Numpy

In [3]:
```
import numpy as np
```

In [4]:
```
np.__version__
```

Out[4]: '2.1.3'

In [5]:
```
my_list = [0,1,2,3,4,5]
my_list
```

Out[5]: [0, 1, 2, 3, 4, 5]

In [7]:
```
type(my_list)
```

Out[7]: list

In [9]:
```
my_list
```

Out[9]: [0, 1, 2, 3, 4, 5]

In [8]:
```
arr = np.array(my_list)
arr
```

Out[8]: array([0, 1, 2, 3, 4, 5])

In [10]:
```
print(type(arr))
```

```
<class 'numpy.ndarray'>
```

np.arange()

In [11]:
```
np.arange(10)
```

Out[11]: array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])

In [12]:
```
np.arange(10,20)
```

Out[12]: array([10, 11, 12, 13, 14, 15, 16, 17, 18, 19])

In [13]:
```
np.arange(10,50,5)
```

Out[13]: array([10, 15, 20, 25, 30, 35, 40, 45])

In [14]:
```
np.arange(20,10)  #1st arg < 2nd arg
```

Out[14]: array([], dtype=int64)

In [15]:
```
np.arange(-20,10)
```

```
Out[15]: array([-20, -19, -18, -17, -16, -15, -14, -13, -12, -11, -10,  -9,  -8,
                -7,  -6,  -5,  -4,  -3,  -2,  -1,   0,   1,   2,   3,   4,   5,
                 6,   7,   8,   9])
```

np.zeros()

```
In [16]: np.zeros(5) #parameter tunning
```

```
Out[16]: array([0., 0., 0., 0., 0.])
```

```
In [17]: np.zeros(5, dtype=int) #hyperparameter tunning
```

```
Out[17]: array([0, 0, 0, 0, 0])
```

```
In [18]: np.zeros([2,2])
```

```
Out[18]: array([[0., 0.],
                [0., 0.]])
```

```
In [19]: np.zeros([5,4])
```

```
Out[19]: array([[0., 0., 0., 0.],
                [0., 0., 0., 0.],
                [0., 0., 0., 0.],
                [0., 0., 0., 0.],
                [0., 0., 0., 0.]])
```

```
In [20]: np.zeros((10,10),dtype = int)
```

```
Out[20]: array([[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                [0, 0, 0, 0, 0, 0, 0, 0, 0, 0]])
```

np.ones()

```
In [21]: np.ones(2)
```

```
Out[21]: array([1., 1.])
```

```
In [22]: np.ones(2, dtype=int)
```

```
Out[22]: array([1, 1])
```

```
In [23]: np.ones([2,2])
```

```
Out[23]: array([[1., 1.],
                [1., 1.]])
```

In [24]:
```
np.ones([4,5])
```

Out[24]:
```
array([[1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.]])
```

In [25]:
```
arr
```

Out[25]:
```
array([0, 1, 2, 3, 4, 5])
```

rand()

In [ ]:
```
rand(3,2)
```

In [ ]:
```
random.rand(3,2)
```

In [26]:
```
np.random.rand(3,2)
```

Out[26]:
```
array([[0.42452863, 0.98902134],
       [0.16924306, 0.32724227],
       [0.9196972 , 0.94387884]])
```

In [27]:
```
np.random.rand(3)
```

Out[27]:
```
array([0.68317645, 0.919149  , 0.06118782])
```

randint()

In [28]:
```
np.random.randint(4,6)
```

Out[28]:
```
5
```

In [29]:
```
np.random.randint(0,10)
```

Out[29]:
```
7
```

In [30]:
```
np.random.randint(0,10,4)
```

Out[30]:
```
array([7, 8, 4, 9], dtype=int32)
```

In [31]:
```
np.random.randint(0,10,5)
```

Out[31]:
```
array([7, 2, 1, 7, 1], dtype=int32)
```

In [32]:
```
n = np.random.randint(10,40,(8,10))
```

In [33]:
```
n
```

Out[33]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [25, 21, 17, 28, 33, 32, 29, 33, 35, 37]], dtype=int32)
```

In [34]:
```
n[5]
```

Out[34]:
```
array([36, 20, 18, 36, 37, 29, 17, 39, 36, 35], dtype=int32)
```

In [35]:
```
n
```

Out[35]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [25, 21, 17, 28, 33, 32, 29, 33, 35, 37]], dtype=int32)
```

In [37]:
```
n[0:6]
```

Out[37]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35]], dtype=int32)
```

In [38]:
```
n
```

Out[38]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [25, 21, 17, 28, 33, 32, 29, 33, 35, 37]], dtype=int32)
```

In [39]:
```
n[::-1]
```

Out[39]:
```
array([[25, 21, 17, 28, 33, 32, 29, 33, 35, 37],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [33, 22, 16, 13, 17, 39, 38, 29, 15, 17]], dtype=int32)
```

In [40]:
```
n
```

Out[40]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [25, 21, 17, 28, 33, 32, 29, 33, 35, 37]], dtype=int32)
```

In [41]:
```
n[::2]
```

Out[41]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26]], dtype=int32)
```

In [42]:
```
n
```

Out[42]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [25, 21, 17, 28, 33, 32, 29, 33, 35, 37]], dtype=int32)
```

In [43]:
```
n[0]
```

Out[43]:
```
array([33, 22, 16, 13, 17, 39, 38, 29, 15, 17], dtype=int32)
```

In [44]:
```
n
```

Out[44]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [25, 21, 17, 28, 33, 32, 29, 33, 35, 37]], dtype=int32)
```

In [45]:
```
n[0:5]
```

Out[45]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33]], dtype=int32)
```

In [46]:
```
n[0,5]
```

Out[46]:
```
np.int32(39)
```

In [47]:
```
n
```

Out[47]:
```
array([[33, 22, 16, 13, 17, 39, 38, 29, 15, 17],
       [20, 39, 32, 29, 18, 39, 33, 12, 31, 33],
       [12, 28, 38, 24, 18, 30, 39, 16, 12, 37],
       [12, 19, 31, 28, 22, 39, 13, 14, 26, 16],
       [38, 15, 15, 10, 34, 11, 17, 38, 32, 33],
       [36, 20, 18, 36, 37, 29, 17, 39, 36, 35],
       [18, 21, 37, 29, 19, 28, 12, 11, 23, 26],
       [25, 21, 17, 28, 33, 32, 29, 33, 35, 37]], dtype=int32)
```

In [48]:
```
n[5,-3]
```

Out[48]:
```
np.int32(39)
```

In [49]:
```
import numpy as np

x = np.int32(10)
print(x)        # Output: 10
#print(type(x))
```

```
10
```

reshape()

In [50]:
```
np.arange(1,13).reshape(6,2)
```

Out[50]:
```
array([[ 1,  2],
       [ 3,  4],
       [ 5,  6],
       [ 7,  8],
       [ 9, 10],
       [11, 12]])
```

In [51]:
```
np.arange(1,13).reshape(5,5)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[51], line 1
----> 1 np.arange(1,13).reshape(5,5)

ValueError: cannot reshape array of size 12 into shape (5,5)
```

In [54]:
```
np.arange(1,13).reshape(4,3)
```

Out[54]:
```
array([[ 1,  2,  3],
       [ 4,  5,  6],
       [ 7,  8,  9],
       [10, 11, 12]])
```

In [55]:
```
np.arange(1,13).reshape(6,2)
```

Out[55]:
```
array([[ 1,  2],
       [ 3,  4],
       [ 5,  6],
       [ 7,  8],
       [ 9, 10],
       [11, 12]])
```

In [56]:
```
np.arange(1,13).reshape(1,12)
```

Out[56]:
```
array([[ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12]])
```

In [57]:
```
np.arange(1,13).reshape(12,1)
```

Out[57]:
```
array([[ 1],
       [ 2],
       [ 3],
       [ 4],
       [ 5],
       [ 6],
       [ 7],
       [ 8],
       [ 9],
       [10],
       [11],
       [12]])
```

In [ ]: