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Date : - 27.04.25

IMPLEMENTATION OF A SEARCH ALGORITHM*

PYHTON 3.py - C:/Users/admin/AppData/Local/Programs/Python/Python310/PYHTON 3.py (3.10.8)

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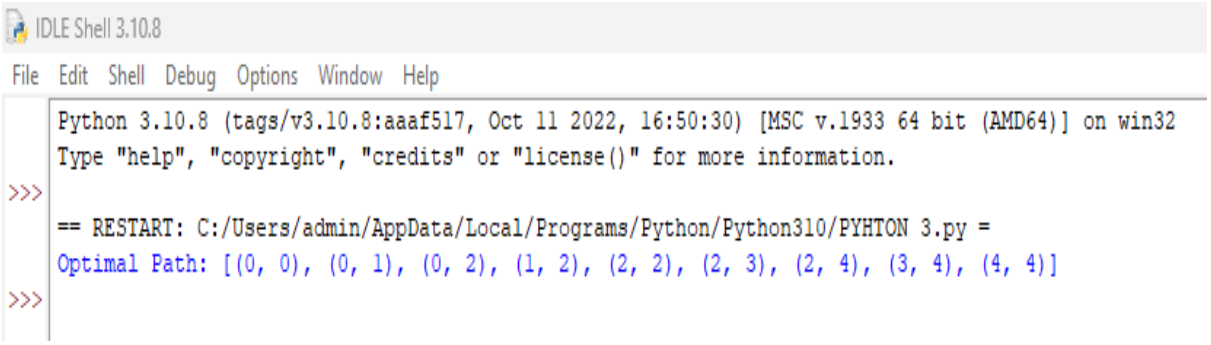
```
import heapq
class Node:
    def __init__(self, position, parent=None, g=0, h=0):
        self.position = position
        self.parent = parent
        self.g = g
        self.h = h
        self.f = g + h

    def __lt__(self, other):
        return self.f < other.f
def heuristic(a, b):
    return abs(a[0] - b[0]) + abs(a[1] - b[1])
def a_star(grid, start, goal):
    rows, cols = len(grid), len(grid[0])
    open_list = []
    heapq.heappush(open_list, Node(start, None, 0, heuristic(start, goal)))
    closed_set = set()
    while open_list:
        current_node = heapq.heappop(open_list)
        if current_node.position == goal:
            path = []
            while current_node:
                path.append(current_node.position)
                current_node = current_node.parent
            return path[::-1]
        closed_set.add(current_node.position)
        for dr, dc in [(-1, 0), (1, 0), (0, -1), (0, 1)]:
            new_pos = (current_node.position[0] + dr, current_node.position[1] + dc)
            if (0 <= new_pos[0] < rows and 0 <= new_pos[1] < cols and
                grid[new_pos[0]][new_pos[1]] == 0 and new_pos not in closed_set):
                new_node = Node(new_pos, current_node, current_node.g + 1, heuristic(new_pos, goal))
                heapq.heappush(open_list, new_node)
    return None
warehouse_grid = [
    [0, 0, 0, 0, 1],
    [1, 1, 0, 1, 0],
    [0, 0, 0, 0, 0],
    [0, 1, 1, 1, 0],
    [0, 0, 0, 0, 0]
]
start_position = (0, 0)
goal_position = (4, 4)
path = a_star(warehouse_grid, start_position, goal_position)
print("Optimal Path:", path)
```


IDLE Shell 3.10.8
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Python 3.10.8 (tags/v3.10.8:aaaf517, Oct 11 2022, 16:50:30) [MSC v.1933 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
== RESTART: C:/Users/admin/AppData/Local/Programs/Python/Python310/PYHTON 3.py =
Optimal Path: [(0, 0), (0, 1), (0, 2), (1, 2), (2, 2), (2, 3), (2, 4), (3, 4), (4, 4)]
>>>