=0)
rowvar=np.var(a,axis=1)
print("Variance= ",v)
print("Column Variance= ",colvar)
print("Row Variance= ",rowvar)
```

```
Variance= 1.25
Column Variance= [0.25 2.25]
Row Variance= [0.25 0.25]
```

```
In [23]: # Calculate std of ndarray
# standard deviation=sqrt(var)
a=np.array([[2,1],[3,4]])
print(a)
```

```
[[2 1]
 [3 4]]
```

```
In [24]: s=np.std(a)
colstd=np.std(a,axis=0)
rowstd=np.std(a,axis=1)
print("Standard Deviation= ",s)
print("Column Standard Deviation= ",colstd)
print("Row Standard Deviation= ",rowstd)
```

```
Standard Deviation= 1.118033988749895
Column Standard Deviation= [0.5 1.5]
Row Standard Deviation= [0.5 0.5]
```

```
In [26]: m=np.mode(a) # AttributeError: module 'numpy' has no attribute 'mode'
```

```
-----  
AttributeError                                Traceback (most recent call last)  
Cell In[26], line 1  
----> 1 m=np.mode(a)  
  
File ~\anaconda3\Lib\site-packages\numpy\__init__.py:320, in __getattr__(attr  
r)  
    317     from .testing import Tester  
    318     return Tester  
--> 320 raise AttributeError("module {!r} has no attribute "  
    321                        "{!r}".format(__name__, attr))  
  
AttributeError: module 'numpy' has no attribute 'mode'
```

```
In [27]: # In Python, we have statistics module and it contains mode() and multimode()
```

```
In [28]: import statistics as s
```

```
In [30]: lst=[10,20,30,10,20,40,50,60,70,10,20,10]  
freq=s.mode(lst)  
print("Frequently repeated Element=",freq)
```

Frequently repeated Element= 10

```
In [31]: lst=[10,20,30,10,20,40,50,60,70,10,20,10,20]  
freq=s.mode(lst)  
print("Frequently repeated Element=",freq)
```

Frequently repeated Element= 10

```
In [32]: lst=[20,10,30,10,20,40,50,60,70,10,20,10,20]  
freq=s.mode(lst)  
print("Frequently repeated Element=",freq)
```

Frequently repeated Element= 20

```
In [33]: lst=[20,10,30,10,20,40,50,60,70,10,20,10,20]  
freq=s.multimode(lst)  
print("Frequently repeated Element=",freq)
```

Frequently repeated Element= [20, 10]

```
In [35]: lst=[20,10,30,10,20,40,50,60,70,10,20,10,20]  
a=np.array(lst)  
freq=s.mode(a)  
print("Frequently repeated Element=",freq)
```

Frequently repeated Element= 20

```
In [36]: lst=[20,10,30,10,20,40,50,60,70,10,20,10,20]
a=np.array(lst)
freq=s.multimode(a)
print("Frequently repeated Element=",freq)
```

Frequently repeated Element= [20, 10]

In []: