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LAB - 3

8 Puzzle DFS Algorithm

```
def id_dfs(puzzle, goal, get_moves)
    import itertools

def dfs(route, depth):
    if depth == 0 :
        return
    if route[-1] == goal:
        return route
    for moves in get_moves(route[-1]) :
        if move not in route :
            next_route = dfs (route + [move], depth-1
            if next_route:
                return next_route
    for depth in itertools.count():
        route = dfs ([puzzle], depth)
        if route:
            return route.

def possible_moves (state):
    b = state.index (0)
    d = [ ]
    if b not in [0,1,2]:
        d.append('u')
    if b not in [6,7,8]:
        d.append ('d')
    if b not in [0,3,6]:
        d.append ('l')
    if b not in [2,5,8]:
        d.append ('r')
    pos_moves = [ ]
```

```
for i in d:
    pos_moves.append(generate(state, i, b))
return pos_moves.

def generate(state, m, b):
    temp = state.copy()
    if m == 'd':
        temp[b+3], temp[b] = temp[b], temp[b+3]
    if m == 'u':
        temp[b-1], temp[b] = temp[b], temp[b-1]
    if m == 'l':
        temp[b-1], temp[b] = temp[b], temp[b-1]
    if m == 'r'
        temp[b+1], temp[b] = temp[b], temp[b+1]
    return temp

initial = [1, 2, 3, 0, 4, 6, 7, 5, 8]
goal = [1, 2, 3, 4, 5, 6, 7, 8, 0]

route = id_dfs(initial, goal, possible_moves)

if route:
    print("success!!")
    print("Path", route)
else:
    print("Failed to find a solution")
```

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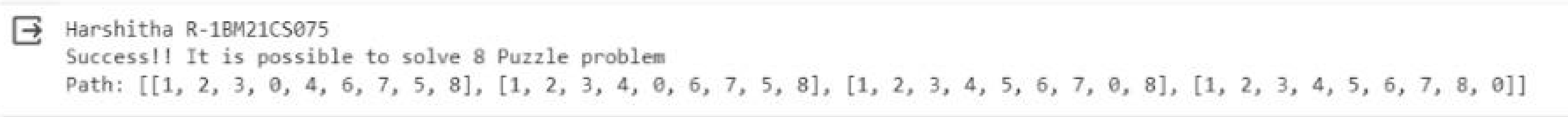

```
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Success!! It is possible to solve 8 Puzzle problem
Path: [[1, 2, 3, 0, 4, 6, 7, 5, 8], [1, 2, 3, 4, 0, 6, 7, 5, 8], [1, 2, 3, 4, 5, 6, 7, 0, 8], [1, 2, 3, 4, 5, 6, 7, 8, 0]]
```