

Path Planning

DFS, BFS, UCS, A*, and Hill Climbing

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IN A NUTSHELL

Files and Serialization

Reading a file, writing into a file, byte streams, etc.

Queue and Stack

First in first out vs. first in last out

DFS and BFS

A path vs. shortest path

Nodes and Graphs

Edges, weights, etc.

UCS

Most cost efficient path

A* (A star) : *A* always selects the node with the smallest $f(n)$ value, where $f(n) = \text{cost of previous path} + \text{estimation of distance to destination}$. Output is optimal as long as heuristics are consistent and admissible.*

Hill Climbing: *Hill climbing considers only the next node through optimization of the neighboring states. Search uses little memory.*



Depth First Search

Nodes Explored: 2102
Time Elapsed: 0.114s

80×80 $(11,11) \rightarrow (77, 77)$

*
..... = path
| = explored cells



Breadth First Search

Nodes Explored: 5491

Time Elapsed: 0.285s

80x80

(11,11) → (77, 77)

*
..... = path
| = explored cells



Uniform Cost Search

Nodes Explored: 5575

Time Elapsed: 2.328s

80×80

(11,11) → (77, 77)

*
 = path
 | = explored cells



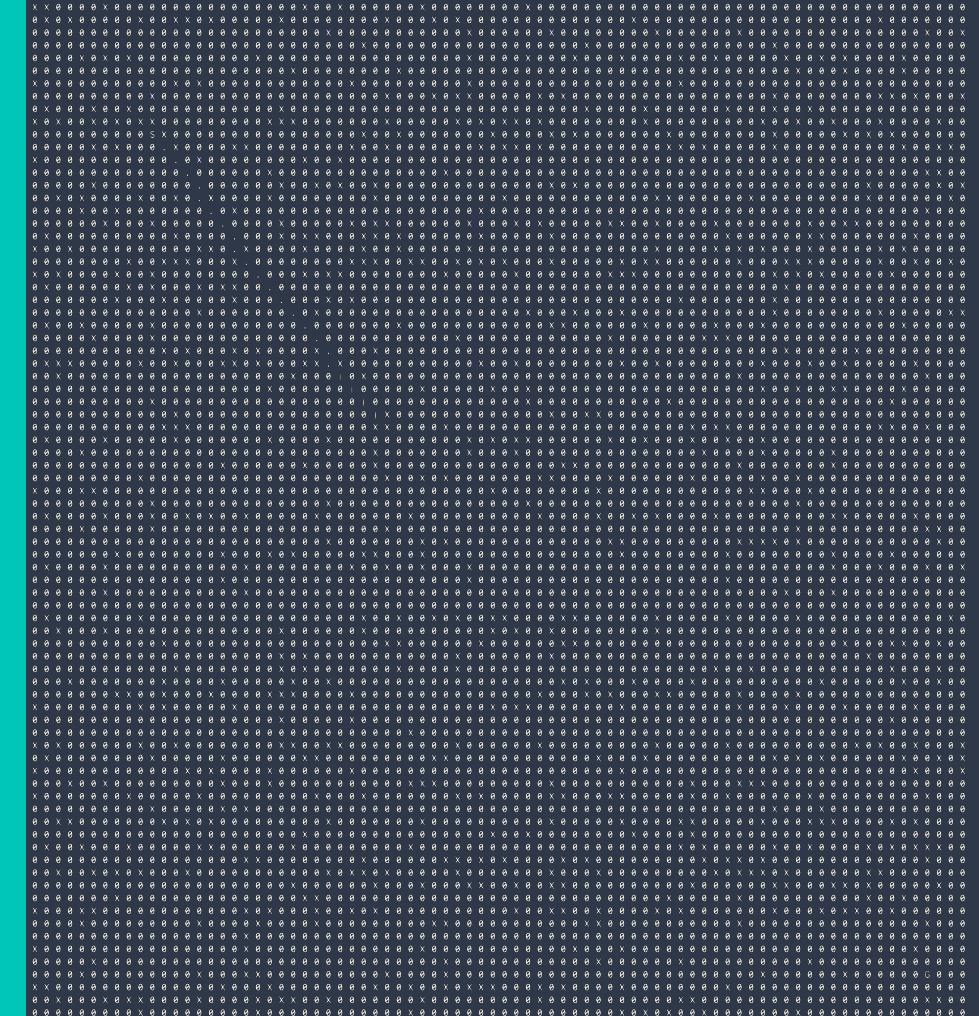
A*

Nodes Explored: 1687

Time Elapsed: 1.915s

80x80

(11,11) → (77, 77)



*
..... = path
| = explored cells



Hill Climbing

Nodes Explored: 418

Time Elapsed: 0.021s

80×80

(11,11) → (77, 77)

*
..... = path
| = explored cells



Hill Climbing

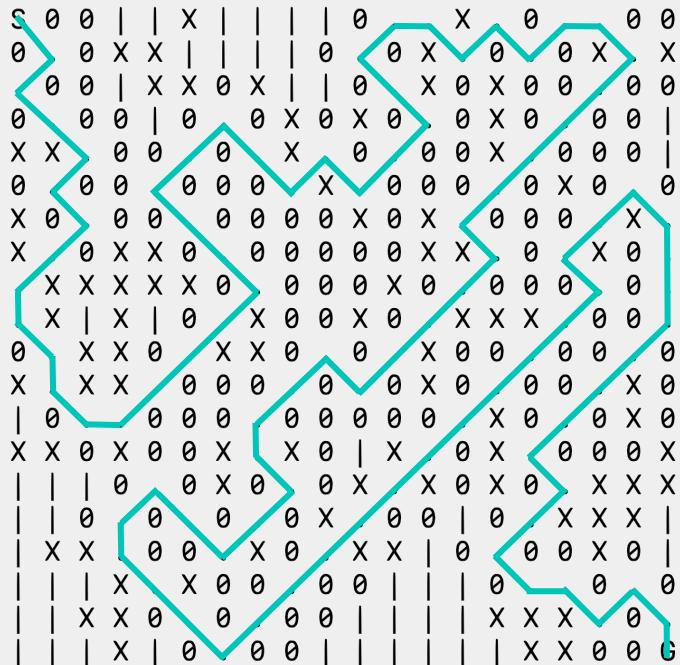
Nodes Explored: 71

Time Elapsed: 0.007s

80×80

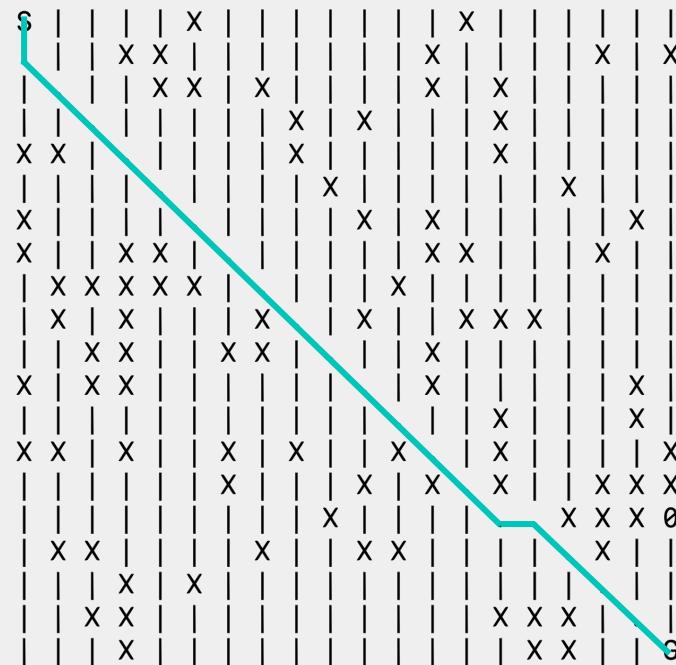
(11,11) → (77, 77)

DFS

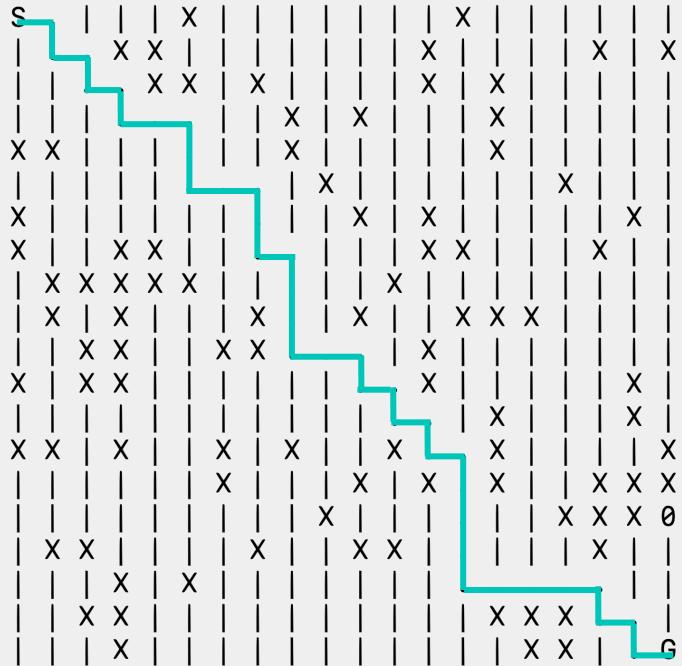


vs.

BFS

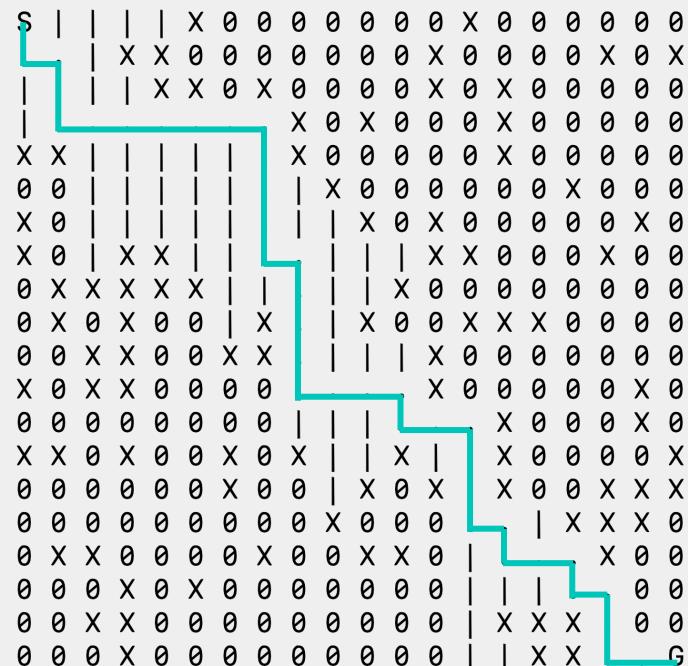


UCS



A*

vs.

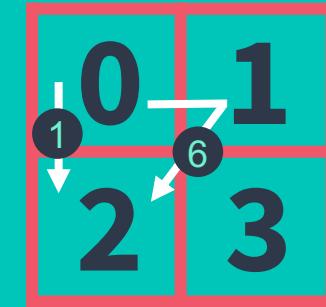


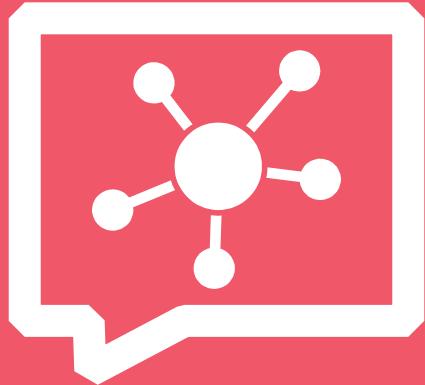
1st Challenge

`==` vs. `equals()`

2nd Challenge

New nodes for UCS & A* stacks





THANKS