THOMPSON RIVERS UNIVERSITY

COMP 3710 - 3

Applied Artificial Intelligence (3,1,0)

Fall 2017

Seminar/Lab 2

A* Algorithm, and *n*-Puzzle Game
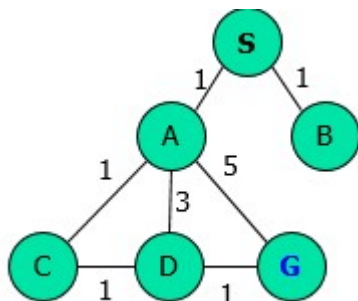
Instructor: Mahnhoon Lee

Student Name: ZHENYU WANG

Student Number: T00059541

1. **Exercise 1**

- Use "Generic Search Algorithm" with BFS (Breadth First Search) to find a solution

  on the graph in Slide 13.

- At each step, you need to show ExpandedQ and VisitedQ, and selected node, as

  shown in Slide 13 for DFS.

Answer:

BFS:

Expanded: S

Visited:

Visiting S, and expanding A, B;

Expanding A, B;

Visited S;

Visiting A, and expanding B;

Expanding C, D, G;

Visited S, A;

Visiting C, and expanding C, D, G;

Expanding D, G;

Visited S, A, B;

Visiting C, and expanding D, G;

Expanding G;

Visited S, A, B, C;

Visiting D, and expanding G;

Visiting G, and find the goal;

2. **Exercise 2**

   8-puzzle game:

   Initial node: Goal node:

   1   2   3   1   2   3

   4   8   5   4   5   6

   7   0   6   7   8   **0**

- Let's expand the current node (123, 485, 706), then

    - 123,405,786   g = 1; h = 2; f = 3;

    - 123,485,076   g = 1; h = 4; f = 5;

    - 123,485,760   g = 1; h = 4; f = 5;

- 123,405,786 (g=1) is selected and visited. Let's expand this new node.

    - 123,485,076   g = 1; h = 4; f = 5;   previous ones in the queue

    - 123,485,760   g = 1; h = 4; f = 5;

    - 103,425,786   g = 2; h = 3; f = 5;   new ones

    - 123,045,786   g = 2; h = 3; f = 5;

    - 123,450,786   g = 2; h = 1; f = 3;

    - 123,485,706   g = 2; h = 3; f = 5;

- 123,450,786 (g=2) is selected and visited. Let's expand this new node.

    - 123,485,076   g = 1; h = 4; f = 5;   previous ones in the queue

    - 123,485,760   g = 1; h = 4; f = 5;

    - 103,425,786   g = 2; h = 3; f = 5;

    - 123,045,786   g = 2; h = 3; f = 5;

    - 123,485,706   g = 2; h = 3; f = 5;

    - 120,456,786   g = 3; h = 2; f = 5;   new ones

    - 123,405,786   g = 3; h = 2; f = 5;

    - 123,456,780   g = 3; h = 0; f = 3;

- 123, 456,780 (g=3) is selected and visited. This is the goal node.