Artificial Intelligence Lab (BTCOL 706)

Experiment No – 05

Aim: Write a Program to solve any problem using Breadth First Search.

Theory:

Breadth-First Search (BFS) is a graph traversal algorithm that explores all the vertices of a graph in breadth ward motion, visiting all the neighbors of a vertex before moving on to their neighbors. BFS is often used for finding the shortest path in unweighted graphs and can also be used to explore a graph systematically.

Here is an outline of the BFS algorithm and its key components::

Algorithm:

1. Start with an initial node (usually the source node).
2. Create an empty queue and enqueue the initial node into it.
3. Create a set or array to keep track of visited nodes.
4. While the queue is not empty:
    a. Dequeue a node from the queue.
    b. Mark it as visited.
    c. Process the node (e.g., record it as part of the traversal or perform any desired operation).
    d. Enqueue all the unvisited neighbors of the node.
5. Repeat step 4 until the queue is empty.

Key Concepts:

- **Queue**: BFS uses a queue data structure to maintain the order in which nodes are explored. The "first in, first out" (FIFO) property ensures that nodes are explored in a breadthward manner.

- **Visited Set**: To avoid revisiting nodes and to prevent infinite loops in graphs with cycles, a set or array is used to keep track of visited nodes.
- **Exploration Order**: BFS explores nodes in a level-order traversal fashion, meaning all nodes at the same level are explored before moving to the next level. This property makes it suitable for finding the shortest path.

Program: Write a following program and take print with output and attached

1. Write a Program in Prolog to solve any problem using Breadth First Search.
2. Write a Program in Python to solve any problem using Breadth First Search.

Questions:

1. Explain Breadth First Search Technique with example.
2. State Application of Breadth First Search.
3. Explain Application of Breadth First Search Technique

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(Subject In-charge)

(Prof.S.B.Mehta)