

Assignment #5: Greedy穷举 Implementation

Updated 1939 GMT+8 Oct 21, 2024

2024 fall, Compiled by 任宇桐 物理学院

说明:

- 1) 请把每个题目解题思路 (可选), 源码Python, 或者C++ (已经在Codeforces/Openjudge上AC), 截图 (包含Accepted), 填写到下面作业模版中 (推荐使用 typora <https://typoraio.cn>, 或者用 word)。AC 或者没有AC, 都请标上每个题目大致花费时间。
- 3) 提交时候先提交pdf文件, 再把md或者doc文件上传到右侧“作业评论”。Canvas需要有同学清晰头像、提交文件有pdf、“作业评论”区有上传的md或者doc附件。
- 4) 如果不能在截止前提交作业, 请写明原因。

1. 题目

04148: 生理周期

brute force, <http://cs101.openjudge.cn/practice/04148>

思路:

直接暴力计算出所有的满足位置的日期, 然后按照大小筛选对应满足要求的位置即可。

代码:

```
cnt = 0
while True:
    cnt += 1
    p, e, i, d = [int(x) for x in input().split()]
    if (p, e, i, d) == (-1, -1, -1, -1):
        break
    list_p = [p+j*23 for j in range(int(21252/23)+d+1)]
    list_e = [e+j*28 for j in range(int(21252/28)+d+1)]
    list_i = [i+j*33 for j in range(int(21252/33)+d+1)]
    answers = list(set(list_p)&set(list_e)&set(list_i))
    answers.sort()
    while answers[0] <= d:
        answers.pop(0)
    ans = answers[0]-d
    print('Case '+str(cnt)+': the next triple peak occurs in '+str(ans)+' days.')
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
cnt = 0
while True:
    cnt += 1
    p, e, i, d = [int(x) for x in input().split()]
    if (p, e, i, d) == (-1, -1, -1, -1):
        break
    list_p = [p+j*23 for j in range(int(21252/23)+d+1)]
    list_e = [e+j*28 for j in range(int(21252/28)+d+1)]
    list_i = [i+j*33 for j in range(int(21252/33)+d+1)]
    answers = list(set(list_p)&set(list_e)&set(list_i))
    answers.sort()
    while answers[0] <= d:
        answers.pop(0)
    ans = answers[0]-d
    print('Case '+str(cnt)+' : the next triple peak occurs in '+str(ans)+' days.')
```

基本信息

#: 46109494
题目: 04148
提交人: 24n2400011498
内存: 3872kB
时间: 26ms
语言: Python3
提交时间: 2024-09-18 16:58:06

18211: 军备竞赛

greedy, two pointers, <http://cs101.openjudge.cn/practice/18211>

思路:

一开始没有看见tag, 然后尝试的各种方式, 没有找到规律, 然后参考了two pointers的指示才开始往这个方向想。

代码:

```
p = int(input())
s = list(map(int, input().split()))
s.sort()

my = 0
other = 0

while my >= other and s:
    if p >= s[0]:
        p -= s[0]
        my += 1
        s.pop(0)
    elif len(s) > 1 and my - other >= 1: ###注意取等条件!!! 不要在边界条件上出错
        p = p + s[-1] - s[0]
        other += 1
        my += 1
        s.pop(0)
        s.pop(-1)
    else:
        break

print(my - other)
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
p = int(input())
s = list(map(int, input().split()))
s.sort()

my = 0
other = 0

while my >= other and s:
    if p >= s[0]:
        p -= s[0]
        my += 1
        s.pop(0)
    elif len(s) > 1 and my - other >= 1: ###注意取等条件!! 不要在边界条件
        p = p + s[-1] - s[0]
        other += 1
        my += 1
        s.pop(0)
        s.pop(-1)
    else:
        break
```

基本信息

#: 46655955
题目: 18211
提交人: 24n2400011498
内存: 3644kB
时间: 25ms
语言: Python3
提交时间: 2024-10-22 13:09:47

21554: 排队做实验

greedy, <http://cs101.openjudge.cn/practice/21554>

思路:

排序的思路还是比较顺利的, 主要是复习了一下小数的输出方法。

代码:

```
n = int(input())
s = list(map(int, input().split()))
clct = []
for i, t in enumerate(s):
    clct.append([i+1, t])
pre = 0
tot = 0
clct.sort(key=lambda x: x[1])
num = []
for i in range(n-1):
    pre += clct[i][1]
    tot += pre
    num.append(clct[i][0])
num.append(clct[-1][0])
aver = tot/n
print(*num)
print('%.2f' % aver)
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
n = int(input())
s = list(map(int, input().split()))
clct = []
for i, t in enumerate(s):
    clct.append([i+1, t])
pre = 0
tot = 0
clct.sort(key=lambda x: x[1])
num = []
for i in range(n-1):
    pre += clct[i][1]
    tot += pre
    num.append(clct[i][0])
num.append(clct[-1][0])
aver = tot/n
print(*num)
print('%.2f' % aver)
```

基本信息

#: 46608916
题目: 21554
提交人: 24n2400011498
内存: 3960kB
时间: 25ms
语言: Python3
提交时间: 2024-10-20 10:14:00

01008: Maya Calendar

implementation, <http://cs101.openjudge.cn/practice/01008/>

思路:

整体还是比较顺利的, 第一次尝试的时候忘记了print(n),然后不知道为什么错。

代码:

```
n = int(input())
haab = ['pop', 'no', 'zip', 'zotz', 'tzec', 'xul', 'yoxkin', 'mol', 'chen',
        'yax',
        'zac', 'ceh', 'mac', 'kankin', 'muan', 'pax', 'koyab', 'cumhu', 'uayet']
tzolkin = ['imix', 'ik', 'akbal', 'kan', 'chicchan', 'cimi', 'manik', 'lamat',
           'muluk',
           'ok', 'chuen', 'eb', 'ben', 'ix', 'mem', 'cib', 'caban', 'eznab',
           'canac', 'ahau']
print(n)
for _ in range(n):
    s = input().split()
    haab_date = int(s[0][:-1])
    haab_month = haab.index(s[1])
    haab_year = int(s[2])
    days = haab_year * 365 + haab_month * 20 + haab_date
    tzolkin_year, reserve_days = divmod(days, 260)
    tzolkin_number = (reserve_days % 13) + 1
    tzolkin_letter = reserve_days % 20
    print(tzolkin_number, tzolkin[tzolkin_letter], tzolkin_year)
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
n = int(input())
haab = ['pop', 'no', 'zip', 'zotz', 'tzec', 'xul', 'yoxkin', 'mol', 'chen', 'yax',
        'zac', 'ceh', 'mac', 'kankin', 'muan', 'pax', 'koyab', 'cumhu', 'uayet']
tzolkin = ['imix', 'ik', 'akbal', 'kan', 'chicchan', 'cimi', 'manik', 'lamat', 'i',
           'ok', 'chuen', 'eb', 'ben', 'ix', 'mem', 'cib', 'caban', 'eznab', 'ca']

print(n)
for _ in range(n):
    s = input().split()
    haab_date = int(s[0][:1])
    haab_month = haab.index(s[1])
    haab_year = int(s[2])
    days = haab_year * 365 + haab_month * 20 + haab_date
    tzolkin_year, reserve_days = divmod(days, 260)
    tzolkin_number = (reserve_days % 13) + 1
    tzolkin_letter = reserve_days % 20
    print(tzolkin_number, tzolkin[tzolkin_letter], tzolkin_year)
```

基本信息

#: 46655866
题目: 01008
提交人: 24n2400011498
内存: 4016kB
时间: 25ms
语言: Python3
提交时间: 2024-10-22 13:04:28

545C. Woodcutters

dp, greedy, 1500, <https://codeforces.com/problemset/problem/545/C>

思路:

认真思考以后,发现其实思路还是比较明确的,从两边开始,树木向两侧倒,然后尝试向中间倒,倒不下就跳过。

代码:

```
n = int(input())
s = []
for _ in range(n):
    s.append(list(map(int, input().split())))
s.sort()
if n == 1:
    print(1)
elif n == 2:
    print(2)
else:
    i = 1
    j = n - 2
    cnt = 2
    temp_l = s[0][0]
    temp_r = s[n - 1][0]
    while i <= j:
        if i == j:
            temp = max(s[i][0] - temp_l, temp_r - s[j][0])
            if temp > s[i][1]:
                cnt += 1
            break
        if s[i][0] - temp_l > s[i][1]:
            temp_l = s[i][0]
            cnt += 1
        elif s[i + 1][0] - s[i][0] > s[i][1]:
            temp_l = s[i][0] + s[i][1]
            cnt += 1
        else:
            temp_l = s[i][0]
        i += 1
        if temp_r - s[j][0] > s[j][1]:
            temp_r = s[j][0]
            cnt += 1
        elif s[j - 1][0] - s[j][0] > s[j][1]:
            temp_r = s[j][0] + s[j][1]
            cnt += 1
        else:
            temp_r = s[j][0]
        j -= 1
    print(cnt)
```

```

        temp_r = s[j][0]
        cnt += 1
    elif s[j][0]-s[j-1][0]>s[j][1]:
        temp_r = s[j][0]-s[j][1]
        cnt += 1
    else:
        temp_r = s[j][0]
    j -= 1
print(cnt)

```

代码运行截图 (至少包含有"Accepted")

#	Author	Problem	Lang	Verdict	Time	Memory	Sent	Judged		
286652390	Practice: stur	545C - 14	Python 3	Accepted	421 ms	19184 KB	2024-10-19 09:48:47	2024-10-19 09:48:47	★	Compare

→ Source Copy

```

n = int(input())
s = []
for _ in range(n):
    s.append(list(map(int, input().split())))
s.sort()
if n == 1:
    print(1)
elif n == 2:
    print(2)
else:
    i = 1
    j = n-2
    cnt = 2
    temp_l = s[0][0]
    temp_r = s[n-1][0]
    while i <= j:
        if i == j:
            temp = max(s[i][0]-temp_l, temp_r-s[j][0])
            if temp > s[i][1]:
                cnt += 1
            break
        if s[i][0]-temp_l > s[j][1]:
            temp_l = s[i][0]

```

01328: Radar Installation

greedy, <http://cs101.openjudge.cn/practice/01328/>

思路:

一开始分类讨论了很久, 然后发现和进程检测是一样的。

代码:

```

import math
test = 1
while True:
    s = input()
    if len(s.lstrip()) == 0:
        test += 1
        continue
    n,d = map(int, s.split())
    if (n,d) == (0,0):
        break
    data = []
    cnt = 0
    for _ in range(n):
        x,y = map(int, input().split())
        if d >= y:
            a = x - math.sqrt(d**2-y**2)
            b = x + math.sqrt(d**2-y**2)
            data.append((a,b))
    if len(data) == n:
        data.sort()

```

```
cnt = 1
temp = data[0][1]
for i in range(n):
    if temp >= data[i][0]:
        temp = min(data[i][1], temp)
    else:
        temp = data[i][1]
        cnt += 1
else:
    cnt = -1
print(f'Case {test}: {cnt}')
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
import math
test = 1
while True:
    s = input()
    if len(s.lstrip()) == 0:
        test += 1
        continue
    n, d = map(int, s.split())
    if (n, d) == (0, 0):
        break
    data = []
    cnt = 0
    for _ in range(n):
        x, y = map(int, input().split())
        if d >= y:
            a = x - math.sqrt(d**2 - y**2)
            b = x + math.sqrt(d**2 - y**2)
            data.append((a, b))
    if len(data) == n:
        data.sort()
```

基本信息

#: 46593551
题目: 01328
提交人: 24n2400011498
内存: 4164kB
时间: 55ms
语言: Python3
提交时间: 2024-10-19 14:38:01

2. 学习总结和收获

如果作业题目简单，有否额外练习题目，比如：OJ“计概2024fall每日选做”、CF、LeetCode、洛谷等网站题目。

随着难度的增加，发现需要用更多的时间完成练习，希望通过努力能够还跟得上每日选做。