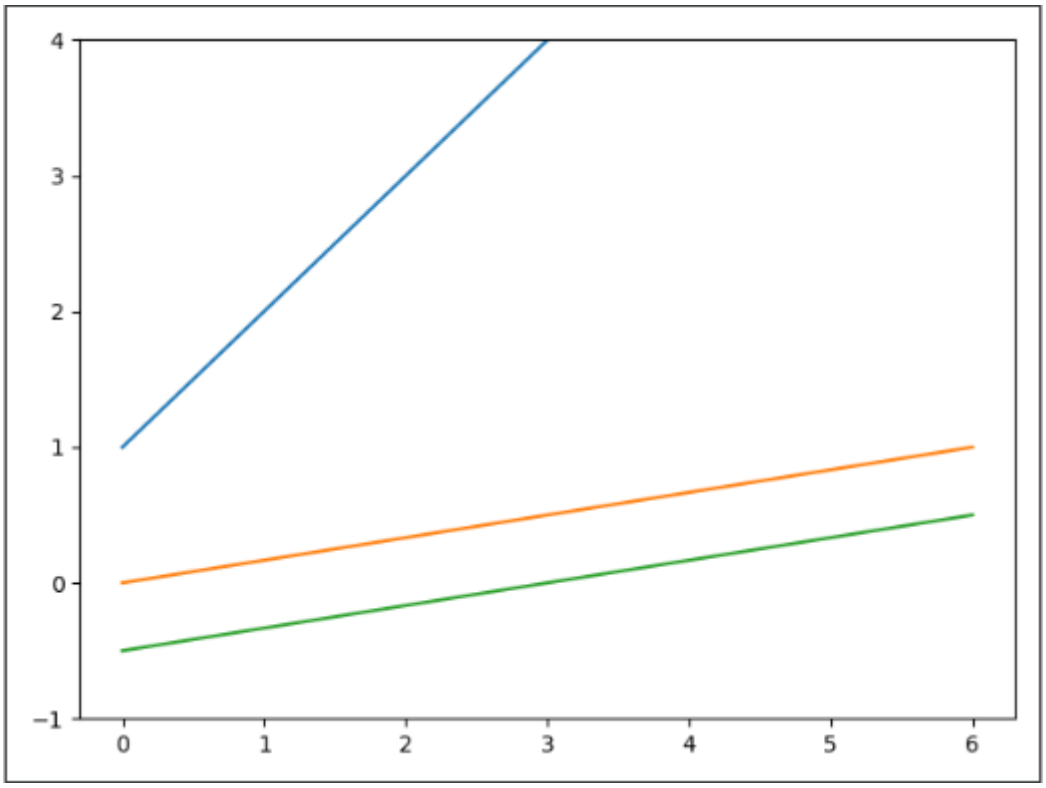
归一化

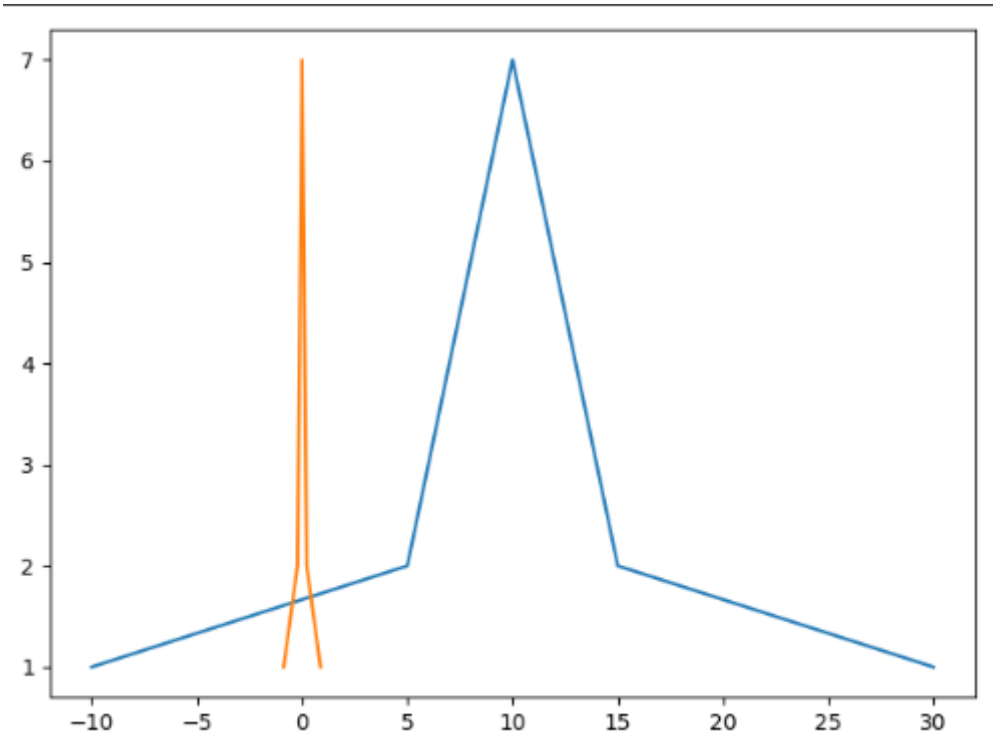
简而言之，归一化的目的就是使得预处理的数据被限定在一定的范围内（比如[0,1]或者[-1,1]），从而消除奇异样本数据导致的不良影响。[https://zhuanlan.zhihu.com/p/424518359]

对比效果

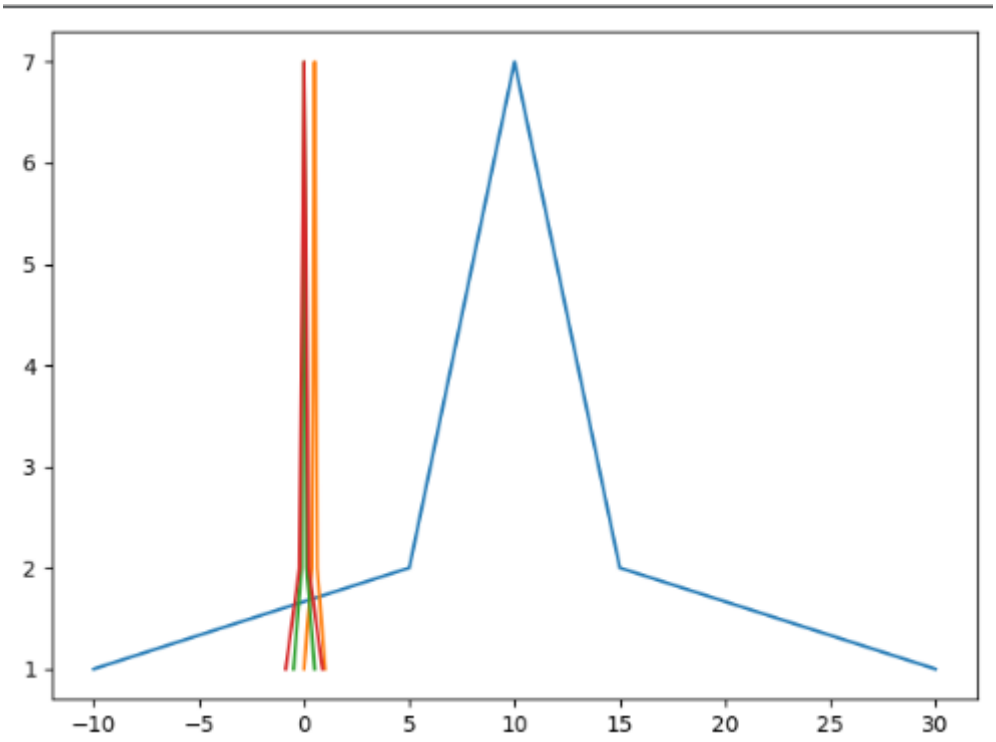
```
import numpy as np
import matplotlib.pyplot as plt
# 归一化的两种方式
def normalization1(x):
    '''归一化 (0~1) '''
    '''x_=(x-x_min)/(x_max-x_min)'''
    return [(float(i) - min(x)) / float(max(x) - min(x)) for i in x]
def normalization2(x):
    '''归一化 (-1~1) '''
    '''x_=(x-x_mean)/(x_max-x_min)'''
    return [(float(i) - np.mean(x)) / (max(x) - min(x)) for i in x]
test_list = [1,2,3,4,5,6,7]
normal_1 = normalization1(test_list)
normal_2 = normalization2(test_list)

plt.ylim(-1, 4)
plt.plot(test_list)
plt.plot(normal_1)
plt.plot(normal_2)
plt.show()
```


4
3
2
1
0
−1
0
1
2
3
4
5
6

```
import numpy as np
import matplotlib.pyplot as plt

#归一化的两种方式
def Normalization1(x):
    '''归一化 (0~1) '''
    '''x_=(x-x_min)/(x_max-x_min)'''
    return [(float(i)-min(x))/float(max(x)-min(x)) for i in x]
def Normalization2(x):
    '''归一化 (-1~1) '''
    '''x_=(x-x_mean)/(x_max-x_min)'''
    return [(float(i)-np.mean(x))/(max(x)-min(x)) for i in x]

#标准化
def z_score(x):
    '''x*=(x-μ)/σ'''
    x_mean=np.mean(x)
    s2=sum([(i-np.mean(x))*(i-np.mean(x)) for i in x])/len(x)
    return [(i-x_mean)/s2 for i in x]

l=[-10, 5, 5, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8, 8, 8, 9, 9, 9, 9, 9, 9, 10, 10, 10, 10, 10, 10, 10,

cs=[]
for i in l:
    c=l.count(i)
    cs.append(c)
print(cs)
n1 = Normalization1(l)
n2 = Normalization2(l)
z = z_score(l)
print('n1:\t', n1)
print('n2:\t', n2)
print('z:\t', z)
'''
蓝线为原始数据，橙线为z
'''
plt.plot(l,cs)
plt.plot(z,cs)
plt.show()


[1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6, 6, 6, 6, 6, 7, 7, 7, 7, 7, 7, 7, 6, 6, 6, 6, 6, 6, 5, 5, 5, 5
n1:      [0.0, 0.375, 0.375, 0.4, 0.4, 0.4, 0.425, 0.425, 0.425, 0.425, 0.45, 0.45, 0.45, 0.45, 0.45, 0.475, 0.47
n2:      [-0.5, -0.125, -0.125, -0.1, -0.1, -0.1, -0.075, -0.075, -0.075, -0.075, -0.05, -0.05, -0.05, -0.05, -0.
z:       [-0.875, -0.21875, -0.21875, -0.175, -0.175, -0.175, -0.13125, -0.13125, -0.13125, -0.13125, -0.0875, -0
```




```
plt.plot(l, cs)
plt.plot(n1, cs)
plt.plot(n2, cs)
plt.plot(z, cs)
plt.show()
```



附录

看一下是啥类型

```
test_list = [1,2,3,4,5,6,7.1]
print(type(test_list))
print(type(test_list[0]))
test_list = [1,2,3,4,5,6,7.1]
print(type(test_list))
print(type(test_list[6]))
```

```
<class 'list'>
<class 'int'>
<class 'list'>
<class 'float'>
```

看看函数

```
test_list = [1,2,3,4,5,6,7.1]
print(type(max(test_list)))
print(type(min(test_list)))
```

```
<class 'float'>
<class 'int'>
```

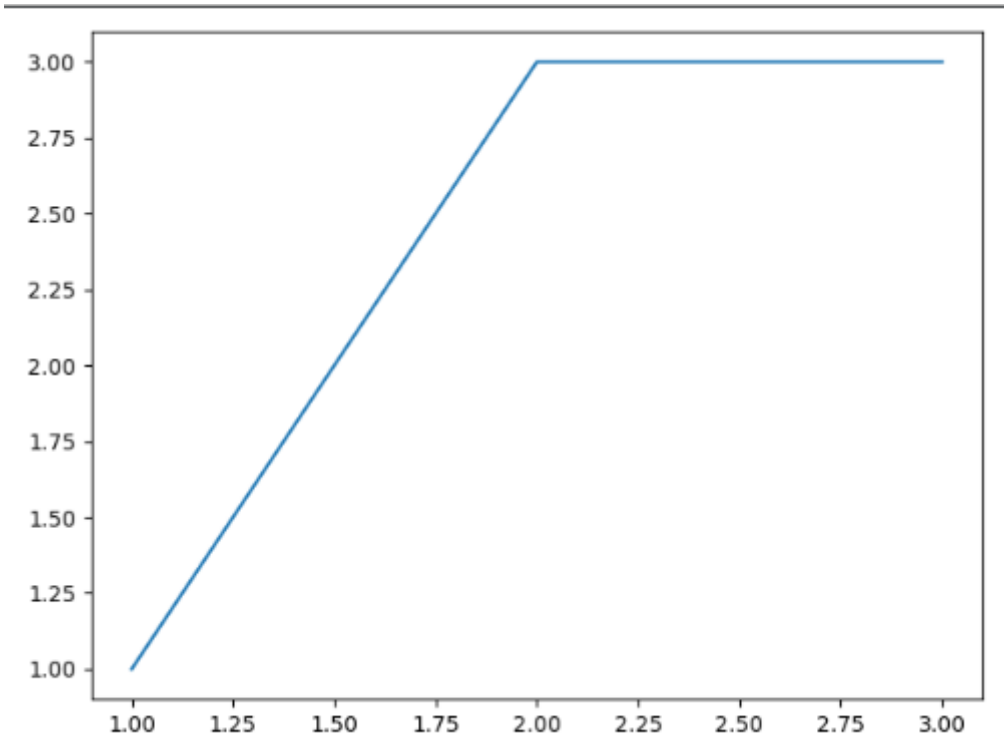
看看函数返回类型

```
test_list = [1,2,3,4,5,6,7]
print(np.mean(test_list))  # return numpy.float64
print(type(np.mean(test_list)))
```

```
4.0
<class 'numpy.float64'>
```

画图：画图像描点一样，从前往后化，若x中有重复的那就画在同一y轴上。

```
import matplotlib.pyplot as plt

x = [1,2,2,2,3,3,3]  # 画图等价[123]
y = [x.count(i) for i in x]  # 与x画图等价[133]

# plt.plot(x)  # 蓝
plt.plot(x, y)  # x[123] y[133]
plt.show()
```




```
import matplotlib.pyplot as plt
x = [1,2,2,2,3,3,3]
y = [1,2,2,1,3,3,3]
plt.plot(x, y)
plt.show()
```