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School of Computer Science Engineering & Information Systems

Winter Sem – 2023 - 2024
Exercise Set - 1

Programme : B.Tech (IT)
Course Title : Artificial Intelligence **Course Code: BITE308P**

1. Assume that you will be given an undirected graph represented as an adjacency list and a starting vertex. Implement a function ***BFS(graph, start)*** that performs Breadth-First Search starting from the given vertex. The function should return a list of vertices visited in **BFS order**.

2. Assume that you will be given an undirected graph represented as an adjacency list and a starting vertex. Implement a function ***DFS(graph, start)*** that performs Breadth-First Search starting from the given vertex. The function should return a list of vertices visited in **DFS order**.

3. The 8-Queens problem is a classic problem in computer science. The goal is to place eight queens on a chessboard in such a way that no two queens threaten each other. This means that no two queens can be in the same row, column, or diagonal.
   Make an implementation of the 8-Queens problem in Python using a backtracking algorithm:

4. Uniform Cost Search (UCS) is a search algorithm that explores a weighted graph by expanding the least-cost node. It is often used for finding the shortest path in a graph with non-negative edge weights.
   Make an implementation of the Uniform Cost Search algorithm in Python.

5. Iterative Deepening Search (IDS) is a combination of depth-first search and breadth-first search. It repeatedly performs depth-first search with increasing depth limits until the goal is found. This allows the algorithm to explore deeper levels gradually, avoiding the disadvantages of pure depth-first or breadth-first search.
   Make an implementation of the Iterative Deepening Search in Python.

6. The Missionaries and Cannibals problem is a classic river-crossing puzzle that involves moving missionaries and cannibals from one side of a river to the other. The challenge is to find a sequence of moves that allows all missionaries and cannibals to cross without violating certain rules. The rules usually include constraints on the number of missionaries and cannibals on each side of the river, and ensuring that the cannibals don't outnumber the missionaries on either side.
   Create an implementation of the Missionaries and Cannibals problem using a simple BFS algorithm in Python.