

PROBLEM SET 1

C.S. 440 : INTRO TO A.I.

Rutgers University

Summer 2020

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* Disclosure *

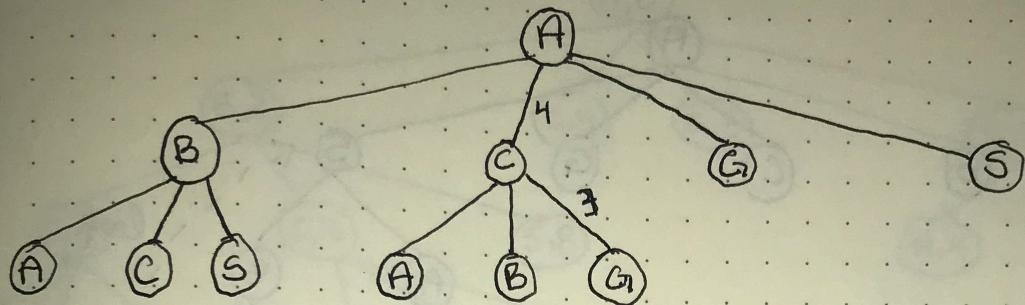
I, Michael Saunders, mistakenly began my search the BFS, DFS, and Uniform-Cost search-trees from node A instead of node S.

It was too late to revise these by the time the mistake was caught.

I included them anyway, but am requesting CHEESE instead of 0 points.

Thank you, and I apologize to Zain Ali,

BFS Tree-search

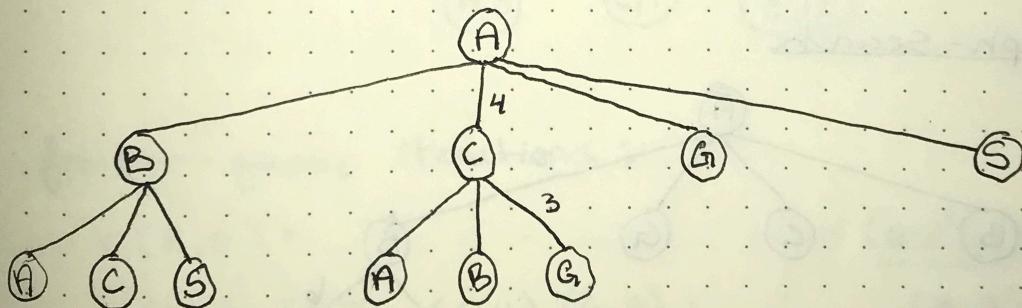


frontier - queue iterations:

- < A >
- < B, C, G, S >
- < C, G, S, A, C, S >
- < G, S, A, C, S, A, B, G >

goal (G) found ; cost = 7

BFS Graph-search

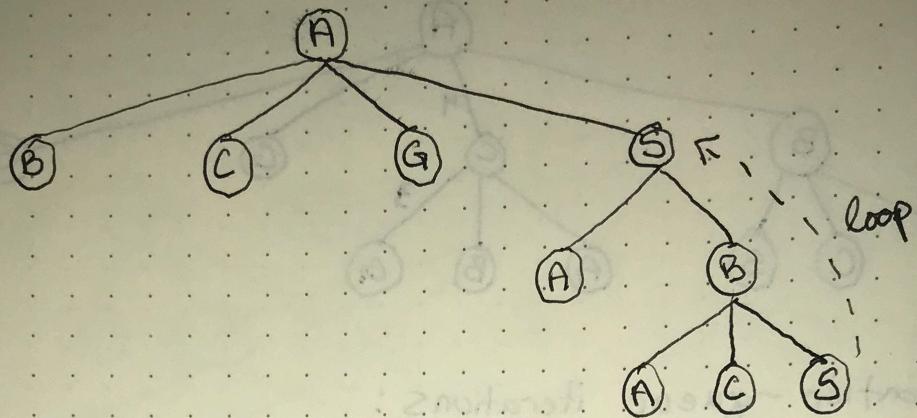


frontier - queue iterations:

- < A >
- < B, C, G, S >
- < C, G, S, C, S >
- < G, S, C, S, G >

goal (G) found ; cost = 7

DFS Tree-Search

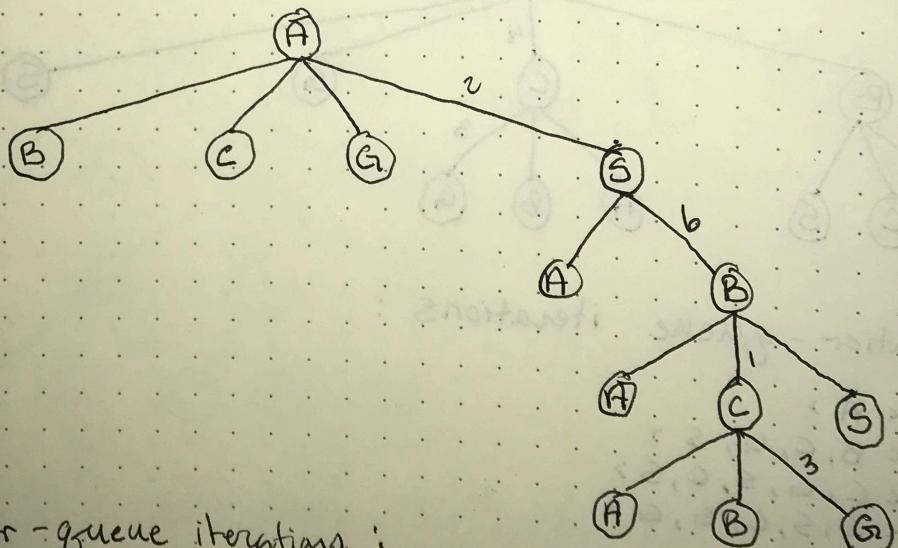


frontier - queue iterations :

- < A >
- < S, G, C, B >
- < B, A, G, C, B >
- < S, C, A, A, G, C, B >

goal (G) Not found ; caught in infinite loop.

DFS Graph-Search

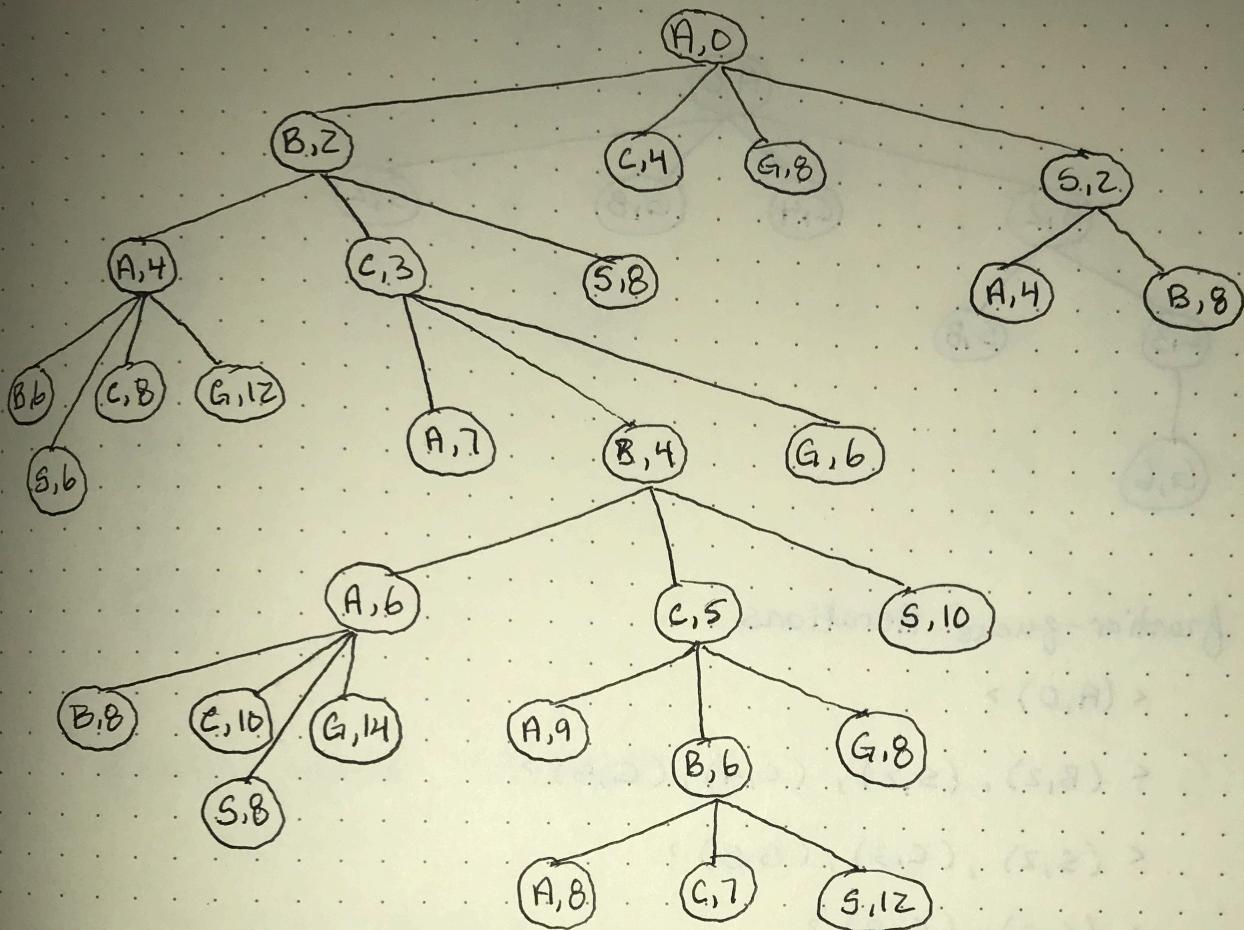


frontier - queue iterations :

- < A >
- < S, G, C, B >
- < B, G, C, B >
- < C, G, C, B >
- < G, G, C, B >

goal (G) found ; cost = 12

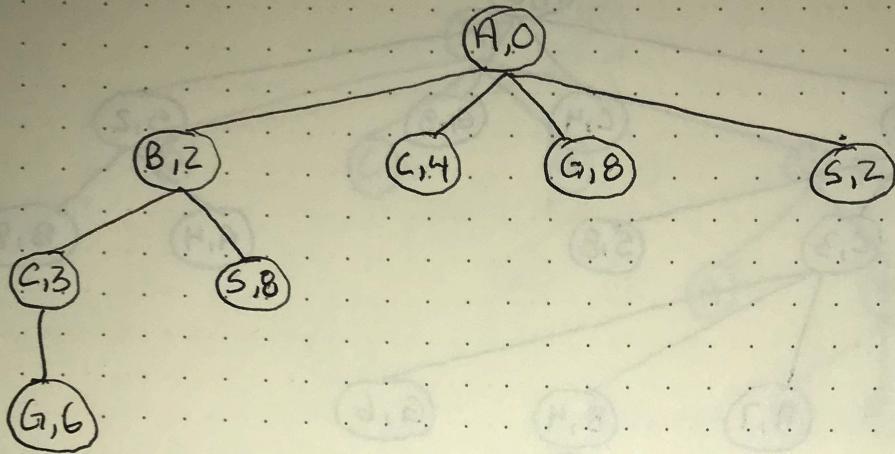
Uniform - Cost Tree - Search



frontier - queue iterations :

- | | |
|--|--|
| $\langle (A,0) \rangle$ | $\langle (G,6), (S,6), (C,7), (A,8) \rangle$ |
| $\langle (B,2), (S,2), (C,4), (G,8) \rangle$ | $\langle (A,8) \rangle$ |
| $\langle (S,2), (C,3), (A,4), (G,8) \rangle$ | goal (G) found ; |
| $\langle (C,3), (A,4), (B,8), (G,8) \rangle$ | cost = 6 |
| $\langle (A,4), (B,4), (G,6) \rangle$ | |
| $\langle (B,4), (G,6), (S,6) \rangle$ | |
| $\langle (C,5), (A,6), (G,6), (S,6) \rangle$ | |
| $\langle (A,6), (B,6), (G,6), (S,6) \rangle$ | |
| $\langle (B,6), (G,6), (S,6) \rangle$ | |

Uniform-Cost Graph-Search



frontier-queue iterations :

< (A,0) >

< (B,2), (S,2), (C,4), (G,8) >

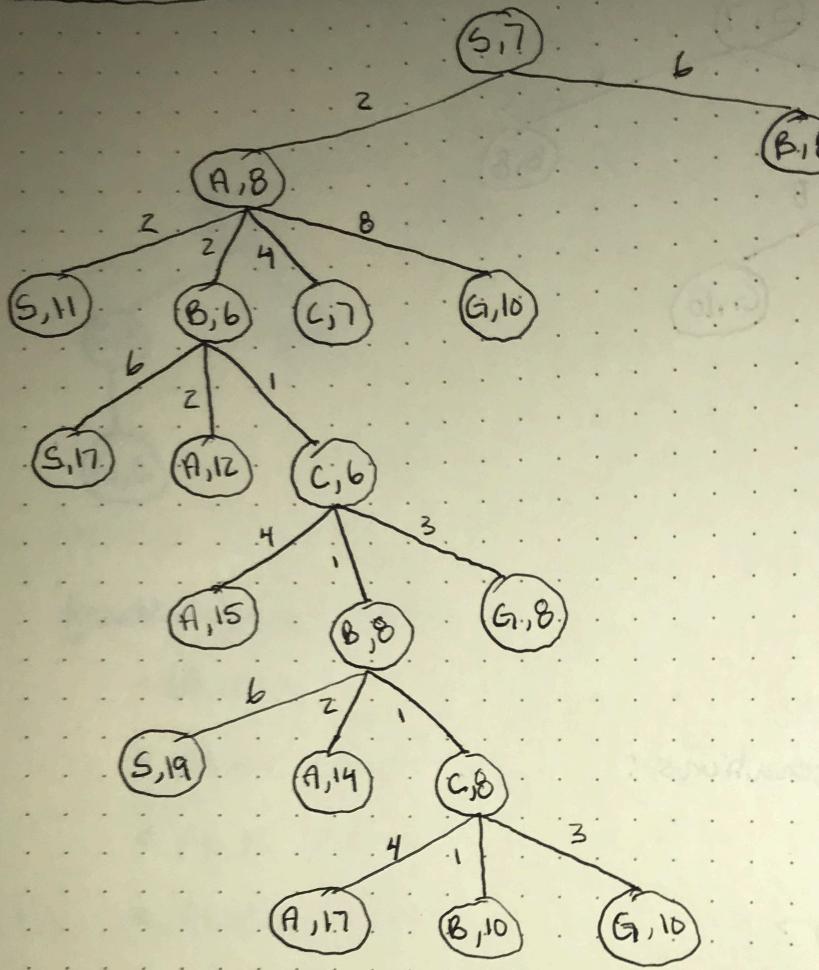
< (S,2), (C,3), (G,8) >

< (C,3), (G,8) >

< (G,6) >

goal (G). Found ; cost = 6

A* Tree - Search



frontier - queue iterations:

$\langle S, 7 \rangle$

$\langle (A, 8), (B, 8) \rangle$

$\langle (B, 6), (C, 7), (G, 10), (S, 11) \rangle$

$\langle (C, 6), (G, 10), (A, 12), (S, 11) \rangle$

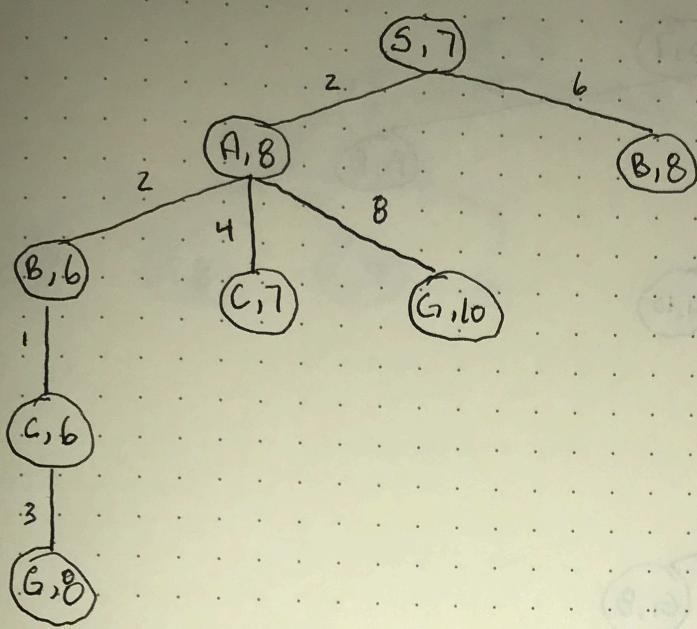
$\langle (B, 8), (G, 8), (A, 12), (S, 11) \rangle$

$\langle (C, 8), (G, 8), (A, 12), (S, 11) \rangle$

$\langle (G, 8), (B, 10), (A, 12), (S, 11) \rangle$

goal(G) found ; cost = 8

A* Graph-Search



frontier - queue iterations:

$\langle (5,7) \rangle$

$$\langle (A, B), (B, g) \rangle$$

$\langle (B, 6), (C, 7), (G, 10) \rangle$

$\{ (c, b), (g, 10) \}$

$\langle (G, \mathcal{S}) \rangle$

goal (g_i) found ; cost = 8