

Assignment #F: 十全十美

Updated 1305 GMT+8 Dec 19, 2023

2023 fall, Compiled by 同学的姓名、院系

说明:

本周作业对零基础同学偏难, 如果耗时太长, 直接找答案看。两个题解, 经常更新。所以最好从这个链接下载最新的, <https://github.com/GMyhf/2020fall-cs101>。

- 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, 学号), 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。
- 2) 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、作业评论有md或者doc。
- 3) 如果不能在截止前提交作业, 请写明原因。

编程环境

(请改为同学的操作系统、编程环境等)

操作系统: macOS Ventura 13.4.1 (c)

Python编程环境: Spyder IDE 5.2.2, PyCharm 2023.1.4 (Professional Edition)

C/C++编程环境: Mac terminal vi (version 9.0.1424), g++/gcc (Apple clang version 14.0.3, clang-1403.0.22.14.1)

1. 题目

如果耗时太长, 直接看解题思路, 或者源码

18155: 组合乘积

dfs, brute force, <http://cs101.openjudge.cn/practice/18155>

思路:

要特别注意目标是1的情况

代码

```
1 '''
2 刘思瑞 2100017810
3 '''
4 import sys
5 N = int(input())
```

```

6  s = list(map(int,input().split()))
7  num = len(s)
8  def dfs(N,s,i):
9      if N == 1:
10         print('YES')
11         sys.exit()
12         for j in range(i+1,num):
13             if N%s[j] ==0:
14                 dfs(N//s[j],s,j)
15         return
16  if N ==1:
17      if 1 in s:
18          print('YES')
19      else:
20          print('NO')
21  else:
22      dfs(N,s,-1)
23      print('NO')

```

代码运行截图

状态: Accepted

源代码

```

'''
刘思瑞 2100017810
'''
import sys
N = int(input())
S = list(map(int,input().split()))
num = len(S)
def dfs(N,S,i):
    if N == 1:
        print('YES')
        sys.exit()
    for j in range(i+1,num):
        if N%S[j] ==0:
            dfs(N//S[j],S,j)
    return
if N ==1:
    if 1 in S:
        print('YES')
    else:
        print('NO')
else:
    dfs(N,S,-1)
    print('NO')

```

20106: 走山路

bfs, <http://cs101.openjudge.cn/practice/20106/>

思路:

bfs

代码

```
1  '''
2  刘思瑞 2100017810
3  '''
4  import heapq
5  m,n,p = map(int,input().split())
6  F = []
7  for i in range(m):
8      F.append(list(input().split()))
9  step = [(0,1),(0,-1),(1,0),(-1,0)]
10 def bfs(s0,s1,o0,o1):
11     global step,F
12     has_vis = set()
13     has_vis.add((s0,s1,-1))
14     heap = []
15     heapq.heappush(heap,(0,s0,s1))
16     ans = []
17     while heap:
18         ene,x,y = heapq.heappop(heap)
19         if x == o0 and y==o1:
20             ans.append(ene)
21             continue
22         for i in step:
23             d0,d1 = i
24             x1,y1 = x + d0,y+d1
25             if 0 <= x1 < m and 0 <= y1 < n and F[x1][y1] != '#' and (x1,
y1,i) not in has_vis:
26                 heapq.heappush(heap,(ene+abs(int(F[x1][y1]))-int(F[x]
[y])),x1,y1))
27                 has_vis.add((x1,y1,i))
28     return ans
29 for i in range(p):
30     s0,s1,o0,o1 = map(int,input().split())
31     if F[s0][s1] == '#' or F[o0][o1] == '#':
32         print('NO')
33         continue
34     ans = bfs(s0,s1,o0,o1)
35     if ans:
36         print(min(ans))
37     else:
38         print('NO')
```

代码运行截图

状态: Accepted

源代码

```
'''
刘思瑞 2100017810
'''

import heapq
m,n,p = map(int,input().split())
F = []
for i in range(m):
    F.append(list(input().split()))
step = [(0,1),(0,-1),(1,0),(-1,0)]
def bfs(s0,s1,o0,o1):
    global step,F
    has_vis = set()
    has_vis.add((s0,s1,-1))
    heap = []
    heapq.heappush(heap,(0,s0,s1))
    ans = []
    while heap:
        ene,x,y = heapq.heappop(heap)
        if x == o0 and y==o1:
            ans.append(ene)
            continue
        for i in step:
            d0,d1 = i
            x1,y1 = x + d0,y+d1
            if 0 <= x1 < m and 0 <= y1 < n and F[x1][y1] != '#' and (x1,
                heapq.heappush(heap,(ene+abs(int(F[x1][y1])-int(F[x][y]))
                has_vis.add((x1,y1,i))
    return ans
for i in range(p):
    s0,s1,o0,o1 = map(int,input().split())
    if F[s0][s1] == '#' or F[o0][o1] == '#':
        print('NO')
        continue
    ans = bfs(s0,s1,o0,o1)
    if ans:
        print(min(ans))
    else:
        print('NO')
```

27314: 一键换词

implementation, string, <http://cs101.openjudge.cn/practice/27314/>

思路:

尤其注意是每句话首字母大写

代码

```
1 '''
2 刘思瑞 2100017810
3 '''
4 s = list(input().split())
5 w,dw = input().split()
6 w = w.lower()
7 dw = dw.lower()
8 sw =[w,w+',',w+'.',':'+w]
9 sdw =[dw,dw+',',dw+'.',':'+dw]
10 for i in range(len(s)):
11     s[i] =s[i].lower()
12     if s[i] in sw:
13         s[i] = sdw[sw.index(s[i])]
14 s[0] = s[0][:1].upper() + s[0][1:]
15 for i in range(len(s)-1):
16     if '.' in s[i]:
17         s[i+1] = s[i+1][:1].upper() + s[i+1][1:]
18 for i in s:
19     print(i,end=' ')
```

代码运行截图

状态: Accepted

源代码

```
'''
刘思瑞 2100017810
'''
s = list(input().split())
w,dw = input().split()
w = w.lower()
dw = dw.lower()
sw =[w,w+',',w+'.',':'+w]
sdw =[dw,dw+',',dw+'.',':'+dw]
for i in range(len(s)):
    s[i] =s[i].lower()
    if s[i] in sw:
        s[i] = sdw[sw.index(s[i])]
s[0] = s[0][:1].upper() + s[0][1:]
for i in range(len(s)-1):
    if '.' in s[i]:
        s[i+1] = s[i+1][:1].upper() + s[i+1][1:]
for i in s:
    print(i,end=' ')
```

19961: 最大点数(外太空2048)

matrices, <http://cs101.openjudge.cn/practice/19961/>

思路:

实在没懂题目，直接看题解了

代码

```
1  import copy
2  import sys
3  sys.setrecursionlimit(1<<30)
4  m,n,p=map(int,input().split())
5  matrix=[]
6  for _ in range(m):
7      matrix.append(list(map(int,input().split())))
8
9  def add(lst):
10     for i in range(len(lst)-1):
11         if lst[i]!=0:
12             for j in range(i+1,len(lst)):
13                 if lst[i]==lst[j]:
14                     lst[i],lst[j]=0,2*lst[i]
15                     break
16                 elif lst[j]==0:
17                     pass
18                 else:
19                     break
20     ans=[]
21     count=0
22     for i in lst:
23         if i!=0:
24             ans.append(i)
25             count+=1
26     return [0]*(len(lst)-count)+ans
27
28
29 def move(matrix,dirc):
30     new=copy.deepcopy(matrix)
31     if dirc=="right":
32         for i in range(m):
33             newrow=add(new[i])
34             new[i]=newrow
35     elif dirc=="down":
36         for j in range(n):
37             temp=[new[i][j] for i in range(m)]
38             newline=add(temp)
39             for k in range(m):
40                 new[k][j]=newline[k]
41     elif dirc=="left":
42         for i in range(m):
43             temp=[new[i][j] for j in range(n-1,-1,-1)]
44             newrow=add(temp)
```

```

45         for k in range(n):
46             new[i][n-1-k]=newrow[k]
47     else:
48         for j in range(n):
49             temp=[new[i][j] for i in range(m-1,-1,-1)]
50             newline=add(temp)
51             for k in range(m):
52                 new[m-1-k][j]=newline[k]
53     return new
54 result=0
55 def calculate(matrix,num):
56     global result
57     if num==p:
58         result=max(result,max(max(matrix[i]) for i in range(m)))
59     return
60     calculate(move(matrix,"up"),num+1)
61     calculate(move(matrix,"down"),num+1)
62     calculate(move(matrix,"left"),num+1)
63     calculate(move(matrix,"right"),num+1)
64 calculate(matrix,0)
65 print(result)

```

代码运行截图

状态: Accepted

源代码

```
import copy
import sys
sys.setrecursionlimit(1<<30)
m,n,p=map(int,input().split())
matrix=[]
for _ in range(m):
    matrix.append(list(map(int,input().split())))

def add(lst):
    for i in range(len(lst)-1):
        if lst[i]!=0:
            for j in range(i+1,len(lst)):
                if lst[i]==lst[j]:
                    lst[i],lst[j]=0,2*lst[i]
                    break
                elif lst[j]==0:
                    pass
                else:
                    break

    ans=[]
    count=0
    for i in lst:
        if i!=0:
            ans.append(i)
            count+=1
    return [0]*(len(lst)-count)+ans

def move(matrix,dirc):
```

27401: 最佳凑单

dp, sparse bucket, <http://cs101.openjudge.cn/practice/27401/>

思路:

代码

```
1  '''
2  刘思瑞 2100017810
3  '''
4  import sys
5  n,t = map(int,input().split())
6  value = list(map(int,input().split()))
7  total_value = sum(value)
8  if total_value < t:
9      print(0)
10     sys.exit()
```



```

11 dp = []
12 for i in range(n+1):
13     dp.append([0] + [-float("inf")]*(total_value))
14 for i in range(1,n+1):
15     for j in range(1,total_value+1):
16         if value[i-1] > j:
17             dp[i][j] = dp[i-1][j]
18         else:
19             dp[i][j] = max(dp[i-1][j],dp[i-1][j-value[i-1]]+value[i-1])
20 for k in range(t,total_value+1):
21     if dp[n][k] > 0:
22         print(dp[n][k])
23         sys.exit()
24 print(0)

```

代码运行截图

状态: Accepted

基

源代码

```

'''
刘思瑞 2100017810
'''
import sys
n,t = map(int,input().split())
value = list(map(int,input().split()))
total_value = sum(value)
if total_value < t:
    print(0)
    sys.exit()
dp = []
for i in range(n+1):
    dp.append([0] + [-float("inf")]*(total_value))
for i in range(1,n+1):
    for j in range(1,total_value+1):
        if value[i-1] > j:
            dp[i][j] = dp[i-1][j]
        else:
            dp[i][j] = max(dp[i-1][j],dp[i-1][j-value[i-1]]+value[i-1])
for k in range(t,total_value+1):
    if dp[n][k] > 0:
        print(dp[n][k])
        sys.exit()
print(0)

```

基

27384: 候选人追踪

heap, <http://cs101.openjudge.cn/practice/27384/>

熊江凯, 这题应该不超纲的, 感觉还是挺好的

思路:

直接看题解

代码

```
1 n,k = map(int,input().split())
2 lst = list(map(int,input().split()))
3 arr = sorted([[lst[2*i],lst[2*i+1]] for i in range(n)])
4 vote = [0 for _ in range(314160)]
5 s = list(map(int,input().split()))
6 mark_dict = {}
7 for i in range(k):
8     mark_dict[s[i]] = 0
9 if k == 314159:
10     print(arr[-1][0])
11     exit()
12 most,least = 0,0
13 ans = 0
14 for j in range(n):
15     v = arr[j][1]
16     if v in mark_dict:
17         mark_dict[v] += 1
18         if least == mark_dict[v]-1:
19             least = min(mark_dict.values())
20     else:
21         vote[v] += 1
22         most = max(most,vote[v])
23         if j < n-1 and arr[j+1][0] != arr[j][0] and least > most:
24             ans += arr[j+1][0]-arr[j][0]
25 print(ans)
```

代码运行截图

状态: Accepted

源代码

```
n,k = map(int,input().split())
lst = list(map(int,input().split()))
arr = sorted([[lst[2*i],lst[2*i+1]] for i in range(n)])
vote = [0 for _ in range(314160)]
s = list(map(int,input().split()))
mark_dict = {}
for i in range(k):
    mark_dict[s[i]] = 0
if k == 314159:
    print(arr[-1][0])
    exit()
most,least = 0,0
ans = 0
for j in range(n):
    v = arr[j][1]
    if v in mark_dict:
        mark_dict[v] += 1
        if least == mark_dict[v]-1:
            least = min(mark_dict.values())
    else:
        vote[v] += 1
```

CF1883D. In Love

data structure, greedy, 1500, <https://codeforces.com/problemset/problem/1883/D>

黄源森、查达闻推荐

思路:

代码

```
1 out = []
2 for _ in range(int(input())):
3     n = int(input())
4     a = list(map(int, input().split()))
5     b = []
6     if a[0] == n:
7         x = n - 1
8     else:
9         x = n
10    f = 0
11    for i in range(n):
12        if a[i] == x:
13            f = i
14        if f:
```

```

15         b.append(a[i])
16     if not f:
17         b.append(a[0])
18     if f == n - 1:
19         f -= 1
20     else:
21         b.append(a[f - 1])
22         f -= 2
23
24     while f > 0 and a[f] > a[0]:
25         b.append(a[f])
26         f -= 1
27     for i in range(f + 1):
28         b.append(a[i])
29     out.append(b)
30
31 for l in out:
32     print(*l)

```

代码运行截图

By meinvader, contest: Codeforces Round 874 (Div. 3), problem: (D) Flipper, **Accepted**, #, [Copy](#)

```

out = []
for _ in range(int(input())):
    n = int(input())
    a = list(map(int, input().split()))
    b = []
    if a[0] == n:
        x = n - 1
    else:
        x = n
    f = 0
    for i in range(n):
        if a[i] == x:
            f = i
            if f:
                b.append(a[i])
    if not f:
        b.append(a[0])
    if f == n - 1:
        f -= 1
    else:
        b.append(a[f - 1])
        f -= 2

    while f > 0 and a[f] > a[0]:
        b.append(a[f])
        f -= 1
    for i in range(f + 1):
        b.append(a[i])
    out.append(b)

for l in out:
    print(*l)

```

2. 学习总结和收获

dp和搜索基本能够掌握这个套路了，但是到时候能不能过真不好说