

PracticeOne

2019 年 10 月 15 日

0.1 练习一

```
[1]: import numpy as np
```

1. 创建一个含有从 0 到 9 数字的一维数组，并输出

```
[2]: arr1 = np.arange(10)
print(arr1)
```

```
[0 1 2 3 4 5 6 7 8 9]
```

2. 创建一个大小为 10 的数组，值为 0 到 1 之间，不包含 0 和 1

```
[10]: arr2 = np.linspace(0,1,12)[1:11]
print(arr2)
```

```
[0.09090909 0.18181818 0.27272727 0.36363636 0.45454545 0.54545455
 0.63636364 0.72727273 0.81818182 0.90909091]
```

3. 创建一个 3*3 的所有值为 True 的 numpy 数组，并输出

```
[13]: arr3 = np.ones((3,3),dtype=bool)
print(arr3)
```

```
[[ True  True  True]
 [ True  True  True]
 [ True  True  True]]
```

4. 创建一个长度为 100，数值为 1~100 的随机数组 arr，并从 arr 数组中提取所有奇数元素

```
[28]: arr4 = np.random.randint(1,101,100)
arr41 = arr4[arr4%2==1]
print(arr41)
```

```
[49 43 71 65  9 51 91 13  7 23 71 19 95 69 43 95 47 75 71 63 63  9 85 75
 99 77  7 83 89 65 33 89 79 73 85 19  1 21 93 69 29 71 93 59 69 31 29 45]
```

5. 用-1 替换上题中 arr 数组中所有的奇数

```
[31]: arr5 = np.random.randint(1,101,100)
arr5[arr5 % 2 == 1] = -1
print(arr4)
```

```
[ -1  -1  -1  -1  44  90   2   6  76  -1  70  78  -1  66  70  -1  -1  -1
 86  -1  26  -1  -1  68  22  -1  -1  -1  80  98  12  -1  -1  64  50  -1
 16  -1  12  70  70  -1  -1  76  12  -1  -1  68  -1  -1  64  54  -1  -1
 -1  -1  22  -1  -1  -1  92  -1  26  84  20  -1  -1  10  78  84  -1  -1
 -1  -1  -1  40  -1  14  68 100  -1  -1  66  -1   2  -1  84  -1  10  76
 -1  68  -1  72  -1  -1  44  -1  94  38]
```

6. 将 1 维数组转换为 2 行的 2 维数组

```
[33]: arr6 = np.arange(10)
arr6.shape=2,5
print(arr6)
```

```
[[0 1 2 3 4]
 [5 6 7 8 9]]
```

7. 垂直堆叠数组 a 和 b

```
[36]: arr71 = np.arange(12).reshape(3,4)
arr72 = arr71 *2
arr7 = np.vstack((arr71,arr72))
print (arr7)
```

```
[[ 0  1  2  3]
 [ 4  5  6  7]
 [ 8  9 10 11]
 [ 0  2  4  6]
 [ 8 10 12 14]
 [16 18 20 22]]
```

8. 水平堆叠数组 a 和 b

```
[38]: arr81 = np.arange(12).reshape(3,4)
arr82 = arr81 *2
arr8 = np.hstack((arr81,arr82))
print (arr8)
```

```
[[ 0  1  2  3  0  2  4  6]
 [ 4  5  6  7  8 10 12 14]
 [ 8  9 10 11 16 18 20 22]]
```

9. 深度堆叠数组 a 和 b

```
[39]: arr91 = np.arange(12).reshape(3,4)
arr92 = arr91 *2
arr9 = np.dstack((arr91,arr92))
print (arr9)
```

```
[[[ 0  0]
 [ 1  2]
 [ 2  4]
 [ 3  6]]
```

```
[[ 4  8]
 [ 5 10]
 [ 6 12]
 [ 7 14]]
```

```
[[ 8 16]
 [ 9 18]
 [10 20]
 [11 22]]]
```

10. 在数组 arr 中交换第 1 行和第 2 行

```
[46]: arr10 = np.arange(16).reshape(4,4)
arr10[[1,0,2,3],:]
```

```
[46]: array([[ 4,  5,  6,  7],
           [ 0,  1,  2,  3],
           [ 8,  9, 10, 11],
           [12, 13, 14, 15]])
```

11. 颠倒二维数组 arr 的列

```
[47]: arr11 = np.arange(16).reshape(4,4)
arr11[:,::-1]
```

```
[47]: array([[ 3,  2,  1,  0],
        [ 7,  6,  5,  4],
        [11, 10,  9,  8],
        [15, 14, 13, 12]])
```

12. 创建两个数组，并对其进行四则运算（略）

```
[48]: arr121 = np.random.randint(1,100,100).reshape(10,10)
arr122 = np.random.randint(1,100,100).reshape(10,10)
arr121 + arr122
```

```
[48]: array([[ 77,  30,  20,  98, 108,  61, 111, 139,  72,  91],
        [  4,  80,  66,  79, 107, 167,  89, 121, 125, 157],
        [120, 130,  82, 105, 119,  84, 100, 116, 116,  84],
        [103, 106,  79,  78, 106,  87,  62, 155, 109, 133],
        [142,  88,  94, 173, 182,  70,  98,  98, 158,  11],
        [151, 130, 102, 105, 114, 149,  96,  69, 105, 139],
        [135, 120, 164,  68,  92, 134, 133, 139,  52,  48],
        [106,  78,  99,  93,  54, 116,  76, 138,  65,  72],
        [182,  93,  86,  32,  99, 159,  91, 100,  61,  10],
        [ 71,  65,  92, 147,  85, 114, 120,  48,  58,  73]])
```

13. 减去矩阵每一行的平均值

```
[56]: arr13 = np.arange(20).reshape(4,5)
for i in range(4):
    arr13[i]=arr13[i] - arr13[i].mean()
print(arr13)
```

```
[-2 -1  0  1  2]
[-2 -1  0  1  2]
[-2 -1  0  1  2]
[-2 -1  0  1  2]]
```

14. 把数组按第 n 列排序

```
[57]: arr14 = np.random.randint(1,100,20).reshape(4,5)
arr14[arr14[:,1].argsort()]
```

```
[57]: array([[52,  2, 40, 15, 60],
           [20, 47, 68, 64, 73],
           [13, 52, 15, 84,  5],
           [12, 66, 53, 74, 72]])
```

15. 将一个数组在一维上重复3次，在二维上重复4次

```
[59]: arr14 = np.random.randint(1,100,20).reshape(4,5)
       np.tile(arr14,(4,3))
```

```
[59]: array([[49, 16, 73, 96, 86, 49, 16, 73, 96, 86, 49, 16, 73, 96, 86],
           [60, 55, 25, 72, 13, 60, 55, 25, 72, 13, 60, 55, 25, 72, 13],
           [81, 11,  8, 44, 70, 81, 11,  8, 44, 70, 81, 11,  8, 44, 70],
           [82, 19, 10,  9, 80, 82, 19, 10,  9, 80, 82, 19, 10,  9, 80],
           [49, 16, 73, 96, 86, 49, 16, 73, 96, 86, 49, 16, 73, 96, 86],
           [60, 55, 25, 72, 13, 60, 55, 25, 72, 13, 60, 55, 25, 72, 13],
           [81, 11,  8, 44, 70, 81, 11,  8, 44, 70, 81, 11,  8, 44, 70],
           [82, 19, 10,  9, 80, 82, 19, 10,  9, 80, 82, 19, 10,  9, 80],
           [49, 16, 73, 96, 86, 49, 16, 73, 96, 86, 49, 16, 73, 96, 86],
           [60, 55, 25, 72, 13, 60, 55, 25, 72, 13, 60, 55, 25, 72, 13],
           [81, 11,  8, 44, 70, 81, 11,  8, 44, 70, 81, 11,  8, 44, 70],
           [82, 19, 10,  9, 80, 82, 19, 10,  9, 80, 82, 19, 10,  9, 80],
           [49, 16, 73, 96, 86, 49, 16, 73, 96, 86, 49, 16, 73, 96, 86],
           [60, 55, 25, 72, 13, 60, 55, 25, 72, 13, 60, 55, 25, 72, 13],
           [81, 11,  8, 44, 70, 81, 11,  8, 44, 70, 81, 11,  8, 44, 70],
           [82, 19, 10,  9, 80, 82, 19, 10,  9, 80, 82, 19, 10,  9, 80]])
```

请对照练习