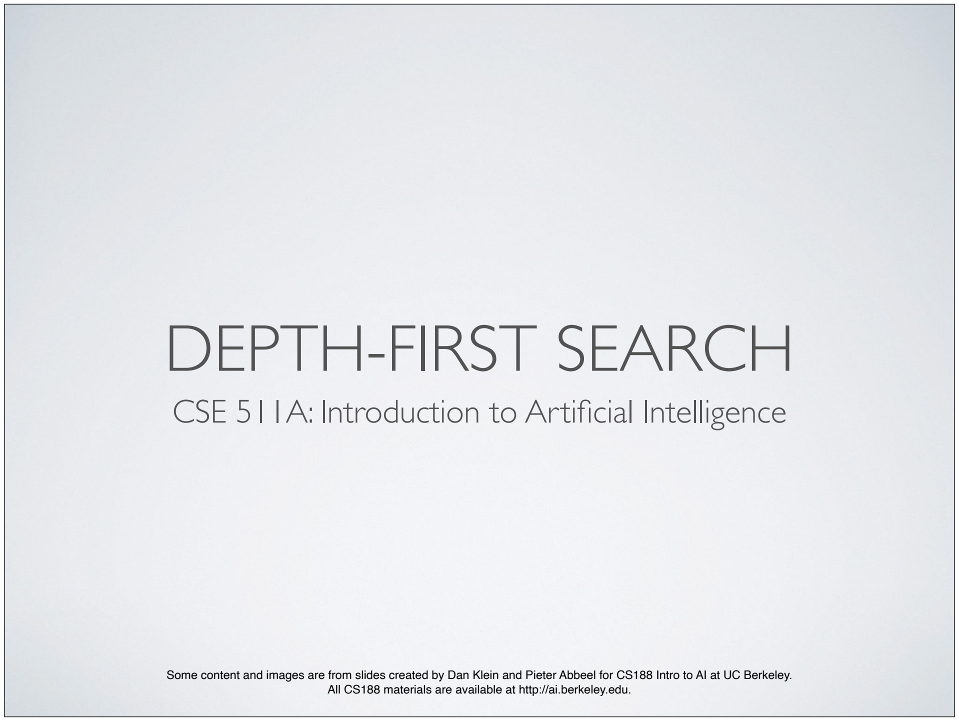
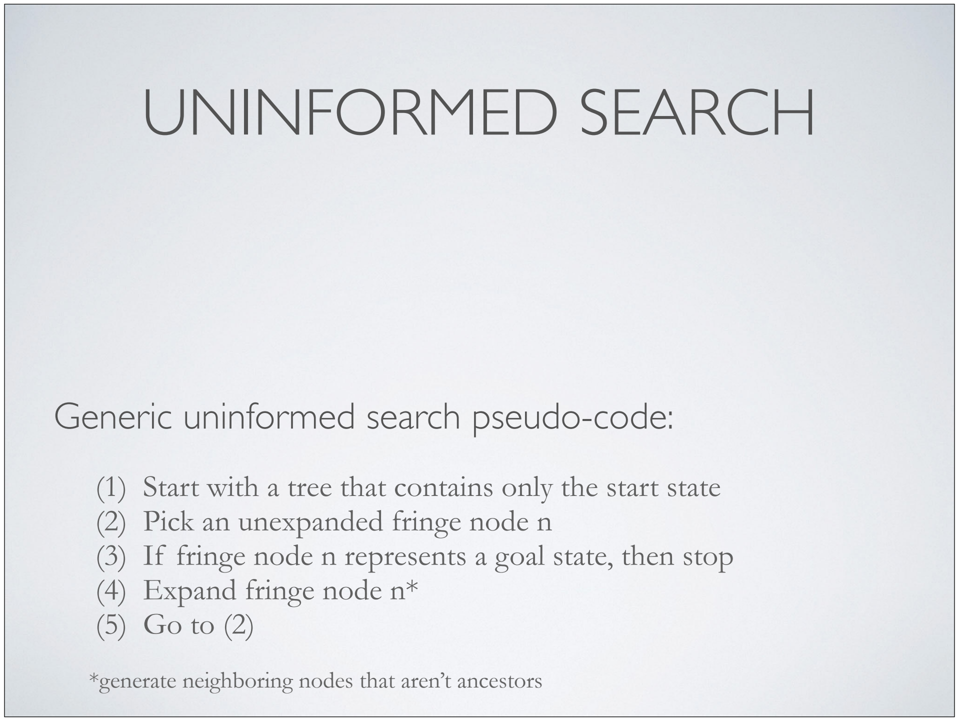


DEPTH-FIRST SEARCH

CSE 511A: Introduction to Artificial Intelligence

Some content and images are from slides created by Dan Klein and Pieter Abbeel for CS188 Intro to AI at UC Berkeley.
All CS188 materials are available at http://ai.berkeley.edu.

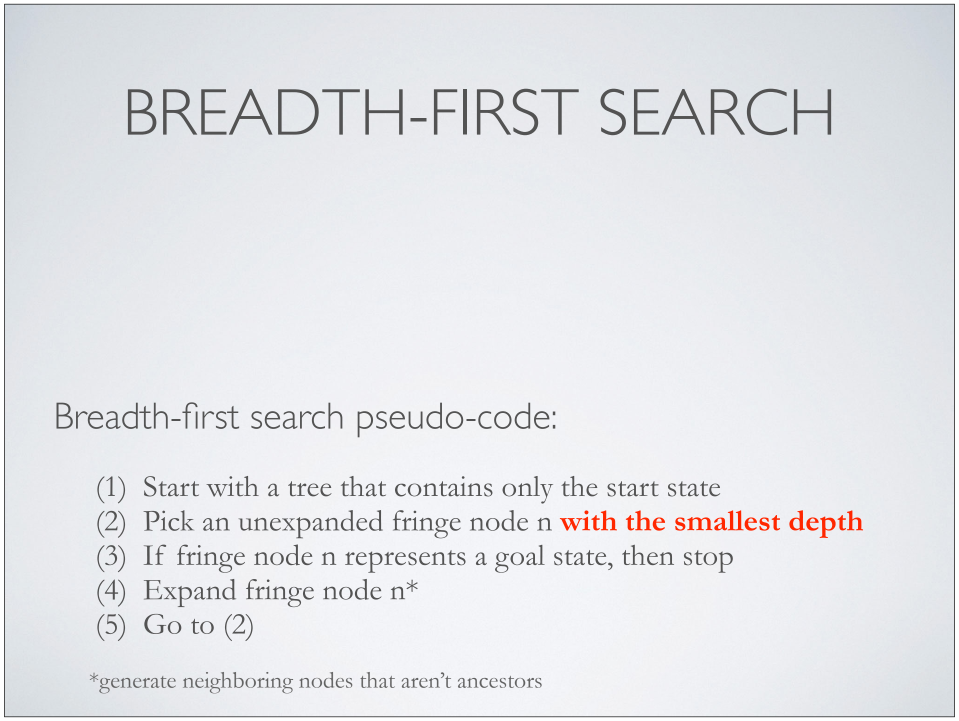


UNINFORMED SEARCH

Generic uninformed search pseudo-code:

```
(1) Start with a tree that contains only the start state
(2) Pick an unexpanded fringe node n
(3) If fringe node n represents a goal state, then stop
(4) Expand fringe node n*
(5) Go to (2)
```

*generate neighboring nodes that aren't ancestors

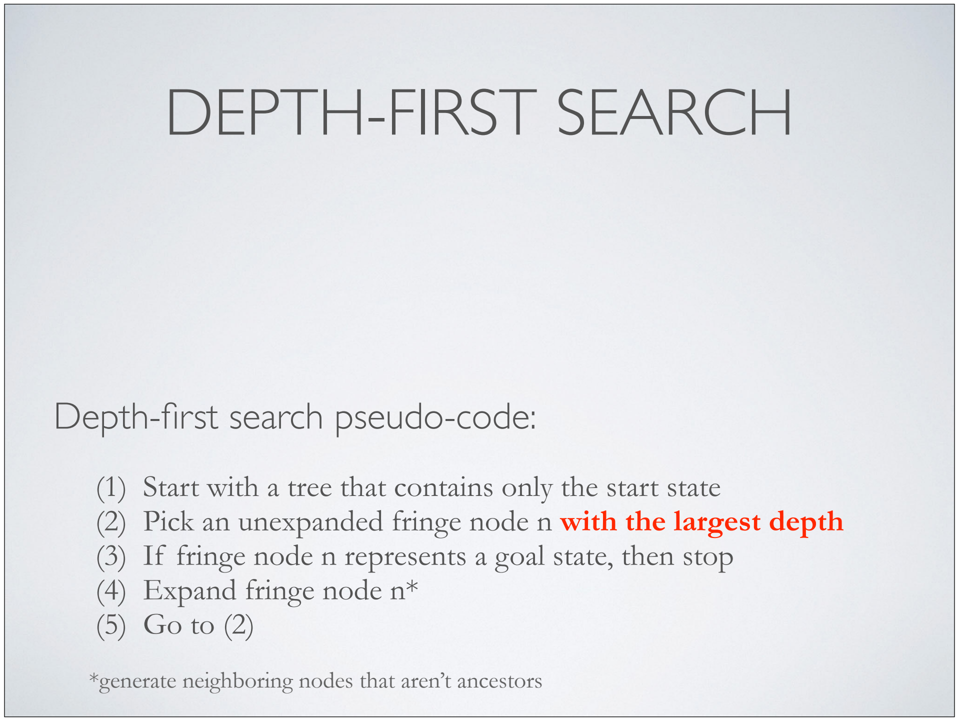


BREADTH-FIRST SEARCH

Breadth-first search pseudo-code:

```
(1) Start with a tree that contains only the start state
(2) Pick an unexpanded fringe node n with the smallest depth
(3) If fringe node n represents a goal state, then stop
(4) Expand fringe node n*
(5) Go to (2)
```

*generate neighboring nodes that aren't ancestors



DEPTH-FIRST SEARCH

Depth-first search pseudo-code:

```
(1) Start with a tree that contains only the start state
(2) Pick an unexpanded fringe node n with the largest depth
(3) If fringe node n represents a goal state, then stop
(4) Expand fringe node n*
(5) Go to (2)
```

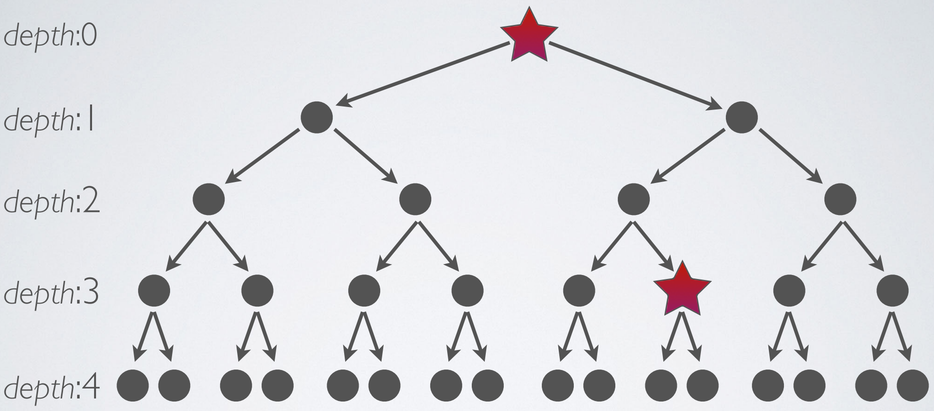
*generate neighboring nodes that aren't ancestors

PROPERTIES

	BFS	DFS
Correct the solution it finds is optimal	Yes if cost is uniform	No
Complete it terminates	Yes if *b* is finite	Yes if *b* & *m* are finite
Space Complexity max nodes in memory	$O(b^{d+1})$	$O(bm)$
Time Complexity max nodes generated	$O(b^{d+1})$	$O(b^m)$

branching factor *b*
depth of the goal *d*
depth of tree *m*

PROPERTIES



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When should we use BFS and when should we use DFS?

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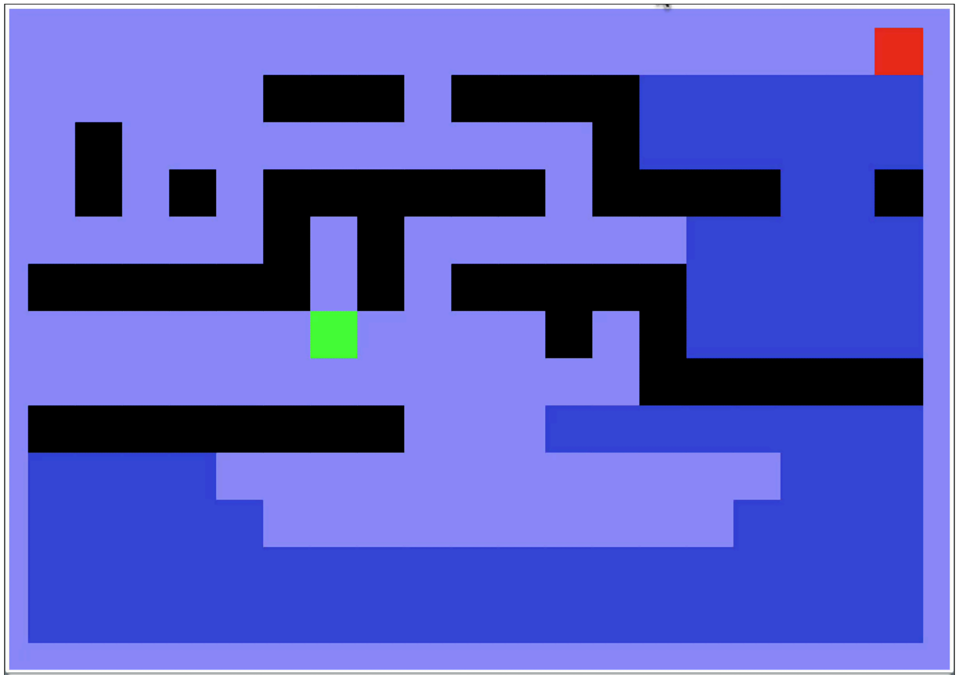
Caveat on BFS and DFS:

The description here may differ from the description in the textbook.

E.g., BFS in the textbook: You terminate when you generate a node.
Here: You terminate when you expand a node.



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