UNIFORM-COST SEARCH

CSE 511A: Introduction to Artificial Intelligence

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

UNIFORM-COST SEARCH

Uniform-cost search pseudo-code:

(1) Start with a tree that contains only the start state
(2) Pick an unexpanded fringe node n **with the smallest g(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

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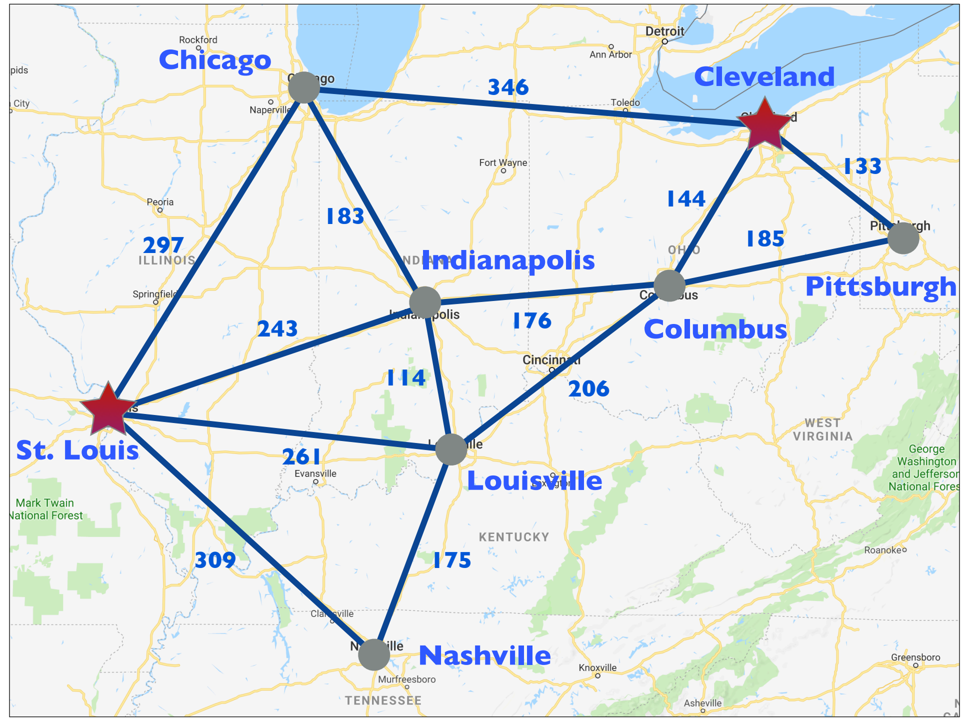

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PROPERTIES

	BFS	UCS
Correct the solution it finds is optimal	Yes if cost is uniform	Yes
Complete it terminates	Yes if *b* is finite	Yes
Space Complexity max nodes in memory	$O(b^{d+1})$	$O(b^{\lceil C^*/\varepsilon \rceil + 1})$
Time Complexity max nodes generated	$O(b^{d+1})$	$O(b^{\lceil C^*/\varepsilon \rceil + 1})$

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

cost of optimal solution C^*
cost increment ε

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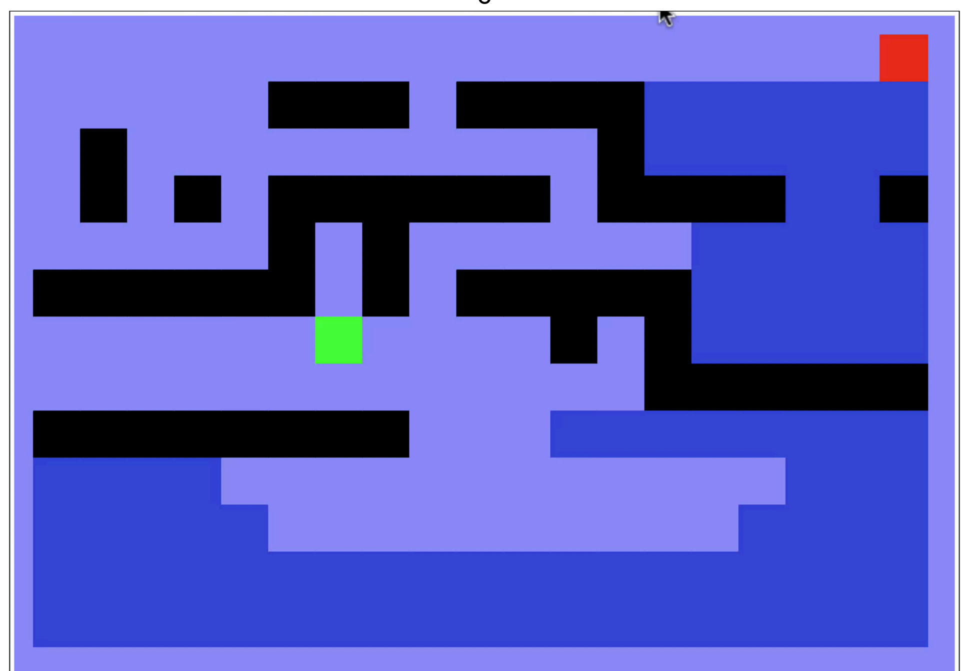

Videos are from slides created by Dan Klein and Pieter Abbeel for CS188 Intro to AI at UC Berkeley. All CS188 materials are available at http://ai.berkeley.edu.

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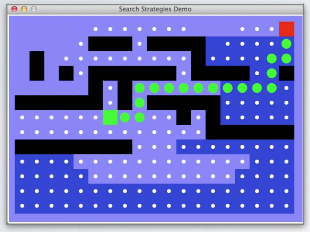
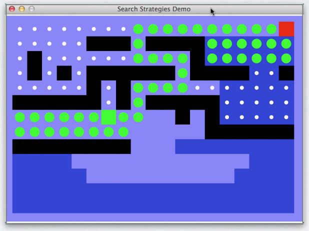
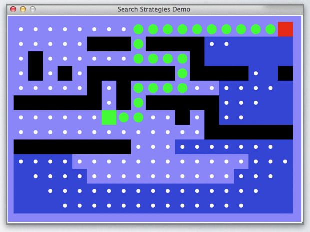
COMPARISONS



BFS



DFS



UCS

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