

1. 用loop讀取sys.argv裡的每一個元素，除了第1個元素以外。識別出 --character, --total 和 scores file path

2. 打開第1步中識別出的score file，把裡面的每一行放進一個list中作為一個element。

3. 用loop整理第2步中的list。

From:

```
[ "piano", "|*****-****-****|", "|*****-*****|", "violin", "|-*****-****|", "|*****-****|"]
```

To:

```
[ [ "piano", [1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1], [1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1] ],  
[ "violin", [0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1], [1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1] ] ]
```

4. 讀取第3步中的list的每一個元素的第1個元素(instrument file)，然後轉換成數字的型式。

From:

```
3      ---  
2      /  \  
1      /  \  
0      ---  \  ---  
-1      \  /  
-2      \  /  
-3      ---
```

To: (對每一行使用split("\t"), 把每一行變成只有2個元素的list( 假設為ls ), 則 ls[0] 為y軸的數字, ls[1] 為右方的圖形(String), 如:" ---" (第一行), 然後把ls[1]中的空格replace成1, 除空格以外的字符replace成該行對應的ls[0] 數字 )

```
[ [ 0, 0, 0, 0, 0, 0, 3, 3, 3 ],  
[ 0, 0, 0, 0, 2, 0, 0, 0, 2 ],  
[ 0, 0, 0, 1, 0, 0, 0, 0, 0, 1 ],  
[ 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, -1, 0, 0, 0, 0, -1 ],  
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -2, 0, 0, 0, -2 ],  
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -3, -3, -3 ] ]
```

To: (先建立一個空的list, 然後把以上的每一行數字加到這個空的list中, index相同的相加)

```
[ 0, 0, 0, 1, 2, 3, 3, 3, 2, 1, 0, -1, -2, -3, -3, -3, -2, -1, 0, 0, 0 ]
```

(如果有多個instrument file則建立多個這種list)

```
[ 0, 0, 0, 1, 2, 3, 3, 3, 2, 1, 0, 0, 0, -1, -2, -3, -3, -3, -2, -1, 0, 0, 0 ] (轉換後的violin)
```

5. 把第3步list中的[11111110111101111]..... 和第5步中相對應的結果結合。

舉piano為例:

From:

```
a = [1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1]
```

```
instrument = [ 0, 0, 0, 1, 2, 3, 3, 3, 2, 1, 0, -1, -2, -3, -3, -2, -1, 0, 0, 0 ]
```

```
result = [] (先建立一個空list)
```

```
idx = 0
```

```
for x in a:
```

    如果 x 是1:

```
        result.append( instrument[index] )      (開始把instrument排進result裡)
```

```
        index += 1
```

    如果 x 是0:

```
        index = 0      (把index變成0, 重instrument的一開頭開始排進result)
```

```
        result.append ( instrument[index] )
```

To:

```
[0, 0, 0, 1, 2, 3, 3, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1]
```

6. 把經過第5步後處在同一個list的用第4步中的方法加總一次

From:

```
[ "piano", [0, 0, 0, 1, 2, 3, 3, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1],
```

```
          [0, 0, 0, 1, 1, 3, 0, 0, 0, 0, 1, 2, 3, 3] ]
```

To:

```
[ "piano", [0, 0, 0, 2, 3, 6, 3, 0, 0, 0, 1, 3, 3, 3, 0, 0, 1]]
```

or

From:

```
[ "violin", [0, 0, 0, 1, 2, 3, 3, 3, 2, 1, 0, 0, 0, 0, 1],
```

```
          [0, 0, 0, 1, 2, 0, 0, 0, 0, 1] ] ]
```

To:

```
[ "violin", [0, 0, 0, 2, 4, 3, 3, 3, 2, 2, 0, 0, 0, 0, 1]]
```

7. 如果在第1步中有識別出"--total"的話，把不同的instrument也都結合起來。如果沒有 "--total" 的話，略過這一步。

From:

```
[ "piano", [0, 0, 0, 2, 3, 6, 3, 0, 0, 0, 1, 3, 3, 3, 0, 0, 1]]
```

```
[ "violin", [0, 0, 0, 2, 4, 3, 3, 3, 2, 2, 0, 0, 0, 0, 1]]
```

To:

```
[ "Total", [0, 0, 0, 4, 7, 9, 6, 3, 2, 2, 1, 3, 3, 3, 1, 0, 1]]
```

( 還是用第4步中的方法加起來)

8. 把result打印出來。

From:

```
[ "piano", [0, 0, 0, 2, 3, 6, 3, 0, 0, 0, 1, 3, 3, 3, 0, 0, 1]]
```

```
[ "violin", [0, 0, 0, 2, 4, 3, 3, 3, 2, 2, 0, 0, 0, 0, 1]]
```

or (取決於有沒有執行第7步)

```
[ "Total", [0, 0, 0, 4, 7, 9, 6, 3, 2, 2, 1, 3, 3, 3, 1, 0, 1]]
```

(以下以有第7步為例)

To:

先創建一個有17欄("Total" x軸的長度)和10列(從0到9)的2維list, 裡面每一個element先預設為空格

result = [] (建立一個空list)

for i in range(10):

    for j in range(17):

        result[i][j] = " "

To: (這裡用0代替空格)

000000000000000000

000000000000000000

000000000000000000

000000000000000000

000000000000000000

000000000000000000

000000000000000000

000000000000000000

000000000000000000

000000000000000000

根據 ls = [ "Total", [0, 0, 0, 4, 7, 9, 6, 3, 2, 2, 1, 3, 3, 3, 1, 0, 1]] 在圖上打點

prev = None

for x in ls[1]:

    如果prev是None:

        正常打點

    如果不是:

        檢查prev比現在這個點的數值大還是小,

        如果比這個點的數值加1(now+1)大:

            for i in range(now+1, prev):

                result[ i ][ index(now) ] = \*

        否則檢查prev+1是否比now要小:

            for i in range(prev+1, now):

                result[ i ][ index(now) ] = \*

```
00000*000000000000
00000*000000000000
0000*0*00000000000
0000*0*00000000000
0000*00*0000000000
000*000*0000000000
000*000*000***000
000*0000**0*00*00
000*000000*000*0*
***000000000000*0
```

最後把這個圖像輸出 把座標補上

Total:

```
9: 00000*000000000000
8: 00000*000000000000
7: 0000*0*00000000000
6: 0000*0*00000000000
5: 0000*00*0000000000
4: 000*000*0000000000
3: 000*000*000***000
2: 000*0000**0*00*00
1: 000*000000*000*0*
0: ***000000000000*0
```

