Python小练习：裁减函数(Clip Function)

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本文介绍两种数据裁剪方法，将原始数据裁剪到某一指定范围内。

1. clip_function_test.py

```
# -*- coding: utf-8 -*-
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# Python小练习：裁减函数(Clip Function)
import torch
import numpy as np
import matplotlib.pyplot as plt
plt.rc('font',family='Times New Roman')
# 裁剪范围
LOG_STD_MAX = 2
LOG_STD_MIN = -10
def clip_function(
    x: torch.Tensor,
    bound_mode: str
) -> torch.Tensor:
    if bound_mode == "clamp": # 将x裁剪到[-10,  2]
        # 大于2的统一设为2，小于-10的统一设为-10
        x = torch.clamp(x, LOG_STD_MIN, LOG_STD_MAX)
    elif bound_mode == "tanh": # 将x裁剪到[-10,  2]
        scale = (LOG_STD_MAX-LOG_STD_MIN) / 2 # 6
        x = (torch.tanh(x)+1) * scale + LOG_STD_MIN
        # tanh：[-1, 1], torch.tanh()+1：[0, 2]
        # (torch.tanh(x)+1) * scale：[0, 12]
        # (torch.tanh(x)+1) * scale + LOG_STD_MIN：[-10, 2]
    elif bound_mode == "no":
        x = x
    else:
        raise NotImplementedError
    return x

torch.manual_seed(0)
x = torch.randn(2, 3)*10
print('原始数据：\n', x)
```

```
34
35 str1 = 'clamp'
36 print('裁剪算子：', str1)
37 y = clip_function(x, str1)
38 print('裁剪后：\n', y)
39
40 str2 = 'tanh'
41 print('裁剪算子：', str2)
42 y = clip_function(x, str2)
43 print('裁剪后：\n', y)
44
45 # --------------------画图-----------------------
46 num = 1000
47 a = torch.randn(num)*10.0
48 a, _ = torch.sort(a)
49 b1 = clip_function(a, str1)
50 b2 = clip_function(a, str2)
51 # 手动设置横纵坐标范围
52 plt.xlim([0, num])
53 plt.ylim([a.min(), a.max()])
54 aa = np.arange(0, num)
55 plt.plot(aa, a, color = 'green', ls = '-', label = 'data')
56 plt.plot(aa, b1, color = 'red', ls = '-', label = str1)
57 plt.plot(aa, b2, color = 'blue', ls = '-', label = str2)
58 # 画2条不起眼的虚线
59 plt.plot([0, num], [LOG_STD_MIN, LOG_STD_MIN], color = 'gray', ls = '--', alpha = 0.3)
60 plt.plot([0, num], [LOG_STD_MAX, LOG_STD_MAX], color = 'gray', ls = '--', alpha = 0.3)
61 # 横纵坐标轴
62 plt.xlabel('x')
63 plt.ylabel('clip(x)')
64 plt.legend(loc = 2)
65 plt.tight_layout()
66 plt.savefig('Clip Function.png', bbox_inches='tight', dpi=500)
67 plt.show()
```

2. 结果

```
D:\ProgramData\Anaconda3\python.exe "D:/Python code/2023.3 exercise/Other/clip_function_test.py"
原始数据：
 tensor([[ 15.4100,  -2.9343, -21.7879],
        [  5.6843, -10.8452, -13.9860]])
裁剪算子：  clamp
裁剪后：
 tensor([[  2.0000,  -2.9343, -10.0000],
        [  2.0000, -10.0000, -10.0000]])
```

```
裁剪算子： tanh
裁剪后：
 tensor([[  2.0000,  -9.9662, -10.0000],
        [  1.9999, -10.0000, -10.0000]])

Process finished with exit code 0
```