



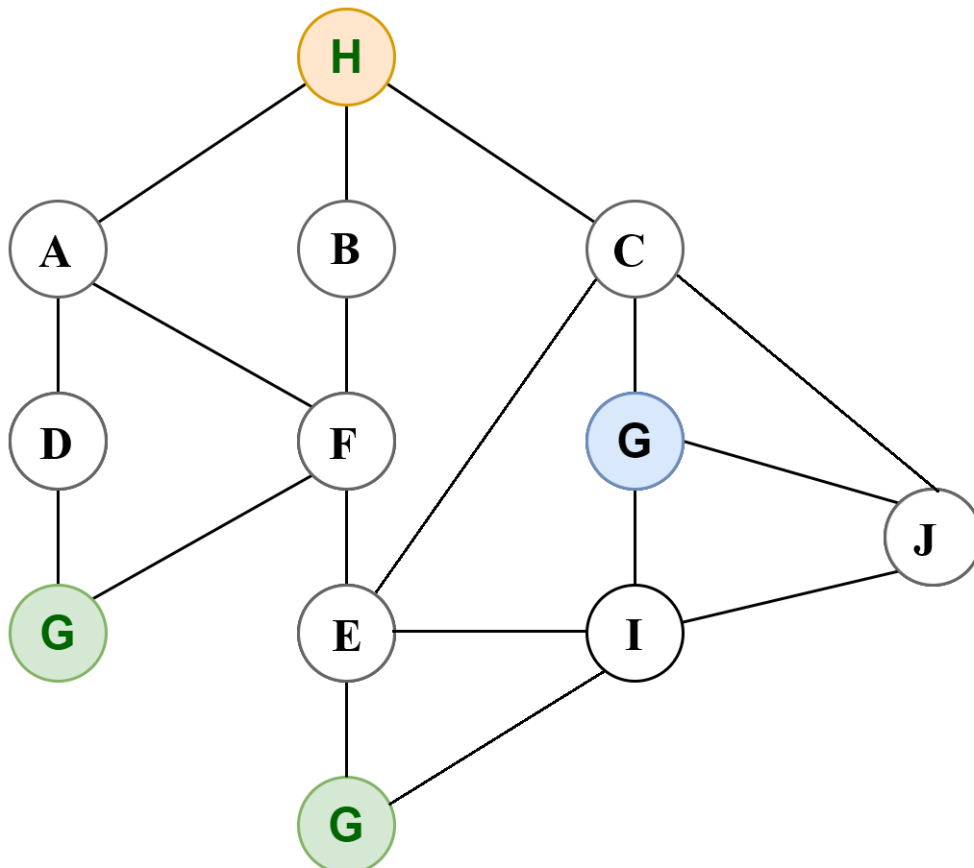
Department of AI & DS

23AD2001O - Artificial Intelligence and Machine Learning

2024-25 Even Sem

ALM-1 Problem based learning

1. Consider the given example of house(H) and grocery stores (G) mentioned in the section. Suppose now you need to find the nearest grocery store from the house instead of any grocery store. Consider that each edge is of 1 unit distance. Consider the diagram below and find the solution using BFS and DFS methods?



ANSWER

Breadth-First Search (BFS)

1. **Reason for BFS:** BFS explores all nodes at the current distance before moving to the next distance. Thus, it guarantees finding the nearest grocery store first.
 2. **Steps:**
 - Start at **H** and initialize a queue.
 - Visit neighbors level by level.
 - Stop when you find the first grocery store (**G**).
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Depth-First Search (DFS)

1. **Reason for DFS:** DFS explores as far as possible along a branch before backtracking. It might not find the nearest grocery store directly but will eventually visit all nodes.
2. **Steps:**
 - Start at **H** and traverse depth-first.
 - Track visited nodes to avoid loops.
 - Keep a record of all distances to **G** nodes and find the minimum.

Results Using BFS and DFS

BFS Solution:

- Start from **H**.
- Level-by-level search:
 - Neighbors of **H**: **A**, **B**, **C**.
 - Then, their neighbors (**D**, **F**, **E**, etc.).
 - The nearest **G** is at node **D** or **E** (distance = 2).

DFS Solution:

- Start from **H** and explore depth-first.
- The path may find **G** in a non-optimal order.
- For instance:
 - Visit **H → A → D → G**.
 - Find **G** at distance = 2.

DFS might not stop early since it doesn't prioritize the closest node.

Conclusion:

- BFS is preferred for finding the nearest **G**, with a result of distance = 2.