

8 PUZZLE PROBLEM USING DFS

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def find_blank(state):
    for i in range(3):
        for j in range(3):
            if state[i][j] == 0:
                return i, j

def get_neighbors(state):
    neighbors = []
    x, y = find_blank(state)
    directions = [(0, 1), (1, 0), (0, -1), (-1, 0)] # right, down, left,
up

    for dx, dy in directions:
        new_x, new_y = x + dx, y + dy
        if 0 <= new_x < 3 and 0 <= new_y < 3:
            new_state = [row[:] for row in state] # Create a copy
            new_state[x][y], new_state[new_x][new_y] =
new_state[new_x][new_y], new_state[x][y]
            neighbors.append(new_state)

    return neighbors

def iterative_dfs(start_state):
    stack = [start_state]
    visited = set()
    path_map = {tuple(map(tuple, start_state)): None}

    while stack:
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current_state = stack.pop()

if current_state == GOAL_STATE:
    return reconstruct_path(path_map, current_state)

visited.add(tuple(map(tuple, current_state)))

for neighbor in get_neighbors(current_state):
    neighbor_tuple = tuple(map(tuple, neighbor))
    if neighbor_tuple not in visited and neighbor_tuple not in
path_map:

        path_map[neighbor_tuple] = current_state
        stack.append(neighbor)

return None

def reconstruct_path(path_map, goal_state):
    path = []
    current = goal_state
    while current is not None:
        path.append(current)
        current = path_map[tuple(map(tuple, current))]
    return path[::-1] # Reverse to get the correct order

def print_solution(path):
    if path:
        for state in path:
            for row in state:
                print(row)

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        print()

    else:

        print("No solution found.")

# Example usage

GOAL_STATE = [[1, 2, 3], [4, 5, 6], [7, 8, 0]]
start_state = [[1, 2, 3], [4, 0, 6], [7, 5, 8]]

solution_path = iterative_dfs(start_state)
print_solution(solution_path)

name = "Varsha Prasanth"
usn = "1BM22CS321"

print(f"Name: {name}, USN: {usn}")

```

Output

```

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

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

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

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

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

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

```

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