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↗ course	🤖 AI
Zohaib	none
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Notes

Last Class Recap: Problem Solving

- **Classical Approach**: Emphasizes problem representation and search strategies.
- **Problem Representation**: Crucial for systematic problem-solving.
- **Categories of Search Algorithms**: Addressed classical methods.

Today: Properties of Search Algorithms

Understanding Efficiency

- **Completeness**: Ability to find a solution if one exists.
- **Optimality**: Finding the best solution, often with the lowest cost.
- **Time Complexity**: Measure of computational time required.
- **Space Complexity**: Measure of memory usage during search.

Types of Search Algorithms

1. **Uninformed Search Algorithms**: Rely solely on problem definition.
2. **Informed Search Algorithms**: Incorporate additional information (heuristics) for guidance.

Uninformed Search Algorithms

- Operate without additional problem-specific knowledge.
- Focus on traversing the search space systematically.

Breadth-first Search (BFS)

- Traverses breadth-wise in a tree or graph.
- Utilizes a FIFO queue data structure.
- Provides a solution if one exists, but may require significant memory.

Depth-first Search (DFS)

- Traverses deeply into a tree or graph.
- Utilizes a LIFO stack data structure.
- Requires less memory but may not find an optimal solution.

Depth-limited Search

- Variant of DFS with a predetermined depth limit.
- Guarantees termination and addresses infinite path issues.
- Memory efficient but may not be optimal.

Uniform-cost Search

- Searches for the path with the lowest cumulative cost.
- Utilizes a priority queue.
- Optimal but may not consider the number of steps involved.

Iterative Deepening Depth First Search (IDDFS)

- Combines benefits of BFS and DFS.
- Searches iteratively with increasing depth limits.
- Offers a balance between search speed and memory efficiency.

Performance Measurement

- Completeness: Varies with algorithm design and problem constraints.
- Optimality: Depends on the problem and search strategy.

- Time and Space Complexity: Influenced by algorithm type and problem characteristics.

Next Class: Informed Search Algorithms and Heuristic Functions