

**COMP 3710 - 3**

**Applied Artificial Intelligence (3,1,0)**

**Fall 2017**

**Seminar/Lab 2**

**A\* Algorithm, and *n*-Puzzle Game**

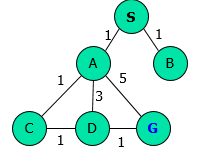
**Instructor:** Mahnhoon Lee

**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;

1. **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.