数据结构与算法（Python版）

骑士周游问题算法实现

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骑士周游算法实现

- 用于解决骑士周游问题的图搜索算法是深度优先搜索（Depth First Search）
- 相比前述的广度优先搜索，其逐层建立搜索树的特点
- 深度优先搜索是沿着树的单支尽量深入向下搜索

  如果到无法继续的程度还未找到问题解

  就回溯上一层再搜索下一支

骑士周游算法实现

- 后面会介绍DFS的两个实现算法

  一个DFS算法用于解决骑士周游问题，其特点是每个顶点仅访问一次

  另一个DFS算法更为通用，允许顶点被重复访问，可作为其它图算法的基础

骑士周游算法实现

- **深度优先搜索解决骑士周游的关键思路**

  如果沿着单支深入搜索到无法继续（所有合法移动都已经被走过了）时

  路径长度还没有达到预定值（8×8棋盘为63）

  那么就清除颜色标记，返回到上一层

  换一个分支继续深入搜索

- **引入一个栈来记录路径**

  并实施返回上一层的回溯操作

骑士周游算法代码


```
def knightTour(n,path,u,limit):
    u.setColor('gray')
    path.append(u)
    if n < limit:
        nbrList = list(u.getConnections())
        i = 0
        done = False
        while i < len(nbrList) and not done:
            if nbrList[i].getColor() == 'white':
                done = knightTour(n+1, path, nbrList[i], limit)
            i = i + 1
        if not done:  # prepare to backtrack
            path.pop()
            u.setColor('white')
    else:
        done = True
    return done
```

n:层次；path:路径；u:当前顶点；limit:搜索总深度

当前顶点加入路径

对所有合法移动逐一深入

选择白色未经过的顶点深入

都无法完成总深度，回溯，试本层下一个顶点

层次加1，递归深入

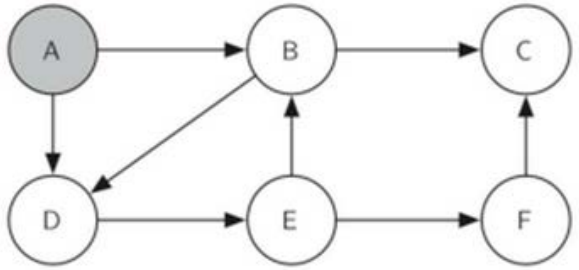


Figure 3: Start with node A

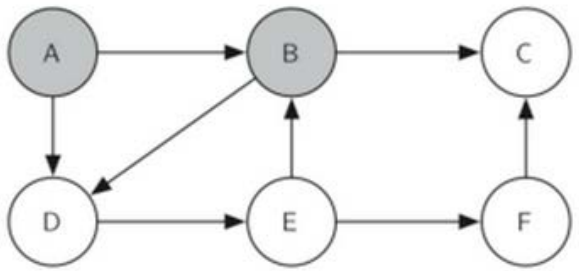


Figure 4: Explore B

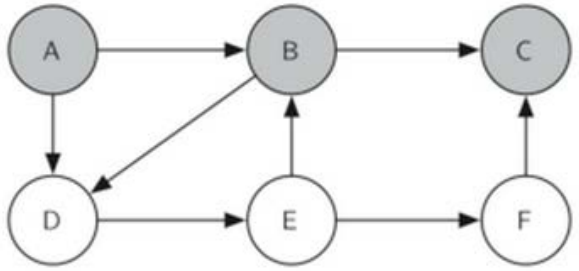


Figure 5: Node C is a dead end

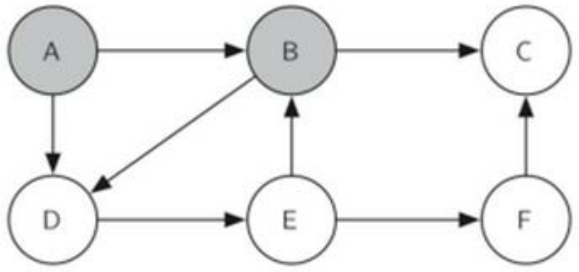


Figure 6: Backtrack to B

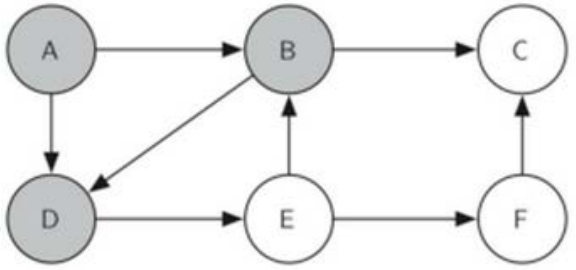


Figure 7: Explore D

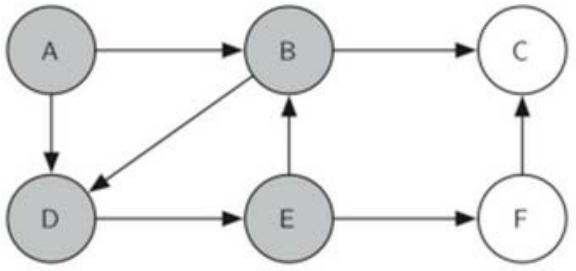


Figure 8: Explore E

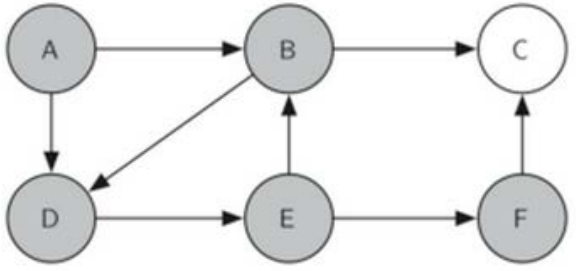


Figure 9: Explore F

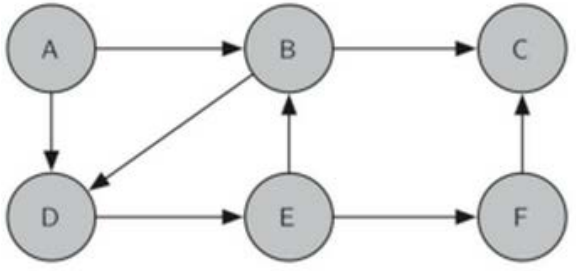
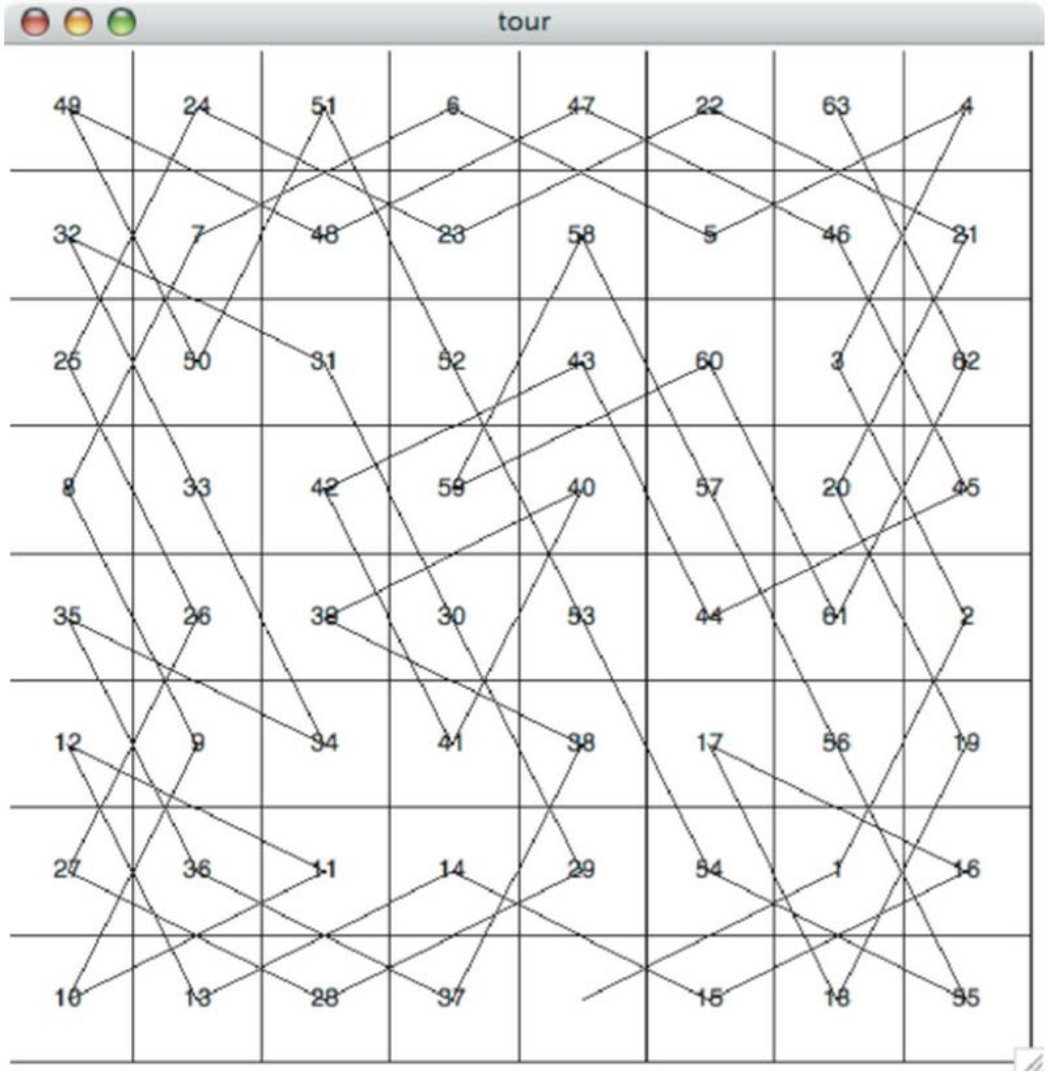


Figure 10: Finish

骑士周游问题：一个解


tour
49 24 51 6 47 22 63 4
32 7 48 23 58 5 46 21
25 50 31 52 43 60 3 62
8 33 42 59 40 57 20 45
35 26 39 30 53 44 61 2
12 9 34 41 38 17 56 19
27 36 11 14 29 54 1 16
10 13 28 37 15 18 55