CS3642-02 Programming Assignment #2 (Fall 2024)

Due: October 17, 2024 (11:30PM)

To implement Uniform-Cost Search (UCS) and A* Algorithm to solve the following 8-puzzle problem (i.e. find the goal):

8-puzzle Problem:

The 8-puzzle consists of eight numbered, movable tiles set in a 3x3 frame. One tile of the 8-puzzle is always empty thus making it possible to move an adjacent numbered tile into the empty tile position. Start with a random state (Do not make it a fixed starting state). The goal state is listed below.

1	2	3
8		4
7	6	5

The program is to solve the initial configuration and find the goal configuration. A solution to the problem is an appropriate sequence of moves. You must write your own codes for the algorithms. Make sure your submission meets all of the requirements and free of plagiarism.

Your program should be able to address any initial configuration and provide a table of statistics below in your PDF file.

Algorithm	**Average number of nodes visited** (you need repeat each algorithm several times with different initial configuration)	**Give the best run time, the worst run time, and average run time when you run your program: run each algorithm at least 5 times**	**Your comment on these algorithms**
UCS (using the depth as the cost)	Best: Worst: Average:	Best: Worst: Average:	
A* (using Manhattan distance as the heuristics)	Best: Worst: Average:	Best: Worst: Average:	
A* (using Nilsson's Sequence as the heuristics)	Best: Worst: Average:	Best: Worst: Average:	

You may write your code in a contemporary language of your choice; typical languages would include C/C++, Python, Java, Ada, Pascal, Smalltalk, Lisp, and Prolog. A GUI interface is preferred.

1. Submit a PDF file of your well-commented source program, your design and your printed outputs (screen shots). Please include your codes in your PDF file. It is plagiarism to take any codes from the

website or others. Try to understand the algorithm and implement the algorithm by your own. You must have all the information required in your PDF file.

2. Provide a video presentation of your programming assignment in MP3/MP4, YouTube, or any media. This presentation should show that your program is running properly for the correct output.
3. Please upload items 1) and 2) above separately to D2L.
4. Restriction: No zipped files.

Make sure the following information is in your PDF file.

I. Your Information:

// Course: _____
// Student name: _____
// Student ID: _____
// Assignment #: _____
// Due Date: _____
// Signature: _____(Your signature assures that everything is your own work. Required.)
// Score: _____(Note: Score will be posted on D2L)

II. The table of statistics:

III. Your code:

IV. Examples of your output if any: