Assignment #D: 十全十美

2024 fall, Complied by 吕金浩，物理学院

1. 题目

02692: 假币问题

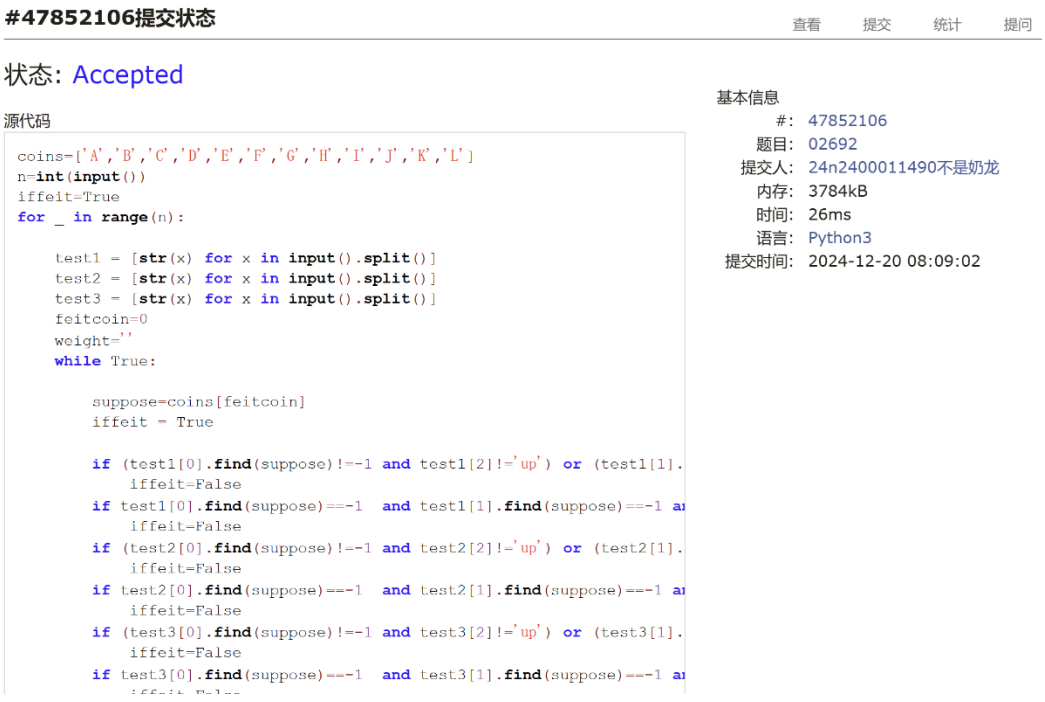
brute force, http://cs101.openjudge.cn/practice/02692

思路：主打一个枚举。我在九月份做了这个题目，所以代码显得非常长。

代码：

```
coins=['A','B','C','D','E','F','G','H','I','J','K','L']
n=int(input())
iffeit=True
for _ in range(n):

    test1 = [str(x) for x in input().split()]
    test2 = [str(x) for x in input().split()]
    test3 = [str(x) for x in input().split()]
    feitcoin=0
    weight=''
    while True:

        suppose=coins[feitcoin]
        iffeit = True

        if (test1[0].find(suppose)!=-1 and test1[2]!='up') or (test1[1].find(suppose)!=-1 and
test1[2]!='down'):
            iffeit=False
        if test1[0].find(suppose)==-1   and test1[1].find(suppose)==-1 and test1[2]!='even':
            iffeit=False
        if (test2[0].find(suppose)!=-1 and test2[2]!='up') or (test2[1].find(suppose)!=-1 and
test2[2]!='down'):
            iffeit=False
        if test2[0].find(suppose)==-1   and test2[1].find(suppose)==-1 and test2[2]!='even':
            iffeit=False
        if (test3[0].find(suppose)!=-1 and test3[2]!='up') or (test3[1].find(suppose)!=-1 and
test3[2]!='down'):
            iffeit=False
        if test3[0].find(suppose)==-1   and test3[1].find(suppose)==-1 and test3[2]!='even':
            iffeit=False
        if iffeit:
            weight='heavy'
            break
        iffeit = True

        if (test1[0].find(suppose) != -1 and test1[2] != 'down') or (test1[1].find(suppose) !=
-1 and test1[2] != 'up'):
```

```
            iffeit = False
        if test1[0].find(suppose)==-1   and test1[1].find(suppose)==-1 and test1[2]!='even':
            iffeit = False
        if (test2[0].find(suppose) != -1 and test2[2] != 'down') or (test2[1].find(suppose) !=
-1 and test2[2] != 'up'):
            iffeit = False
        if test2[0].find(suppose)==-1   and test2[1].find(suppose)==-1 and test2[2]!='even':
            iffeit = False
        if (test3[0].find(suppose) != -1 and test3[2] != 'down') or (test3[1].find(suppose) !=
-1 and test3[2] != 'up'):
            iffeit = False
        if test3[0].find(suppose)==-1   and test3[1].find(suppose)==-1 and test3[2]!='even':
            iffeit = False
        if iffeit:
            weight = 'light'
            break

        feitcoin+=1
    print(str(coins[feitcoin])+' is the counterfeit coin and it is '+weight+'.')
```



#47852106提交状态

查看 提交 统计 提问

状态: Accepted

源代码

```
coins=['A','B','C','D','E','F','G','H','I','J','K','L']
n=int(input())
iffeit=True
for _ in range(n):

    test1 = [str(x) for x in input().split()]
    test2 = [str(x) for x in input().split()]
    test3 = [str(x) for x in input().split()]
    feitcoin=0
    weight=''
    while True:

        suppose=coins[feitcoin]
        iffeit = True

        if (test1[0].find(suppose)!=-1 and test1[2]!='up') or (test1[1].
            iffeit=False
        if test1[0].find(suppose)==-1  and test1[1].find(suppose)==-1 a
            iffeit=False
        if (test2[0].find(suppose)!=-1 and test2[2]!='up') or (test2[1].
            iffeit=False
        if test2[0].find(suppose)==-1  and test2[1].find(suppose)==-1 a
            iffeit=False
        if (test3[0].find(suppose)!=-1 and test3[2]!='up') or (test3[1].
            iffeit=False
        if test3[0].find(suppose)==-1  and test3[1].find(suppose)==-1 a
```

基本信息

#: 47852106
题目: 02692
提交人: 24n2400011490不是奶龙
内存: 3784kB
时间: 26ms
语言: Python3
提交时间: 2024-12-20 08:09:02

01088: 滑雪

dp, dfs similar, http://cs101.openjudge.cn/practice/01088

思路：使用递归避免基础情况讨论，利用 lru_cache

代码：

```
r,c=map(int,input().split())
matrix=[[int(x) for x in    input().split()] for _ in range(r)]
dx=[0,0,1,-1]
```

```
dy=[1,-1,0,0]
res=0
import sys
sys.setrecursionlimit(1<<30)
from functools import lru_cache

@lru_cache(maxsize=None)

def dfs(x,y):
    ans=1

    for i in range(4):
        nx=x+dx[i]
        ny=y+dy[i]
        if 0<=nx<r and 0<=ny<c:
            if matrix[nx][ny]<matrix[x][y]:
                ans=max(ans,1+dfs(nx,ny))
    return ans
for j in range(r):
    for k in range(c):
        res=max(res,dfs(j,k))
print(res)
```

25572: 螃蟹采蘑菇

bfs, dfs, http://cs101.openjudge.cn/practice/25572/

思路：将更左边或更上面的 5 记为“头”，则螃蟹的位置可以用头的位置来表征。螃蟹的取向可用两个变量 hor 和 ver 的 True 或 False 来表征。

代码：

```
n=int(input())
matrix=[[int(x) for x in input().split()] for _ in range(n) ]
def head():
    for i in range(n):
        for j in range(n):
            if matrix[i][j]==5:
                matrix[i][j] = 0
                return (i,j)

hdx,hdy=head()
tlx,tly=head()
def fd():
    for i in range(n):
        for j in range(n):
            if matrix[i][j]==9:
                matrix[i][j]=0
                return (i,j)
tx,ty=fd()
from collections import deque
q=deque()
q.append((hdx,hdy))
inq={(hdx,hdy)}
hor=hdx==tlx
ver=hdy==tly
dx=[1,-1,0,0]
dy=[0,0,1,-1]
while q:
    x,y=q.popleft()
    if (x==tx and y==ty ) or (hor and x==tx and y+1==ty) or (ver and y==ty and x+1==tx):
        print('yes')
        break
    for k in range(4):
        nx=x+dx[k];ny=y+dy[k]
        if 0<=nx<n and 0<=ny<n and ((hor and 0<=ny+1<n) or (ver and 0<=nx+1<n)) and
(nx,ny) not in inq:
            if matrix[nx][ny]!=1 and ((hor and matrix[nx][ny+1]!=1) or (ver and
matrix[nx+1][ny]!=1)):
                q.append((nx,ny))
                inq.add((nx,ny))

else:
    print('no')
```

#47838930提交状态

查看 提交 统计 提问

状态：Accepted

基本信息

#：47838930
题目：25572
提交人：24n2400011490不是奶龙
内存：3736kB
时间：21ms
语言：Python3
提交时间：2024-12-19 15:52:06

源代码

```
n=int(input())
matrix=[[int(x) for x in input().split()] for _ in range(n) ]
def head():
    for i in range(n):
        for j in range(n):
            if matrix[i][j]==5:
                matrix[i][j] = 0
                return (i,j)

hdx,hdy=head()
tlx,tly=head()
def fd():
    for i in range(n):
        for j in range(n):
            if matrix[i][j]==9:
                matrix[i][j]=0
                return (i,j)
tx,ty=fd()
from collections import deque
q=deque()
q.append((hdx,hdy))
inq={(hdx,hdy)}
hor=hdx==tlx
ver=hdy==tly
dx=[1,-1,0,0]
dy=[0,0,1,-1]
while q:
```

27373: 最大整数

dp, http://cs101.openjudge.cn/practice/27373/

思路：不看答案真想不到可以起手进行冒泡排序，省去之后关于数字顺序的一系列讨论……

还是递归+lru_cache

代码：

```
m=int(input());n=int(input())
nums=input().split()
ok=False
import sys
sys.setrecursionlimit(1<<30)
from functools import lru_cache

while not ok:
    ok=True
    for i in range(n-1):
        if nums[i]+nums[i+1]>nums[i+1]+nums[i]:
            nums[i],nums[i+1]=nums[i+1],nums[i]
            ok=False
@lru_cache(maxsize=None)
def mx(x,dig):
    if dig<=0:
        return ''
    if x==0:
        if len(nums[0])<=dig:
            return nums[0]
        else:
            return ''
```

```
    ans1=mx(x-1,dig)
    ans2=''
    if dig>=len(nums[x]):

        ans2=nums[x]+mx(x-1,dig-len(nums[x]))
    else:
        return ans1
    if not ans1:
        return ans2
    if not ans2:
        return ans1
    if int(ans1)<int(ans2):
        return ans2
    else:
        return ans1
print(mx(n-1,m))
```

02811: 熄灯问题

brute force, http://cs101.openjudge.cn/practice/02811

思路: 也并没有想到去枚举第一行的操作方式……这道题的深拷贝卡了我一会, 吸取教训了。计概 A 的某个班最近的一次测试考到了基本一样的问题，考的是给定某一初态求最少需要关灯数量。

代码:

```
init=[[int(x) for x in input().split()] for _ in range(5)]

cur=[]
dm=[1,-1,0,0]
```

```
dn=[0,0,1,-1]
def turnoff(m,n):
    cur[m][n]=1-cur[m][n]
    for i in range(4):
        nm=m+dm[i]
        nn=n+dn[i]
        if 0<=nm<5 and 0<=nn<6:
            cur[nm][nn]=1-cur[nm][nn]
ans=[]

for y in range(64):
    x=y
    x=bin(x)[2:]
    x='0'*(6-len(x))+x
    cur=[z[:] for z in init]

    ope = [[0] * 6 for _ in range(5)]
    ope[0]=[int(i) for i in x][:]

    for k in range(6):
        if ope[0][k]:turnoff(0,k)
    for j in range(1,5):
        for k in range(6):
            if cur[j-1][k]:
                ope[j][k]=1
                turnoff(j,k)

    if cur[-1]==[0,0,0,0,0,0]:
        ans=ope[:]
        break
#print(ans)
for i in range(5):
    print(' '.join(str(x) for x in ans[i]))
```

#47781988提交状态

查看 提交 统计 提问

状态：Accepted

基本信息

#：47781988
题目：02811
提交人：24n2400011490不是奶龙
内存：3948kB
时间：24ms
语言：Python3
提交时间：2024-12-17 10:20:04

源代码

```
init=[[int(x) for x in input().split()] for _ in range(5)]

cur=[]
dm=[1,-1,0,0]
dn=[0,0,1,-1]
def turnoff(m,n):
    cur[m][n]=1-cur[m][n]
    for i in range(4):
        nm=m+dm[i]
        nn=n+dn[i]
        if 0<=nm<5 and 0<=nn<6:
            cur[nm][nn]=1-cur[nm][nn]
ans=[]

for y in range(64):
    x=y
    x=bin(x)[2:]
    x='0'*(6-len(x))+x
    cur=[z[:] for z in init]

    ope = [[0] * 6 for _ in range(5)]
    ope[0]=[int(i) for i in x][:]

    for k in range(6):
        if ope[0][k]:turnoff(0,k)
    for j in range(1,5):
        for k in range(6):
```

08210: 河中跳房子

binary search, greedy, http://cs101.openjudge.cn/practice/08210/

思路：做了 Aggressive cows，再看到提示的 binary search，较为轻松地做出来了。

代码：

```
l,n,m=map(int,input().split())
rocks=[0]
for _ in range(n):
    rocks.append(int(input()))
rocks.append(l)
def valid(x):
    cur=0
    cnt=0
    for i in range(1,n+2):
        rock=rocks[i]
        if rock-cur<x:
            cnt+=1
        else:
            cur=rock
    return cnt<=m
left=1
right=l
while left<right:
    mid=(left+right)//2
    if valid(mid):
        left=mid+1
    else:
        right=mid
```

print(left-1)

#47839295提交状态

查看 提交 统计 提问

状态：Accepted

源代码

```
l,n,m=map(int,input().split())
rocks=[0]
for _ in range(n):
    rocks.append(int(input()))
rocks.append(l)
def valid(x):
    cur=0
    cnt=0
    for i in range(1,n+2):
        rock=rocks[i]
        if rock-cur<x:
            cnt+=1
        else:
            cur=rock
    return cnt<=m
left=1
right=l
while left<right:
    mid=(left+right)//2
    if valid(mid):
        left=mid+1
    else:
        right=mid

print(left-1)
```

基本信息

#: 47839295
题目: 08210
提交人: 24n2400011490不是奶龙
内存: 5564kB
时间: 252ms
语言: Python3
提交时间: 2024-12-19 16:06:12

2. 学习总结和收获

最大最小整数似乎是去年的期末题，没做出来，感觉非常慌张……搜索的题目感觉还好，基本不太会卡题，但 dp 和 greedy 相关的题目是真没那么好想，感觉非常慌张，乞求老师期末别把 greedy 放到 tough 球球了