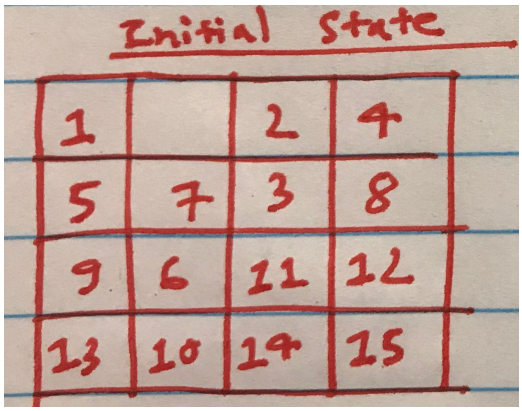
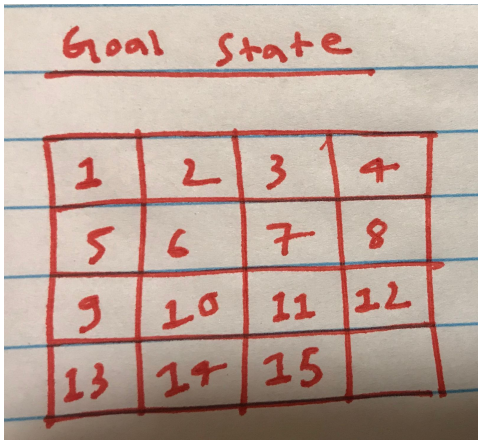
CS 411 - Artificial Intelligence I
Fall 2019
Assignment 4
Department of Computer Science, University of Illinois at Chicago

Total Points: 25

15 puzzle is a sliding puzzle game with numbered squares arranged in 4X4 grid with one tile missing.



The puzzle is solved when the numbers are arranged in order.



The actions are defined in terms of direction where empty square can be moved to

UP (U), Down(D), Left(L), Right(R)

Write a program which performs a breadth-first search to find the solution to any given board position for 15 puzzle

Input

The input should be given in the form of a sequence of numbered tiles for initial board configuration, '0' indicating the empty space (see example below)

Output

1. Moves
2. Number of Nodes expanded
3. Time Taken
4. Memory Used

Example

> 1 0 2 4 5 7 3 8 9 6 11 12 13 10 14 15
Moves: RDLDDRR
Number of Nodes expanded: 361
TIme Taken: 0.238
Memory Used: 704kb

Unsolvable puzzle

There can be some puzzle for which the solved state cannot be reached
If the solution doesn't exist, display the message "solution not found"

> 1 2 3 4 5 6 7 8 9 10 11 12 13 15 14 0
Solution not found

Hints

- Check for repeated state to avoid "out of memory" error
- For unsolvable puzzle, you can set a timeout of 30s

Submission

Please submit a zip file with filename <netid>_bfs.zip including following files:

- Source Code
- Readme.txt including instruction to run the code

Programming Language

You can choose from C++, Java, Python or Julia

Rubric

Print the moves to reach the solution => 10
Print “solution cannot be found” for unsolvable initial state => 3
Print number of nodes expanded => 3
Print total memory usage => 3
Print total time taken => 3
Coding style, comments, readme instruction => 3

Your submission should be your own work. You can take reference from aima codebase but you are not allowed to use the code directly. All submissions will be checked for plagiarism using MOSS (Measure Of Software Similarity).