

Lab3a (25.08.2025)

Sharada Koundinya(1BM23CS310)

Implement BFS without Heuristic approach

classmate
Date _____
Page 5

25/8/25

BFS without Heuristic approach

Algorithm

1. Put the initial board into a queue.
2. Note the position of the blank space.
3. From the blank, find all possible moves (up, down, L, R)
4. Create new boards by making the moves.
5. Repeat until reaching goal board.

OUTPUT :
Enter initial state : 123-46758
Enter goal state : 12345678-
Minimum cost : 3

Steps:

1 2 3	→	1 2 3
- 4 6		4 - 6
7 5 8		7 5 8

↓

1 2 3
4 5 6
7 8 8

↓

1 2 3
4 5 6
7 8 -

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```
from collections import deque
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```
def get_moves(state):
```

```
    idx = state.index("_")
```

```
    x, y = divmod(idx, 3)
```

```
    moves = []
```

```
    for dx, dy in [(-1,0),(1,0),(0,-1),(0,1)]:
```

```
        nx, ny = x+dx, y+dy
```

```
        if 0 <= nx < 3 and 0 <= ny < 3:
```

```
            nidx = nx*3 + ny
```

```
            lst = list(state)
```

```

        lst[idx], lst[nidx] = lst[nidx], lst[idx]

        moves.append("".join(lst))

    return moves

```

```

def bfs(start, goal):
    q = deque([(start, 0)])
    parent = {start: None}
    visited = {start}

    while q:
        state, cost = q.popleft()

        if state == goal:
            path = []

            while state:
                path.append(state)
                state = parent[state]

            path.reverse()

            return path, cost

        for move in get_moves(state):
            if move not in visited:
                visited.add(move)
                parent[move] = state
                q.append((move, cost+1))

```

```

start = input("Enter initial state (e.g., 54_618732): ")
goal = input("Enter goal state (e.g., 12345678_): ")

path, cost = bfs(start, goal)

print("Minimum cost:", cost)

print("Steps:")

for p in path:

```

```
for i in range(0, 9, 3):
```

```
    print(p[i:i+3])
```

```
print()
```

```
print("Sharada Koundinya,1BM23CS310")
```

Output:

```
Enter initial state (e.g., 54_618732): 123_46758
Enter goal state (e.g., 12345678_): 12345678_
Minimum cost: 3
Steps:
123
_46
758

123
4_6
758

123
456
7_8

123
456
78_

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```