

CS 2710 Foundations of AI
Lecture 4

Uninformed search methods (finish)
Informed search methods

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Topics

Uninformed search methods

- Review of uninformed search methods
- **Checking state repeats**
- **Uniform cost search**

Informed search methods

- Incorporating additional information to guide the search
- **Best first search**
 - Greedy methods
 - A* search
 - IDA*
- Heuristics

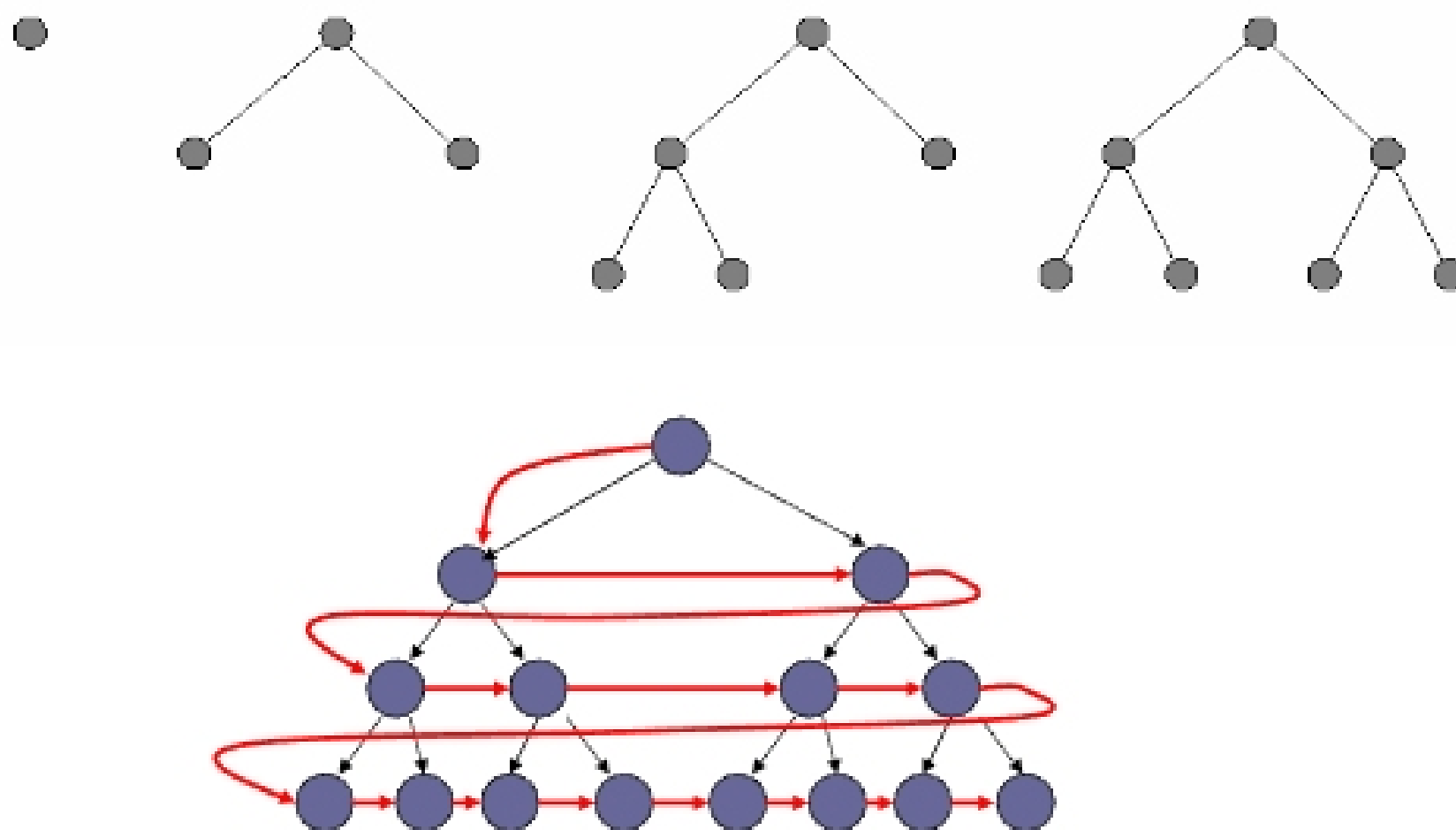
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Uninformed methods

- Uninformed search methods use only information available in the problem definition
 - **Breadth-first search (BFS)**
 - **Depth-first search (DFS)**
 - **Iterative deepening (IDA)**
 - **Bi-directional search**
- **For the minimum cost path problem:**
 - **Uniform cost search**

Breadth first search (BFS)

- The shallowest node is expanded first



Properties of breadth-first search

- **Completeness:** **Yes.** The solution is reached if it exists.
- **Optimality:** **Yes,** for the shortest path.
- **Time complexity:**

$$1 + b + b^2 + \dots + b^d = O(b^d)$$

exponential in the depth of the solution d

- **Memory (space) complexity:**

$$O(b^d)$$

same as time - every node is kept in the memory

Depth-first search (DFS)

- The deepest node is expanded first
- Backtrack when the path cannot be further expanded

