# task 36 numpy

July 25, 2022

[1]:
```
!pip install numpy

import numpy as np
```

```
Requirement already satisfied: numpy in d:\anakonda\lib\site-packages (1.21.5)
```

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

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

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

```
['1' '2' '3' '4' 'a']
```

[10]:
```
# 1,2,3,4 dimention

a=np.array(10)
b=np.array([1,2,3])
c=np.array([[1,2,3],[1,2,3]])
d=np.array([[[1,2,3],[4,5,6]],[[1,2,3],[4,5,6]]])
```

[11]:
```
print('a dimension:',a.ndim)
print('b dimension:',b.ndim)
print('c dimension:',c.ndim)
print('d dimension:',d.ndim)
```

```
a dimension: 0
b dimension: 1
c dimension: 2
d dimension: 3
```

[13]:
```
print(a.ndim)
print(b.ndim)
print(c.ndim)
print(d.ndim)
```

```
0
1
```

```
2
3
```

[17]:
```
print(a)
print('shape of a:',a.shape)
print(b)
print('shape of b:',b.shape)
print(c)
print('shape of c:',c.shape)
print(d)
print('shape of d:',d.shape)
```

```
10
shape of a: ()
[1 2 3]
shape of b: (3,)
[[1 2 3]
 [1 2 3]]
shape of c: (2, 3)
[[[1 2 3]
  [4 5 6]]

 [[1 2 3]
  [4 5 6]]]
shape of d: (2, 2, 3)
```

[16]:
```
print(a)
print(a.shape)
print(b)
print(b.shape)
print(c)
print(c.shape)
print(d)
print(d.shape)
```

```
10
()
[1 2 3]
(3,)
[[1 2 3]
 [1 2 3]]
(2, 3)
[[[1 2 3]
  [4 5 6]]

 [[1 2 3]
  [4 5 6]]]
(2, 2, 3)
```

[18]:
```
print(type(a))
print(type(b))
print(type(c))
print(type(d))
```

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

[19]:
```
print(a.dtype)
print(b.dtype)
print(c.dtype)
print(d.dtype)
```

```
int32
int32
int32
int32
```

[31]:
```
print(len(b))
print(len(c))
print(len(d))
```

```
3
2
2
```

[32]:
```
len(d)
```

[32]: 2

[38]:
```
l1=[10,20,30]
l2=[30,40,50]
l3=np.array(l1)
l4=np.array(l2)
print(type(l3))
print((l3))
print(l4)
```

```
<class 'numpy.ndarray'>
[10 20 30]
[30 40 50]
```

[39]:
```
np.arange(1,11)
```

[39]: array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10])

[40]:
```
np.arange(1,23,2)
```

[40]:
```
array([ 1,  3,  5,  7,  9, 11, 13, 15, 17, 19, 21])
```

[44]:
```
np.arange(1,40,1)
```

[44]:
```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16, 17,
       18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34,
       35, 36, 37, 38, 39])
```

[55]:
```
np.eye(5, dtype = int)
```

[55]:
```
array([[1, 0, 0, 0, 0],
       [0, 1, 0, 0, 0],
       [0, 0, 1, 0, 0],
       [0, 0, 0, 1, 0],
       [0, 0, 0, 0, 1]])
```

[56]:
```
np.eye(5, dtype = bool)
```

[56]:
```
array([[ True, False, False, False, False],
       [False,  True, False, False, False],
       [False, False,  True, False, False],
       [False, False, False,  True, False],
       [False, False, False, False,  True]])
```

[62]:
```
np.eye(15, dtype = int)
```

[62]:
```
array([[1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
       [0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
       [0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
       [0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
       [0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
       [0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0],
       [0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0],
       [0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0],
       [0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0],
       [0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
       [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0],
       [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0],
       [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0],
       [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0],
       [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1]])
```

[68]:
```
np.zeros((5,5), dtype = int)
```

[68]:
```
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]])
```

[79]:
```
np.ones((5,5), dtype = int)
```

[79]:
```
array([[1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1]])
```

[83]:
```
np.full((3,5),4, dtype = int)
```

[83]:
```
array([[4, 4, 4, 4, 4],
       [4, 4, 4, 4, 4],
       [4, 4, 4, 4, 4]])
```

[84]:
```
x=[1,2,3,4,5,6,7,]
np.diag(x)
```

[84]:
```
array([[1, 0, 0, 0, 0, 0, 0],
       [0, 2, 0, 0, 0, 0, 0],
       [0, 0, 3, 0, 0, 0, 0],
       [0, 0, 0, 4, 0, 0, 0],
       [0, 0, 0, 0, 5, 0, 0],
       [0, 0, 0, 0, 0, 6, 0],
       [0, 0, 0, 0, 0, 0, 7]])
```

[87]:
```
np.random.random(100)
```

[87]:
```
array([0.31849417, 0.28807171, 0.58171174, 0.11597656, 0.24171367,
       0.86244481, 0.87055785, 0.98565678, 0.91544248, 0.06560505,
       0.33466296, 0.39893985, 0.75184977, 0.72492271, 0.57337177,
       0.60284521, 0.13976896, 0.46137423, 0.40516222, 0.02020274,
       0.07163318, 0.95421288, 0.30513464, 0.6186917 , 0.90501149,
       0.78088122, 0.36778396, 0.51643056, 0.36643749, 0.61321998,
       0.76492369, 0.78091215, 0.75211649, 0.67284066, 0.52939058,
       0.47374756, 0.11001634, 0.32882029, 0.06195495, 0.08069353,
       0.72394285, 0.5985334 , 0.33216832, 0.42587219, 0.4051559 ,
       0.62226641, 0.14482117, 0.65393045, 0.26207148, 0.05014111,
       0.56380098, 0.08878074, 0.9149363 , 0.1797011 , 0.09146968,
       0.1670167 , 0.56980262, 0.53124347, 0.38114909, 0.71339502,
       0.89287456, 0.86843416, 0.15219105, 0.02488941, 0.92879122,
       0.40684798, 0.74400937, 0.86336328, 0.29657866, 0.31837218,
       0.30227181, 0.17804832, 0.36027918, 0.44903887, 0.71210368,
       0.29964966, 0.96083044, 0.76860879, 0.9926145 , 0.39913822,
       0.41021129, 0.62622518, 0.59608984, 0.05862366, 0.2296191 ,
       0.76845321, 0.94226403, 0.33368227, 0.83060897, 0.96376004,
       0.2424392 , 0.11255342, 0.83747427, 0.33786342, 0.96601633,
```

```
0.43283546, 0.50873063, 0.46064536, 0.64378274, 0.83613979])
```

[88]:
```
np.random.randn(100)
```

[88]:
```
array([ 0.45911973, -2.41155339, -1.22269303, -0.23428725,  1.42390623,
        1.09685789,  1.44832666,  0.43461046, -0.00632108,  0.25456952,
       -1.36179105, -0.0662942 , -0.81099272,  0.44104233, -0.45499539,
        2.52410849, -0.66396636, -0.7945721 , -1.27930146, -0.86647621,
        0.50108632, -0.41444078,  0.07369303, -1.70854484,  0.66818149,
        2.69166497,  1.72901247,  1.9462607 , -1.07894635,  1.00299027,
        1.41027505,  0.95977199, -0.86799591,  0.2394223 , -0.3807864 ,
       -1.10105009,  1.44958586,  1.66808576,  1.62126791,  0.07590717,
       -0.32125574,  1.59171699, -1.70846971, -1.64838345, -0.83660698,
        0.6710679 ,  1.09915182,  0.3274794 ,  1.41157307,  0.59972147,
        1.79308967,  0.29172304,  0.18833931,  0.93714935,  0.2849062 ,
       -1.04368374, -1.24268299, -0.46721546, -1.95493514,  0.99134852,
       -0.7880694 , -0.62440469, -0.45365949, -1.11621247,  0.44899032,
        0.39562437,  0.76977219,  0.14312672, -0.00351327,  0.36192342,
        1.5350081 , -0.32381921,  0.89465636, -0.1914751 , -1.03145516,
        0.48274817, -0.97057204, -1.83292514, -0.263982  ,  0.38904011,
       -1.12622574,  0.1670435 ,  1.27130451,  1.12553806, -0.64715818,
       -1.82756859, -0.89582827, -1.17951256,  0.77148925,  0.44568258,
        2.03569595, -0.5184926 , -0.51693577, -0.48945522,  0.16768768,
       -1.02323074, -1.91830759, -1.10275854,  0.7794325 ,  0.25750735])
```

[99]:
```
import random
a=random.randint(100,10000)
a
```

[99]:
```
1606
```

[102]:
```
x=np.arange(1,17)
print(x)
print(x.shape)
print(x.ndim)
```

```
[ 1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16]
(16,)
1
```

[107]:
```
n=x.reshape(8,2)
print(n)
print(n.shape)
print(n.ndim)
```

```
[[ 1  2]
 [ 3  4]
 [ 5  6]
 [ 7  8]
```

```
 [ 9 10]
 [11 12]
 [13 14]
 [15 16]]
(8, 2)
2
```

[108]:
```
n=x.reshape(4,2,2)
print(n)
print(n.shape)
print(n.ndim)
```

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

 [[ 5  6]
  [ 7  8]]

 [[ 9 10]
  [11 12]]

 [[13 14]
  [15 16]]]
(4, 2, 2)
3
```

[110]:
```
n=x.ravel()
print(n.shape)
print(n)
print(n.ndim)
```

```
(16,)
[ 1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16]
1
```

[111]:
```
x.flatten()
```

[111]:
```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16])
```

[112]:
```
a=np.arange(4,12,3)
print(a)
```

```
[ 4  7 10]
```

[114]:
```
b=np.array([[[1,2,3],[4,5,6]],[[1,2,3],[4,5,6]]])
b.shape
b
```

[114]:
```
array([[[1, 2, 3],
        [4, 5, 6]],

       [[1, 2, 3],
        [4, 5, 6]]])
```

[115]:
```
b[0][1][2]
```

[115]:
```
6
```

[117]:
```
arr=np.arange(1,11)
arr
```

[117]:
```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10])
```

[118]:
```
arr[0:5]
```

[118]:
```
array([1, 2, 3, 4, 5])
```

[120]:
```
arr[5:]
```

[120]:
```
array([ 6,  7,  8,  9, 10])
```

[121]:
```
arr[:5]
```

[121]:
```
array([1, 2, 3, 4, 5])
```

[122]:
```
arr[1:7:2]
```

[122]:
```
array([2, 4, 6])
```

[123]:
```
arr[0:10:2]
```

[123]:
```
array([1, 3, 5, 7, 9])
```

[124]:
```
arr
```

[124]:
```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10])
```

[125]:
```
a
```

[125]:
```
array([ 4,  7, 10])
```

[126]:
```
arr[2]
```

[126]:
```
3
```

[128]:
```
arr[5]
```

[128]: 6

[131]:
```
a[0:1:]
```

[131]: array([4])

[ ]:

[132]:
```
x1=np.arange(10)
x1
```

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

[133]:
```
x2=x1
```

[136]:
```
print(x1)
print(x2)
```

```
[10  1  2  3  4  5  6  7  8  9]
[10  1  2  3  4  5  6  7  8  9]
```

[135]:
```
x2[0]=10
```

[137]:
```
print(x1)
print(x2)
```

```
[10  1  2  3  4  5  6  7  8  9]
[10  1  2  3  4  5  6  7  8  9]
```

[140]:
```
print(id(x1))
print(id(x2))
```

```
2157705536784
2157705536784
```

[141]:
```
print(np.shares_memory(x1,x2))
print(id(x1))
print(id(x2))
```

```
True
2157705536784
2157705536784
```

[142]:
```
x3=x1.view()
```

[143]:
```
np.shares_memory(x1,x3)
```

[143]: True

[144]:
```
x3[0]=100
```

[145]:
```
print(x1)
print(x2)
```

```
[100   1   2   3   4   5   6   7   8   9]
[100   1   2   3   4   5   6   7   8   9]
```

[146]:
```
x4=np.copy(x1)
```

[147]:
```
x4[-1]=900
```

[148]:
```
print(x1)
print(x4)
```

```
[100   1   2   3   4   5   6   7   8   9]
[100   1   2   3   4   5   6   7   8 900]
```

[150]:
```
print(id(x1))
print(id(x4))
np.shares_memory(x1,x4)
```

```
2157705536784
2157705177680
```

[150]:
```
False
```

[ ]:
```
array=[1,2,3,4,5,6,7,8]
```

[166]:
```
print(a.transpose())
print('-------------')
print(a)
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Input In [166], in <cell line: 1>()
----> 1 print(a.transpose())
      2 print('-------------')
      3 print(a)

AttributeError: 'list' object has no attribute 'transpose'
```

[ ]:
```
```

[ ]:
```
```

[167]:
```
print(x1)
print(x4)
np.vstack((x1,x4))
```

```
[100   1   2   3   4   5   6   7   8   9]
[100   1   2   3   4   5   6   7   8 900]
```

[167]:
```
array([[100,   1,   2,   3,   4,   5,   6,   7,   8,   9],
       [100,   1,   2,   3,   4,   5,   6,   7,   8, 900]])
```

[168]:
```
np.hstack((x1,x4))
```

[168]:
```
array([100,   1,   2,   3,   4,   5,   6,   7,   8,   9, 100,   1,   2,
         3,   4,   5,   6,   7,   8, 900])
```

[171]:
```
print(x1)
print(x4)
np.insert(x1, 4, x4)
```

```
[100   1   2   3   4   5   6   7   8   9]
[100   1   2   3   4   5   6   7   8 900]
```

[171]:
```
array([100,   1,   2,   3, 100,   1,   2,   3,   4,   5,   6,   7,   8,
       900,   4,   5,   6,   7,   8,   9])
```

[172]:
```
print(x2)
np.delete(x2,0)
```

```
[100   1   2   3   4   5   6   7   8   9]
```

[172]:
```
array([1, 2, 3, 4, 5, 6, 7, 8, 9])
```

[ ]:
```
a=np.array([[1,2,3],[4,5,6],[7,8,9]])
```

[178]:
```
np.sin(a)
```

[178]:
```
array([[ 0.84147098,  0.90929743,  0.14112001],
       [-0.7568025 , -0.95892427, -0.2794155 ],
       [ 0.6569866 ,  0.98935825,  0.41211849]])
```

[174]:
```
np.cos(a)
```

[174]:
```
array([[ 0.54030231, -0.41614684, -0.9899925 ],
       [-0.65364362,  0.28366219,  0.96017029],
       [ 0.75390225, -0.14550003, -0.91113026]])
```

[175]:
```
np.tan(a)
```

[175]:
```
array([[ 1.55740772, -2.18503986, -0.14254654],
       [ 1.15782128, -3.38051501, -0.29100619],
       [ 0.87144798, -6.79971146, -0.45231566]])
```

[176]:
```
np.exp(a)
```

[176]:
```
array([[2.71828183e+00, 7.38905610e+00, 2.00855369e+01],
       [5.45981500e+01, 1.48413159e+02, 4.03428793e+02],
       [1.09663316e+03, 2.98095799e+03, 8.10308393e+03]])
```

[179]:
```
np.sum(a)
```

[179]:
```
45
```

[180]:
```
np.sum(a,axis=1)
```

[180]:
```
array([ 6, 15, 24])
```

[181]:
```
np.sum(a,axis=0)
```

[181]:
```
array([12, 15, 18])
```

[184]:
```
np.median(a)
```

[184]:
```
5.0
```

[185]:
```
np.mean(a)
```

[185]:
```
5.0
```

[186]:
```
np.std(a)
```

[186]:
```
2.581988897471611
```

[187]:
```
np.max(a)
```

[187]:
```
9
```

[190]:
```
np.sort(a)
```

[190]:
```
array([[1, 2, 3],
       [4, 5, 6],
       [7, 8, 9]])
```

[192]:
```
m=np.where(x1==4)
m
```

[192]:
```
(array([4], dtype=int64),)
```

[193]:
```
x1
```

[193]:
```
array([100,   1,   2,   3,   4,   5,   6,   7,   8,   9])
```

[194]:
```
c=np.array([44,55,66,77,88,99,11,22,33,44,55,66])
```

[195]:
```
np.where(c%2 == 0)
```

[195]:
```
(array([ 0,  2,  4,  7,  9, 11], dtype=int64),)
```

[196]:
```
np.where(x1>5,x1,0)
```

[196]:
```
array([100,   0,   0,   0,   0,   0,   6,   7,   8,   9])
```

[203]:
```
print(dir(tuple))
```

```
['__add__', '__class__', '__class_getitem__', '__contains__', '__delattr__',
'__dir__', '__doc__', '__eq__', '__format__', '__ge__', '__getattribute__',
'__getitem__', '__getnewargs__', '__gt__', '__hash__', '__init__',
'__init_subclass__', '__iter__', '__le__', '__len__', '__lt__', '__mul__',
'__ne__', '__new__', '__reduce__', '__reduce_ex__', '__repr__', '__rmul__',
'__setattr__', '__sizeof__', '__str__', '__subclasshook__', 'count', 'index']
```

[ ]: