**Department of Computer Science**

**Forman Christian College University**

**COMP360: Introduction to AI**

**Spring 2024**

**Lab 5**



|  |  |
| --- | --- |
| **Task 1**  **(20 Marks)** | **Total**  **(20 Marks)** |
|  |  |

**Hill Climbing**

**Lab Instructions:**

* This is an individual Lab assignment. Each student must submit their own work.
* Download the files from tmoodle.
* IMPORTANT: Run the lab.py file and make sure it runs without any errors.
* Then populate the below-mentioned files with your implementation.
* After you’re done with your implementation, zip the files, rename it with your name and roll no. (Ali\_Abbas\_243123455.zip) and upload them on tmoodle.

**Task: Populate the lab.py file with your implementation of the Hill Climbing**

**Algorithm.**

**Task Description: Implementing Hill Climb Algorithm on a Graph**

**Objective:** Implement a basic version of the Hill Climb algorithm on a given graph. The Hill Climb algorithm is a heuristic search used for mathematical optimization problems in the field of Artificial Intelligence. Given a large set of inputs and a good heuristic function, it attempts to find a sufficiently good solution to the problem, though not necessarily the global maximum.

**Instructions:**

1. Implement a function named **hill\_climb\_search(graph, start, goal)** that takes in the following parameters:
   * **graph**: Represents the graph structure. You may modify the provided **Graph** class or create your own.
   * **start**: The starting node for the search.
   * **goal**: The target node to reach.
2. The function should print the path it took after reaching the goal node.

**Graph Representation:**

The graph is represented as follows, where each node is accompanied by its corresponding heuristic value:

(A,3) -> (B, 4), (C, 6), (D, 5)

(B,4) -> (E, 3), (F, 2)

(C,6) -> (G, 7), (H, 8)

(D,5) -> (I, 6), (J, 7)

(H,8) -> (K, 9)

**Solution:** A -> C -> H -> K

**Note:** Ensure that your implementation correctly handles the given graph structure and produces the expected solution.