

Assignment #9: dfs, bfs, & dp

Updated 2107 GMT+8 Nov 19, 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>，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”区有上传的md或者doc附件。
- 3) 如果不能在截止前提交作业，请写明原因。

1. 题目

18160: 最大连通域面积

dfs similar, <http://cs101.openjudge.cn/practice/18160>

思路:

- 照着模板练习了的加保护圈的递归式深搜

代码:

Python

```
from sys import setrecursionlimit
cnt = 0
setrecursionlimit(1<<30)
def dfs(board, x, y):
    global cnt
    board[x][y] = "."
    for dx, dy in direct:
        nx, ny = x + dx, y + dy
        if board[nx][ny] == "W":
            cnt += 1
            dfs(board, nx, ny)
for i in range(int(input())):
    N, M = map(int, input().split())
    board = [["." for i in range(M+2)] + [ "." + list(input()) + "." for i in range(N)] + [ "." for i in range(M+2)]
    direct = ((0, 1), (0, -1), (1, 0), (-1, 0), (1, 1), (-1, -1), (1, -1), (-1, 1))
    maxcnt = 0
    for i in range(1, N+1):
        for j in range(1, M+1):
            if board[i][j] == "W":
                cnt += 1
```

```

        dfs(board, i, j)
    maxcnt = max(cnt, maxcnt)
    cnt = 0
print(maxcnt)

```

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

#47321433提交状态 查看 提交 统计 提问

状态: Accepted

源代码

```

from sys import setrecursionlimit
cnt = 0
setrecursionlimit(1<<30)
def dfs(board, x, y):
    global cnt
    board[x][y] = "."
    for dx, dy in direct:
        nx, ny = x + dx, y + dy
        if board[nx][ny] == "W":
            cnt += 1
            dfs(board, nx, ny)
for i in range(int(input())):
    N, M = map(int, input().split())
    board = ["".join(input()) for i in range(M+2)] + ["".join(input()) + "." for i in range(M+2)]
    direct = ((0, 1), (0, -1), (1, 0), (-1, 0), (1, 1), (-1, -1), (1, -1), (-1, 1))
    maxcnt = 0
    for i in range(1, N+1):
        for j in range(1, M+1):
            if board[i][j] == "W":
                cnt += 1
                dfs(board, i, j)
            maxcnt = max(cnt, maxcnt)
        cnt = 0
    print(maxcnt)

```

基本信息

#:	47321433
题目:	18160
提交人:	颜鼎堃(24n2400011125)
内存:	3704kB
时间:	92ms
语言:	Python3
提交时间:	2024-11-22 10:40:02

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19930: 寻宝

bfs, <http://cs101.openjudge.cn/practice/19930>

思路:

- 用深搜写了, 但因为没有回溯反复WA, 不爽

代码:

```

minstep = 1e9
DIRECTIONS = ((0, 1), (1, 0), (0, -1), (-1, 0))
def dfs(treasure, x, y, steps):
    global minstep

    for dx, dy in DIRECTIONS:
        nx, ny = x+dx, y+dy
        if treasure[nx][ny] == 1:
            minstep = min(minstep, steps)
        elif treasure[nx][ny] == 0:
            treasure[x][y] = 2
            dfs(treasure, nx, ny, steps+1)
            treasure[x][y] = 0

```

Python

```
def main():
    m, n = map(int, input().split())
    treasure = [[2 for i in range(n+2)]] + [[2] + list(map(int, input().split())) +
[2] for i in range(m)] + [[2 for i in range(n+2)]]
    if treasure[1][1] == 1:
        print(0)
        exit()
    dfs(treasure, 1, 1, 1)
    if minstep == 1e9:
        print("NO")
    else:
        print(minstep)
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

#47335554提交状态 查看 提交 统计 提问

状态: Accepted

源代码

```
minstep = 1e9
DIRECTIONS = ((0, 1), (1, 0), (0, -1), (-1, 0))
def dfs(treasure, x, y, steps):
    global minstep

    for dx, dy in DIRECTIONS:
        nx, ny = x+dx, y+dy
        if treasure[nx][ny] == 1:
            minstep = min(minstep, steps)
        elif treasure[nx][ny] == 0:
            treasure[x][y] = 2
            dfs(treasure, nx, ny, steps+1)
            treasure[x][y] = 0

def main():
    m, n = map(int, input().split())
    treasure = [[2 for i in range(n+2)]] + [[2] + list(map(int, inp
if treasure[1][1] == 1:
    print(0)
    exit()
    dfs(treasure, 1, 1, 1)
    if minstep == 1e9:
        print("NO")
    else:
        print(minstep)
if __name__ == '__main__':
    main()
```

基本信息

#: 47335554
 题目: 19930
 提交人: 颜鼎壁(24n2400011125)
 内存: 3692kB
 时间: 33ms
 语言: Python3
 提交时间: 2024-11-22 21:12:35

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04123: 马走日

dfs, <http://cs101.openjudge.cn/practice/04123>

思路:

- 这次要加两层保护圈
- 因为 `cnt` 忘记在循环后归零而反复WA, 不爽

代码:

```

minstep = 1e9
DIRECTIONS = ((0, 1), (1, 0), (0, -1), (-1, 0))
def dfs(treasure, x, y, steps):
    global minstep

    for dx, dy in DIRECTIONS:
        nx, ny = x+dx, y+dy
        if treasure[nx][ny] == 1:
            minstep = min(minstep, steps)
        elif treasure[nx][ny] == 0:
            treasure[x][y] = 2
            dfs(treasure, nx, ny, steps+1)
            treasure[x][y] = 0
def main():
    m, n = map(int, input().split())
    treasure = [[2 for i in range(n+2)]] + [[2] + list(map(int, input().split())) +
[2] for i in range(m)] + [[2 for i in range(n+2)]]
    if treasure[1][1] == 1:
        print(0)
        exit()
    dfs(treasure, 1, 1, 1)
    if minstep == 1e9:
        print("NO")
    else:
        print(minstep)
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

#47344885提交状态

查看 提交 统计 提问

状态: Accepted

源代码

```
cnt = 0
def dfs(board, x, y, step, ma):
    if step == ma:
        global cnt
        cnt += 1
        return
    for dx, dy in DIRECTIONS:
        nx, ny = x + dx, y + dy
        if board[nx][ny] == 0:
            board[nx][ny] = 1
            dfs(board, nx, ny, step+1, ma)
            board[nx][ny] = 0
for i in range(int(input())):
    cnt = 0
    n, m, x, y = map(int, input().split())
    x += 2
    y += 2
    DIRECTIONS = [(1, 2), (1, -2), (-1, 2), (-1, -2), (2, 1), (2, -1), (-2, 1), (-2, -1)]
    board = [[1 for i in range(m+4)] for j in range(2)][[1, 1] + [0]*(m+2)]
    board[x][y] = 1
    dfs(board, x, y, 1, m*n)
    print(cnt)
```

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基本信息

#: 47344885

题目: 04123

提交人: 颜鼎堃(24n2400011125)

内存: 3636kB

时间: 1894ms

语言: Python3

提交时间: 2024-11-23 13:13:10

English 帮助 关于

sy316: 矩阵最大权值路径

dfs, <https://sunnywhy.com/sfbj/8/1/316>

思路:

- 尝试 `visited` 辅助列表
- 因为忘记把输入的坐标减1而反复**WA**, 不爽

代码:

Python

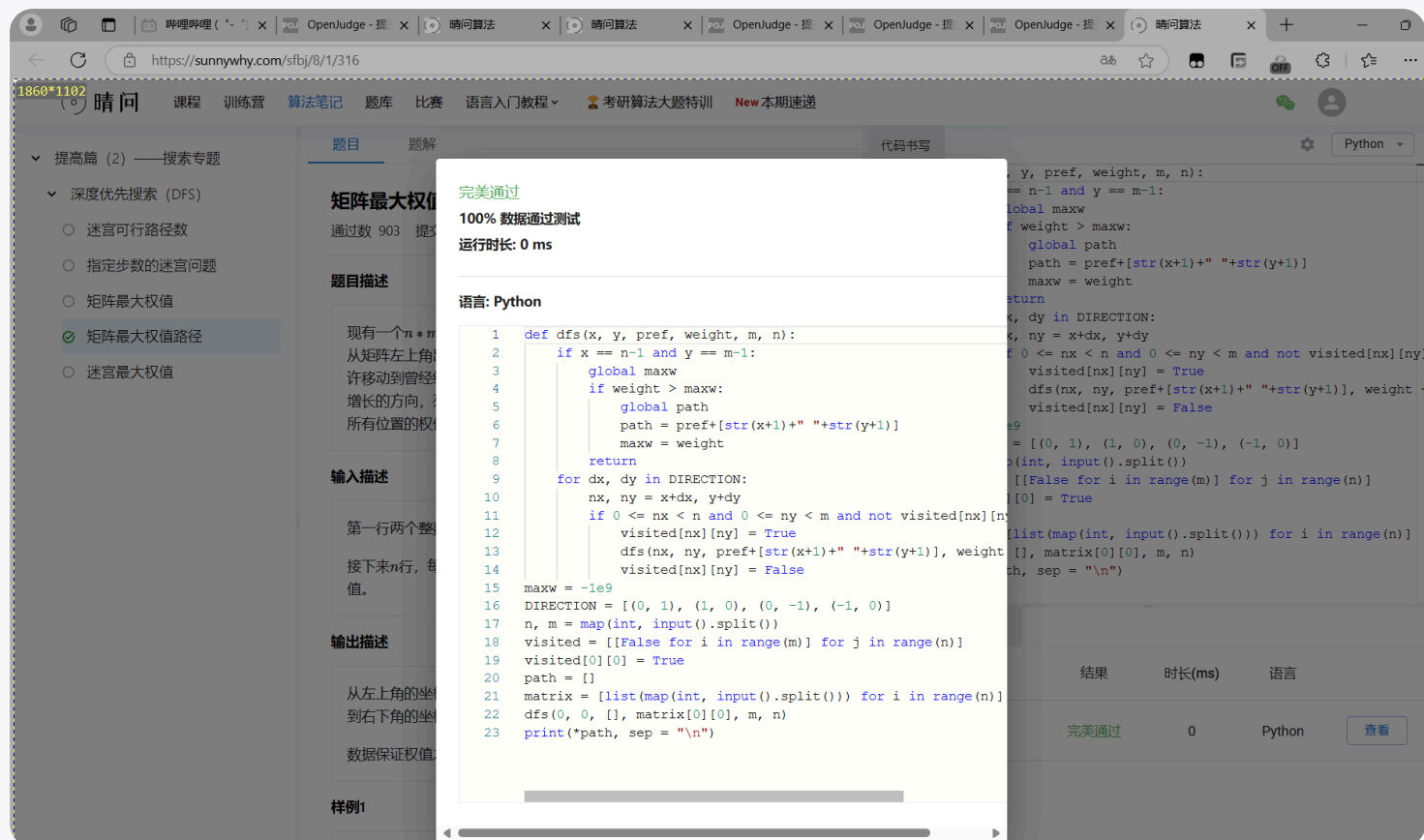
```
def dfs(x, y, pref, weight, m, n):
    if x == n-1 and y == m-1:
        global maxw
        if weight > maxw:
            global path
            path = pref+[str(x+1)+" "+str(y+1)]
            maxw = weight
        return
    for dx, dy in DIRECTION:
        nx, ny = x+dx, y+dy
        if 0 <= nx < n and 0 <= ny < m and not visited[nx][ny]:
            visited[nx][ny] = True
            dfs(nx, ny, pref+[str(x+1)+" "+str(y+1)], weight + matrix[nx][ny], m, n)
            visited[nx][ny] = False
    maxw = -1e9
DIRECTION = [(0, 1), (1, 0), (0, -1), (-1, 0)]
```

```

n, m = map(int, input().split())
visited = [[False for i in range(m)] for j in range(n)]
visited[0][0] = True
path = []
matrix = [list(map(int, input().split())) for i in range(n)]
dfs(0, 0, [], matrix[0][0], m, n)
print(*path, sep = "\n")

```

代码运行截图 (至少包含有"Accepted")



LeetCode62.不同路径

dp, <https://leetcode.cn/problems/unique-paths/>

思路:

- 高中数学排列组合经典例题，四行代码解决问题

代码:

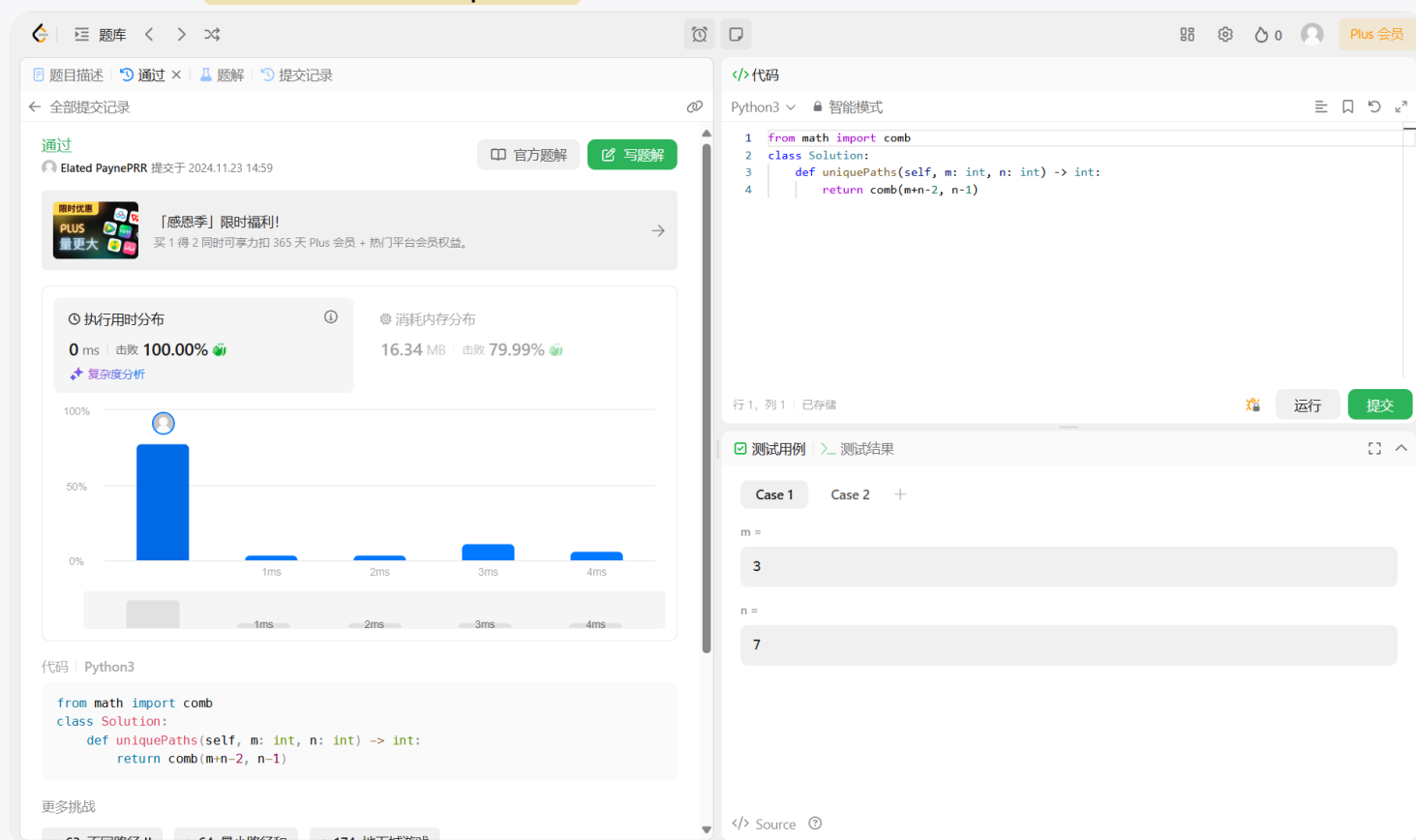
```

from math import comb
class Solution:
    def uniquePaths(self, m: int, n: int) -> int:
        return comb(m+n-2, n-1)
if __name__ == '__main__':
    m, n = map(int, input().split())
    sol = Solution()
    print(sol.uniquePaths(m, n))

```

Python

代码运行截图（至少包含有"Accepted"）



sy358: 受到祝福的平方

dfs, dp, <https://sunnywhy.com/sfbj/8/3/539>

思路:

- 写起来最爽的一题，因为感觉自己的代码还算紧凑

代码:

```
from math import sqrt
def issquare(a):
    return (not a) or ((not bool(sqrt(int(a)) % 1)) and int(a))
def dfs(A):
    if issquare(A):
        return True
    for i in range(1, len(A)+1):
        if issquare(A[:i]) and dfs(A[i:]):
            return True
    return False
print("Yes" if dfs(input()) else "No")
```

Python

代码运行截图 (至少包含有"Accepted")



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。

虽然模板题目偏多，但总还是会在各种意想不到的地方出现问题，包括但不限于方向数组打字打错、搞不清全局变量和局部变量、每一次循环读取输入有些变量忘记初始化等等