```
Total time: 23.401s
File: /Users/rishabhjain/Documents/Masters/SEM 2/Aritificial Intelligence/Program/assignment_1/breathFirstSearch.py
Function: expand at line 24

Line #      Hits         Time      Per Hit    % Time    Line Contents
==============================================================
    24                                                  @cpu
    25                                                  def expand(board):
    26    690276      276.1ms            .      1.2%        for i in range(len(board.data)):                                  # to find the loca
    27   1725749      466.2ms            .      2.0%            for j in range(len(board.data[i])):
    28   1380611      395.4ms            .      1.7%                if board.data[i][j] == '*':
    29    172569       47.1ms            .      0.2%                    location = [i,j];
    30    172569       35.8ms            .      0.2%                    break
    31
    32    172569       35.7ms            .      0.2%        actions = []
    33    632867        2.77s            .     11.8%        for move in possible_actions(constants.board, location):         # to find all poss
    34    460298       19.33s            .     82.6%            actions.append([result(location, move, board.data) , move]) # prepare all poss
    35
    36    172569       38.6ms            .      0.2%        return actions                                                    # After expanding


Total time: 1.250s
File: /Users/rishabhjain/Documents/Masters/SEM 2/Aritificial Intelligence/Program/assignment_1/breathFirstSearch.py
Function: possible_actions at line 38

Line #      Hits         Time      Per Hit    % Time    Line Contents
==============================================================
    38                                                  @cpu
    39                                                  def possible_actions(board, location):                            # to find all poss
    40    172569       58.4ms            .      4.7%        actions = ["RIGHT","LEFT","UP","DOWN"]
    41    172569       43.3ms            .      3.5%        actionstopeform = []
    42
    43    862845      224.0ms            .     17.9%        for x in actions:
    44                                                          # for moving right
    45    690276      175.3ms            .     14.0%            if x == "RIGHT":
    46    172569       63.2ms            .      5.1%                if location[1]+1 < len(board):
    47    115037       60.8ms            .      4.9%                    actionstopeform.append([x,location[0],location[1]+1])
    48                                                          # for moving left
    49    517707      138.6ms            .     11.1%            elif x == "LEFT":
    50    172569       55.1ms            .      4.4%                if location[1]-1 >= 0:
    51    115096       55.6ms            .      4.4%                    actionstopeform.append([x,location[0],location[1]-1])
    52                                                          # for moving up
    53    345138       86.3ms            .      6.9%            elif x == "UP":
    54    172569       54.8ms            .      4.4%                if location[0]-1 >= 0:
    55    115142       46.8ms            .      3.7%                    actionstopeform.append([x,location[0]-1,location[1]])
    56                                                          # for moving down
    57    172569       42.4ms            .      3.4%            elif x == "DOWN":
    58    172569       57.5ms            .      4.6%                if location[0]+1 < len(board):
    59    115023       46.9ms            .      3.7%                    actionstopeform.append([x,location[0]+1,location[1]])
    60
    61    172569       41.4ms            .      3.3%        return actionstopeform


Total time: 18.274s
File: /Users/rishabhjain/Documents/Masters/SEM 2/Aritificial Intelligence/Program/assignment_1/breathFirstSearch.py
Function: result at line 63

Line #      Hits         Time      Per Hit    % Time    Line Contents
==============================================================
    63                                                  @cpu
    64                                                  def result(location,action,board):
    65    460298       15.08s            .     82.5%        newBoard = copy.deepcopy(board)                               # copy of a board so t
    66    460298        1.06s            .      5.8%        temp = copy.deepcopy(newBoard[action[1]][action[2]])
    67    460298        1.03s            .      5.6%        newBoard[action[1]][action[2]] = copy.deepcopy('*')
    68    460298        1.01s            .      5.5%        newBoard[location[0]][location[1]]  = copy.deepcopy(temp)
    69    460298       94.7ms            .      0.5%        return newBoard                                               # return new board aft


Total time: 1755.022s
File: /Users/rishabhjain/Documents/Masters/SEM 2/Aritificial Intelligence/Program/assignment_1/breathFirstSearch.py
Function: bfs at line 71

Line #      Hits         Time      Per Hit    % Time    Line Contents
==============================================================
    71                                                  @memory_profiler.profile
    72                                                  @cpu
    73                                                  def bfs(board):                                                   # function BREADTH-FIF
    74         1            .            .         .        frontier = queue.Queue()
    75         1            .            .         .        node = Node(data = board)                                     # node ← NODE(problem.
    76         1            .            .         .        frontier.put(node)                                            # frontier ← a FIFO qu
    77                                                      # maxQueueSize = 1                                            # only for debug
    78         1            .            .         .        if constants.goalBoard == node.data:                          # if problem.IS-GOAL(n
    79                                                          return node                                               # then return node
    80         1            .            .         .        reached = []
    81         1            .            .         .        reached.append(board)                                         # reached ← {problem.I
    82    172569      612.4ms            .         .        while not frontier.empty():                                   # while not IS-EMPTY(f
    83    172569        1.08s            .      0.1%            val = frontier.get()                                      # node ← POP(frontier
    84    632865       25.33s            .      1.4%            for child in expand(val):                                 # for each child in EX
    85    460297        1.21s            .      0.1%                s =  Node(data=child[0], depth = val.depth + 1, move= child[1] , prev=val)
    86    460297       302.0ms           .         .                if goalBoard == s.data:                               # if problem.IS-GOAL(s
    87                                                                  #print('Max queue size:', maxQueueSize)            # only for debug
    88         1            .            .         .                return s                                              # then return child
    89    460296     1724.37s        3.7ms     98.3%                if s.data not in reached:                             # if s is not in reach
    90    178222       256.0ms           .         .                    reached.append(s.data)                            # add s to reached
    91    178222        1.86s            .      0.1%                    frontier.put(s)                                   # add child to frontie
    92                                                                  # maxQueueSize+=1                                 # only for debug
    93                                                      #print('Max queue size:', maxQueueSize)                       # only for debug
```

```
    94                                                 return failure                                                 # return failure


Total time: 0.000s
File: /Users/rishabhjain/Documents/Masters/SEM 2/Aritificial Intelligence/Program/assignment_1/breathFirstSearch.py
Function: printStatistics at line 96

Line #      Hits         Time      Per Hit    % Time    Line Contents
==============================================================
    96                                                 @cpu
    97                                                 def printStatistics(solution):
    98         1            .            .      0.2%        pathCost = 0
    99         1            .            .      0.2%        stateSequence = []
   100         1            .            .         .        actionSequence = []
   101
   102        29            .            .      1.6%        while solution.prev != None:
   103        28            .            .      3.4%            stateSequence.insert(0, solution.data)
   104        28            .            .      2.1%            actionSequence.insert(0, solution.move)
   105        28            .            .      1.6%            solution = solution.prev
   106        28            .            .      1.4%            pathCost += 1
   107
   108         1            .            .      4.1%        print('Action sequence:')
   109         1        0.1ms        0.1ms     16.3%        print(*actionSequence, sep='\n')
   110
   111         1            .            .      1.4%        print('\nState sequence:')
   112         1        0.3ms        0.3ms     65.3%        print(*stateSequence, sep='\n')
   113
   114         1            .            .      2.3%        print('\nPath cost:', pathCost)
```