

Assignment #5: Greedy穷举Implementation

Updated 1939 GMT+8 Oct 21, 2024

2024 fall, Compiled by 颜鼎堃 工学院

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) <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:

- 中国剩余定理
- 顺便学习了一下扩展欧几里得算法（代码中注释部分）

代码:

```
# def exgcd(a, b):
#     if b == 0:
#         x = 1
#         y = 0
#         return x, y
#     x1, y1 = exgcd(b, a%b)
#     x = y1
#     y = x1 - a//b*y1
#     return x, y

def main():
    for cnt in range(1, int(1e9)):
        p, e, i, d = map(int, input().split())
        if i == -1:
            break
        x = (1288*i - 6831*e + 5544*p) % 21252 - d
```

```

        print(f"Case {cnt}: the next triple peak occurs in {(x-1) %
21252 + 1} days.")

if __name__ == '__main__':
    main()

```

代码运行截图 (至少包含有"Accepted")

OpenJudge 题目ID, 标题, 描述 24n2400011125 信箱 账号

CS101 / 题库 (包括计概、数算题目)

题目 排名 状态 提问

#46755427提交状态 查看 提交 统计 提问

状态: Accepted

源代码

```

def main():
    for cnt in range(1, int(1e9)):
        p, e, i, d = map(int, input().split())
        if i == -1:
            break
        x = (1288*i - 6831*e + 5544*p) % 21252 - d
        print(f"Case {cnt}: the next triple peak occurs in {(x-1) % 21252 + 1} days.")

if __name__ == '__main__':
    main()

```

基本信息

#: 46755427
 题目: 04148
 提交人: 颜鼎堃(24n2400011125)
 内存: 3632kB
 时间: 23ms
 语言: Python3
 提交时间: 2024-10-26 17:22:46

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18211: 军备竞赛

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

思路:

- 双指针，一边负责买一边负责卖，每一轮循环中只要买了就可以卖

代码:

```

p = int(input())
a = sorted(list(map(int, input().split()))))
fwd, bwd = 0, len(a) - 1
cnt = 0
sell = False
while True:
    while p >= a[fwd]:
        p -= a[fwd]
        cnt += 1
        sell = True
        fwd += 1
    if bwd < fwd:

```

```

        sell = False
        break

    if sell:
        cnt -= 1
        p += a[bwd]
        bwd -= 1
        sell = False

    else:
        break

print(cnt)

```

代码运行截图（至少包含有"Accepted"）

The screenshot shows the OpenJudge CS101 problem page for problem 21554. The submission status is 'Accepted'. The code is a Python solution for the 'Queue Experiment' problem. The code reads an integer n, then reads n lines of input. Each line contains a list of integers. The code sorts these lists and then processes them to find the maximum value of the sum of the first and last elements of the sorted lists. The code uses a greedy approach to select the maximum value from the sorted lists.

状态: Accepted

源代码

```

p = int(input())
a = sorted(list(map(int, input().split())))
fwd, bwd = 0, len(a) - 1
cnt = 0
sell = False
while True:
    while p >= a[fwd]:
        p -= a[fwd]
        cnt += 1
        sell = True
        fwd += 1
    if bwd < fwd:
        sell = False
        break
    if sell:
        cnt -= 1
        p += a[bwd]
        bwd -= 1
        sell = False
    else:
        break
print(cnt)

```

基本信息

- #: 46755614
- 题目: 18211
- 提交人: 颜鼎堃(24n2400011125)
- 内存: 3632kB
- 时间: 28ms
- 语言: Python3
- 提交时间: 2024-10-26 17:32:02

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21554: 排队做实验

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

思路:

- 排序不等式经典例题
- 输出的时候注意格式，用空格分隔确实烦人

代码:

```

n = int(input())
stu = list(sorted(enumerate(map(int, input().split()), start = 1), key =
lambda t: t[1]))
time = 0
for i in range(n):

```

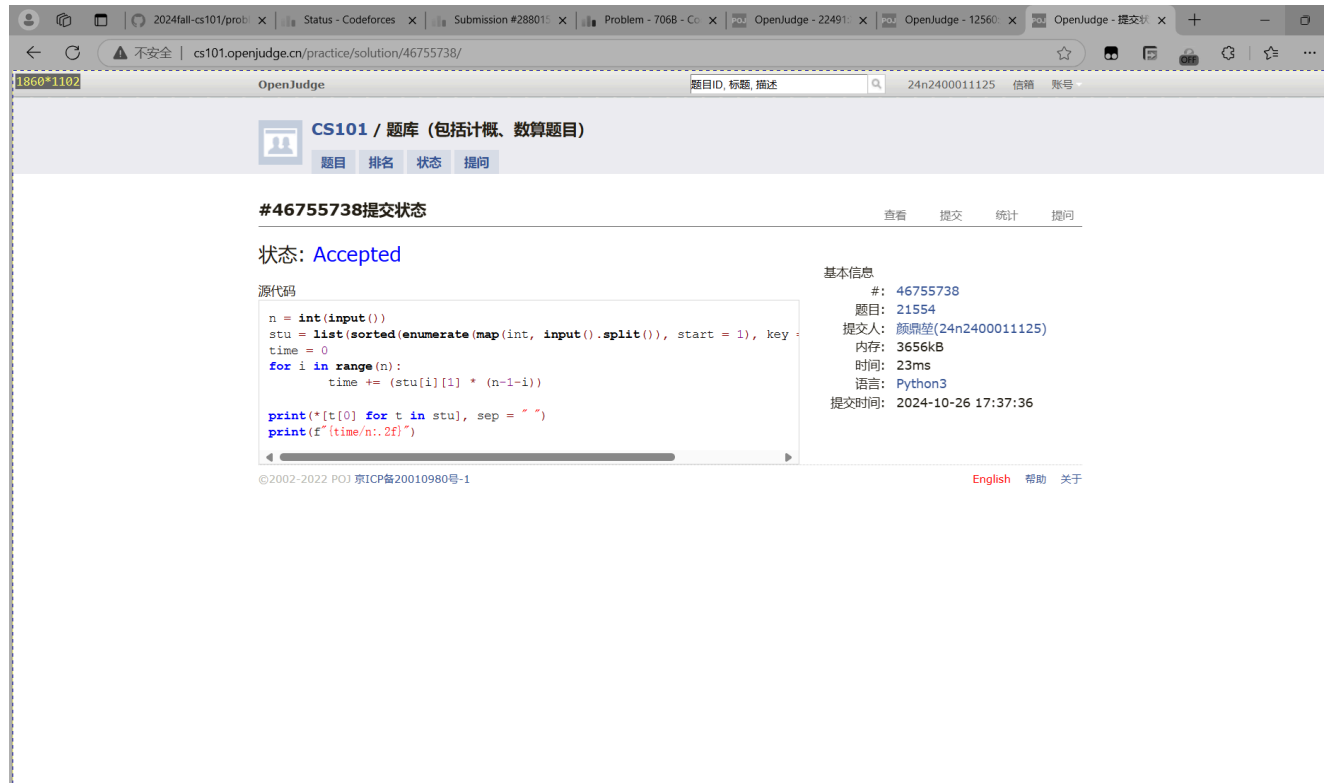
```

time += (stu[i][1] * (n-1-i))

print(*[t[0] for t in stu], sep = " ")
print(f"{time/n:.2f}")

```

代码运行截图 (至少包含有"Accepted")



01008: Maya Calendar

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

思路:

- 数清楚天数
 - 输出的时候把 n 再输出一遍
 - 学会了 `zip` 函数将列表变成元组, 进而变成字典
- 代码:

```

n = int(input())
print(n)
Hmonths = {'pop': 1, 'no': 2, 'zip': 3, 'zotz': 4, 'tzec': 5, 'xul': 6,
'yoxkin': 7, 'mol': 8, 'chen': 9, 'yax': 10, 'zac': 11, 'ceh': 12, 'mac':
13, 'kankin': 14, 'muan': 15, 'pax': 16, 'koyab': 17, 'cumhu': 18, 'uayet':
19}
Tdays = {0: 'imix', 1: 'ik', 2: 'akbal', 3: 'kan', 4: 'chicchan', 5: 'cimi',
6: 'manik', 7: 'lamat', 8: 'muluk', 9: 'ok', 10: 'chuen', 11: 'eb', 12:
'ben', 13: 'ix', 14: 'mem', 15: 'cib', 16: 'caban', 17: 'eznab', 18:
'canac', 19: 'ahau'}
for i in range(n):

```

```

Haab = input().split()
Tzolkin = [0, "", 0]
Haab[0] = int(Haab[0][0:-1])
Haab[2] = int(Haab[2])

day_of_the_year = 0
if Hmonths[Haab[1]] <= 18:
    day_of_the_year = 20 * (Hmonths[Haab[1]] - 1) + Haab[0]
else:
    day_of_the_year = 360 + Haab[0]
day_tot = Haab[2] * 365 + day_of_the_year
Tzolkin[2] = day_tot // 260
Tzolkin_day = day_tot % 260
Tzolkin[0] = Tzolkin_day % 13 + 1
Tzolkin[1] = Tdays[Tzolkin_day % 20]
print(*Tzolkin, sep = " ")

```

代码运行截图 (至少包含有"Accepted")

OpenJudge 题目ID, 标题, 描述 24n2400011125 信箱 账号

CS101 / 题库 (包括计概、数算题目)

题目 排名 状态 提问

#46749785提交状态 查看 提交 统计 提问

状态: Accepted

源代码

```

n = int(input())
print(n)
Hmonths = {'pop': 1, 'no': 2, 'zip': 3, 'zotz': 4, 'tzeo': 5, 'xul': 6, 'yoxi': 7, 'mol': 8, 'chic': 9, 'uot': 10, 'zuc': 11, 'uot': 12}
Tdays = {0: 'imix', 1: 'ik', 2: 'akbal', 3: 'kan', 4: 'chicchan', 5: 'cimi', 6: 'ucan', 7: 'ucan', 8: 'ucan', 9: 'ucan', 10: 'ucan', 11: 'ucan', 12: 'ucan', 13: 'ucan', 14: 'ucan', 15: 'ucan', 16: 'ucan', 17: 'ucan', 18: 'ucan', 19: 'ucan'}
for i in range(n):
    Haab = input().split()
    Tzolkin = [0, "", 0]
    Haab[0] = int(Haab[0][0:-1])
    Haab[2] = int(Haab[2])

    day_of_the_year = 0
    if Hmonths[Haab[1]] <= 18:
        day_of_the_year = 20 * (Hmonths[Haab[1]] - 1) + Haab[0]
    else:
        day_of_the_year = 360 + Haab[0]
    day_tot = Haab[2] * 365 + day_of_the_year
    Tzolkin[2] = day_tot // 260
    Tzolkin_day = day_tot % 260
    Tzolkin[0] = Tzolkin_day % 13 + 1
    Tzolkin[1] = Tdays[Tzolkin_day % 20]
    print(*Tzolkin, sep = " ")

```

基本信息

#: 46749785
 题目: 01008
 提交人: 颜鼎堃(24n2400011125)
 内存: 3756kB
 时间: 36ms
 语言: Python3
 提交时间: 2024-10-26 13:31:44

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545C. Woodcutters

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

思路:

- 输入保证树的坐标升序排列, 无需再排序
- 开头结尾的树一定能砍
- 从前往后遍历每一棵树, 如果树往后倒, 就把倒下后树梢的位置记为树的新位置

代码:

```

n = int(input())
trees = [list(map(int, input().split())) for i in range(n)]
cnt = min(2, n)
for i in range(1, n-1):
    if trees[i][0] - trees[i-1][0] > trees[i][1]:
        cnt += 1
    elif trees[i+1][0] - trees[i][0] > trees[i][1]:
        trees[i][0] += trees[i][1]
        cnt += 1
print(cnt)

```

代码运行截图（至少包含有"Accepted"）

The screenshot shows the Codeforces website interface. At the top, the Codeforces logo is visible, along with user information for 'Chaitinlen' and a 'Logout' button. A navigation bar contains links like HOME, TOP, CATALOG, CONTESTS, GYM, etc. Below this, a tabbed interface shows 'SUBMIT CODE', 'MY SUBMISSIONS', 'STATUS', 'HACKS', 'ROOM', 'STANDINGS', and 'CUSTOM INVOCATION'. The 'STATUS' tab is active, displaying a table of submissions. The table has columns for #, Author, Problem, Lang, Verdict, Time, Memory, Sent, and Judged. One submission is listed with ID 288048950, Author 'Practice: Chaitinlen', Problem '545C - 14', Lang 'Python 3', and Verdict 'Accepted'. Below the table, there is a 'Source' section showing the code that was submitted, which matches the code in the first block. At the bottom, there is a footer with copyright information for Codeforces, the server time, and logos for 'Supported by' including iTMO.

01328: Radar Installation

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

思路：

- 整体思路类似于[OpenJudge - 04100:进程检测](#)
- 注意读取输入时的空行

代码：

```

from math import sqrt, pow
for _ in range(1, int(1e9)):
    n, d = map(int, input().split())
    cnt = 0
    nosol = False

```

```

if n == 0:
    break
island = [list(map(int, input().split())) for i in range(n)]
input()

xcord = []
append = xcord.append
for isl in island:
    if isl[1] > d:
        print(f"Case {}: {-1}")
        nosol = True
        break
    dist = sqrt(pow(d, 2) - pow(isl[1], 2))
    append((isl[0]-dist, isl[0]+dist))
if nosol:
    continue

xcord = sorted(xcord, key = lambda t: t[1])
rht = -1e9
for isl in xcord:
    if isl[0] > rht:
        cnt += 1
        rht = isl[1]
print(f"Case {}: {cnt}")

```

代码运行截图（至少包含有"Accepted"）

OpenJudge

题目ID, 标题, 描述

24n2400011125

信箱

账号

CS101 / 题库 (包括计概、数算题目)

题目

排名

状态

提问

#46754581提交状态

查看 提交 统计 提问

状态: Accepted

源代码

```

from math import sqrt, pow
for _ in range(1, int(1e9)):
    n, d = map(int, input().split())
    cnt = 0
    nosol = False
    if n == 0:
        break
    island = [list(map(int, input().split())) for i in range(n)]
    input()

    xcord = []
    append = xcord.append
    for isl in island:
        if isl[1] > d:
            print(f"Case {}: {-1}")
            nosol = True
            break
        dist = sqrt(pow(d, 2) - pow(isl[1], 2))
        append((isl[0]-dist, isl[0]+dist))
    if nosol:
        continue

    xcord = sorted(xcord, key = lambda t: t[1])
    rht = -1e9
    for isl in xcord:
        if isl[0] > rht:
            cnt += 1
            rht = isl[1]
    print(f"Case {}: {cnt}")

```

基本信息

#: 46754581

题目: 01328

提交人: 颜鼎堃(24n2400011125)

内存: 3936kB

时间: 48ms

语言: Python3

提交时间: 2024-10-26 16:44:50

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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。

1. 每日选做有的题目做起来有点痛苦，因为**边界数据**经常与内部数据的状态不同，每次结果差1的时候就特别难受，如[OpenJudge - 19757: Saruman's Army](#)，硬控我两天，关键在于写好最后的条件判断

你的提交记录

#	结果	时间
6	Accepted	2024-10-25
5	Wrong Answer	2024-10-25
4	Wrong Answer	2024-10-25
3	Wrong Answer	2024-10-25
2	Wrong Answer	2024-10-24
1	Wrong Answer	2024-10-24

2. 感觉有一种离了测试数据活不了的感觉，面对莫名其妙的**Wrong Answer**我很难编出一组能找到问题的测试数据，要么去群里找压缩包，群里没有的时候（如上题）不择手段到上网找，如下[army.in](#) [army.out](#)（要是没有这数据我WA次数还会更多）
总能给我整出来点莫名其妙的测试数据，比如砍树那个题只有1棵树
3. 幸好月考不计分