

operations

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

```
In [3]: a = np.random.randint(10,20,10)
```

```
In [4]: a
```

```
Out[4]: array([16, 19, 18, 10, 11, 13, 16, 13, 16, 14])
```

```
In [6]: arr = np.random.randint(0,100,(10,10))  
arr
```

```
Out[6]: array([[21, 97, 89,  6, 26, 22, 39, 33, 94, 58],  
               [19, 76, 52, 97, 12, 31, 73, 58, 58, 47],  
               [91, 65, 89, 50, 50,  0, 56, 67, 57, 51],  
               [60, 17, 54, 47, 24, 51, 73, 55, 46, 93],  
               [67, 74, 32, 64, 65, 90, 15, 92,  8, 42],  
               [67,  2,  1, 30, 55, 78, 11, 81, 37, 60],  
               [36, 67, 23, 21, 52, 69, 24, 63, 22, 42],  
               [30, 22, 84,  1, 34, 90, 91, 14, 67, 14],  
               [75, 21, 66, 89, 74, 79, 29, 80,  5, 39],  
               [12, 43, 68, 20, 36, 92,  8, 20, 99,  9]])
```

```
In [7]: arr[0]
```

```
Out[7]: array([21, 97, 89,  6, 26, 22, 39, 33, 94, 58])
```

```
In [9]: arr[0:4]
```

```
Out[9]: array([[21, 97, 89,  6, 26, 22, 39, 33, 94, 58],  
               [19, 76, 52, 97, 12, 31, 73, 58, 58, 47],  
               [91, 65, 89, 50, 50,  0, 56, 67, 57, 51],  
               [60, 17, 54, 47, 24, 51, 73, 55, 46, 93]])
```

```
In [10]: arr[3,5]
```

Out[10]: 51

```
In [11]: arr
```

```
Out[11]: array([[21, 97, 89,  6, 26, 22, 39, 33, 94, 58],
                [19, 76, 52, 97, 12, 31, 73, 58, 58, 47],
                [91, 65, 89, 50, 50,  0, 56, 67, 57, 51],
                [60, 17, 54, 47, 24, 51, 73, 55, 46, 93],
                [67, 74, 32, 64, 65, 90, 15, 92,  8, 42],
                [67,  2,  1, 30, 55, 78, 11, 81, 37, 60],
                [36, 67, 23, 21, 52, 69, 24, 63, 22, 42],
                [30, 22, 84,  1, 34, 90, 91, 14, 67, 14],
                [75, 21, 66, 89, 74, 79, 29, 80,  5, 39],
                [12, 43, 68, 20, 36, 92,  8, 20, 99,  9]])
```

```
In [12]: arr[3,-1]
```

Out[12]: 93

```
In [13]: arr[::-1]
```

```
Out[13]: array([[12, 43, 68, 20, 36, 92,  8, 20, 99,  9],
                [75, 21, 66, 89, 74, 79, 29, 80,  5, 39],
                [30, 22, 84,  1, 34, 90, 91, 14, 67, 14],
                [36, 67, 23, 21, 52, 69, 24, 63, 22, 42],
                [67,  2,  1, 30, 55, 78, 11, 81, 37, 60],
                [67, 74, 32, 64, 65, 90, 15, 92,  8, 42],
                [60, 17, 54, 47, 24, 51, 73, 55, 46, 93],
                [91, 65, 89, 50, 50,  0, 56, 67, 57, 51],
                [19, 76, 52, 97, 12, 31, 73, 58, 58, 47],
                [21, 97, 89,  6, 26, 22, 39, 33, 94, 58]])
```

```
In [15]: arr
```

```
Out[15]: array([[21, 97, 89,  6, 26, 22, 39, 33, 94, 58],
               [19, 76, 52, 97, 12, 31, 73, 58, 58, 47],
               [91, 65, 89, 50, 50,  0, 56, 67, 57, 51],
               [60, 17, 54, 47, 24, 51, 73, 55, 46, 93],
               [67, 74, 32, 64, 65, 90, 15, 92,  8, 42],
               [67,  2,  1, 30, 55, 78, 11, 81, 37, 60],
               [36, 67, 23, 21, 52, 69, 24, 63, 22, 42],
               [30, 22, 84,  1, 34, 90, 91, 14, 67, 14],
               [75, 21, 66, 89, 74, 79, 29, 80,  5, 39],
               [12, 43, 68, 20, 36, 92,  8, 20, 99,  9]])
```

```
In [16]: arr[::-3]
```

```
Out[16]: array([[12, 43, 68, 20, 36, 92,  8, 20, 99,  9],
               [36, 67, 23, 21, 52, 69, 24, 63, 22, 42],
               [60, 17, 54, 47, 24, 51, 73, 55, 46, 93],
               [21, 97, 89,  6, 26, 22, 39, 33, 94, 58]])
```

```
In [17]: arr.max()
```

```
Out[17]: 99
```

```
In [18]: arr.min()
```

```
Out[18]: 0
```

```
In [19]: arr.mean()
```

```
Out[19]: 49.05
```

```
In [22]: from numpy import *
         a=array([1,2,3,4,9,7])
```

```
In [24]: median(a)
```

```
Out[24]: 3.5
```

Masking

```
In [25]: mat = np.random.randint(0 , 101 ,(10,10))
```

```
In [26]: mat
```

```
Out[26]: array([[ 40,  97,   8,  20,  71,  19,  49,  91,  56,  16],
 [ 42,  23,  69,  77,  76,  55,  26,  74,   7,  68],
 [ 56,   5,  90,  75,  95,  39,  74,  42,  38,  38],
 [ 89,  29,  38,  34,  55,  30,  53,  80,  43,  59],
 [ 28,  57,  26,  20,  27,  38,  75,  11,  82,  77],
 [ 69,   0,  47,  36,  57,  51,   7, 100,  21,  62],
 [ 21,  43,  14,  36,  57,  58,  38,   4,  66,  28],
 [ 62,  48,  83,  98,  28,  38,  17,  51,  43,  13],
 [ 60,   1,  71,  99,  32,  76,  18, 100,  52,  45],
 [ 93,  17,  39,  15,  14,  73,  16,  42,  94,   4]])
```

```
In [27]: mat<50
```

```
Out[27]: array([[ True, False,  True,  True, False,  True,  True, False, False,
   True],
 [ True,  True, False, False, False, False,  True, False,  True,
 False],
 [False,  True, False, False, False,  True, False,  True,  True,
   True],
 [False,  True,  True,  True, False,  True, False, False,  True,
 False],
 [ True, False,  True,  True,  True,  True, False,  True, False,
 False],
 [False,  True,  True,  True, False, False,  True, False,  True,
 False],
 [ True,  True,  True,  True, False, False,  True,  True, False,
   True],
 [False,  True, False, False,  True,  True,  True, False,  True,
   True],
 [False,  True, False, False,  True, False,  True, False, False,
   True],
 [False,  True,  True,  True,  True, False,  True,  True, False,
   True]])
```

```
In [28]: mat[mat<50]
```

```
Out[28]: array([40,  8, 20, 19, 49, 16, 42, 23, 26,  7,  5, 39, 42, 38, 38, 29, 38,
               34, 30, 43, 28, 26, 20, 27, 38, 11,  0, 47, 36,  7, 21, 21, 43, 14,
               36, 38,  4, 28, 48, 28, 38, 17, 43, 13,  1, 32, 18, 45, 17, 39, 15,
               14, 16, 42,  4])
```

```
In [29]: mat[mat<=50]
```

```
Out[29]: array([40,  8, 20, 19, 49, 16, 42, 23, 26,  7,  5, 39, 42, 38, 38, 29, 38,
               34, 30, 43, 28, 26, 20, 27, 38, 11,  0, 47, 36,  7, 21, 21, 43, 14,
               36, 38,  4, 28, 48, 28, 38, 17, 43, 13,  1, 32, 18, 45, 17, 39, 15,
               14, 16, 42,  4])
```

```
In [31]: mat[mat==40]
```

```
Out[31]: array([40])
```

```
In [32]: mat[mat>=33]
```

```
Out[32]: array([ 40,  97,  71,  49,  91,  56,  42,  69,  77,  76,  55,  74,  68,
                 56,  90,  75,  95,  39,  74,  42,  38,  38,  89,  38,  34,  55,
                 53,  80,  43,  59,  57,  38,  75,  82,  77,  69,  47,  36,  57,
                 51, 100,  62,  43,  36,  57,  58,  38,  66,  62,  48,  83,  98,
                 38,  51,  43,  60,  71,  99,  76, 100,  52,  45,  93,  39,  73,
                 42,  94])
```

Array Manipulations functions

reshape()

```
In [33]: # reshape an array
```

```
a1 = np.array([1,2,3])
reshape = np.reshape(a1, (3,1))
reshape
```

```
Out[33]: array([[1],
               [2],
               [3]])
```

ravel() ----> convert any dimension to 1D array

```
In [34]: # flatten the array
f1 = np.array([[1,2] , [3,4]])
flat = np.ravel(f1)
flat
```

```
Out[34]: array([1, 2, 3, 4])
```

transpose() --> transpose rows to columns & vise versa

```
In [35]: f1 = np.array([[1,2] , [3,4]])
tran = np.transpose(f1)
tran
```

```
Out[35]: array([[1, 3],
               [2, 4]])
```

vstack() --> vertical stacking

```
In [38]: a = np.array([1,2,3])
b = np.array([3,4,7])
stack = np.vstack([a,b])
stack
```

```
Out[38]: array([[1, 2, 3],
               [3, 4, 7]])
```

hstack() --> horizontal stacking

```
In [39]: a = np.array([1,2])
b = np.array([3,4])
stack = np.hstack([a,b])
stack
```

```
Out[39]: array([1, 2, 3, 4])
```

eye() --> to create identical matrix

```
In [40]: f=np.eye(4) # 4x4 identity matrix
f
```

```
Out[40]: array([[1., 0., 0., 0.],
               [0., 1., 0., 0.],
               [0., 0., 1., 0.],
               [0., 0., 0., 1.]])
```

identity() --> The diagonal items will be ones and remaining will be zeros

```
In [41]: np.identity(3)
```

```
Out[41]: array([[1., 0., 0.],
               [0., 1., 0.],
               [0., 0., 1.]])
```

ndim --> to find number number of dimensions

```
In [42]: a1 = np.array ([[[[1,2] , [3,4], [6,8]]]])
a1
```

```
Out[42]: array([[[[1, 2],
                 [3, 4],
                 [6, 8]]]])
```

```
In [43]: a1.ndim
```

```
Out[43]: 4
```