

Riphah International University

Artificial Intelligence (AI)

Lab 5



Submitted by: Muhammad Qasim

Sap ID: 37137

Section: BSCS-6A

Submitted To: Mahjabeen

**Riphah School of Computing & Innovation Faculty
of Computing Riphah International University,
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Lab

```
import heapq

def astar(graph, heuristic, start, goal):
    open_list = [(0, start)]
    closed = set()
    g = {node: float('inf') for node in graph}
    for node in heuristic:
        if node not in g:
            g[node] = float('inf')
    g[start] = 0
    pred = {}

    while open_list:
        f, curr = heapq.heappop(open_list)

        if curr == goal:
            path = []
            while curr != start:
                path.append(curr)
                curr = pred[curr]
            path.append(start)
            return list(reversed(path))

        closed.add(curr)

        for neigh, dist in graph[curr]:
            if neigh in closed:
                continue

            tentative_g = g[curr] + dist

            if tentative_g < g[neigh]:
                g[neigh] = tentative_g
                f = tentative_g + heuristic[neigh]
                heapq.heappush(open_list, (f, neigh))
                pred[neigh] = curr

    return None

graph = {
    'A': [('B', 2), ('E', 3)],
```

```
'B': [('C', 1), ('G', 9)],  
'E': [('D', 6)],  
'D': [('G', 1)]  
}  
  
heuristic = {'A': 11, 'B': 6, 'C': 99, 'D': 1, 'E': 7, 'G': 0}  
  
start = 'A'  
goal = 'G'  
  
path = astar(graph, heuristic, start, goal)  
print(path)
```

Output:

```
PS D:\Uni\Semester 6\Artificial Intelligence\Lab Task> python -u "d:\Uni\Semester 6\Artificial Intelligence\Lab Task\astar lab 5.py"  
['A', 'E', 'D', 'G']  
PS D:\Uni\Semester 6\Artificial Intelligence\Lab Task> █
```