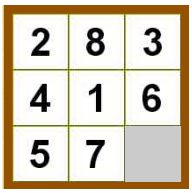
CS367 Assignment 2 – Search

[worth 6% of final grade]
Due: Monday 24th August 2015 at 1:00 am

Assignment Description:
This assignment is to write the **neighbors/2** and **h/2** (heuristic evaluation) relations for the eight sliding tile puzzle. You are given a version of the IDA* algorithm, its location is described below in the **Resources** section.

What the eight tile puzzle looks like. There are 8 numbered tiles and 9 board locations. No two tiles can ever be in the same location.



For a given domain, the IDA* algorithm needs to be given a neighbors relation, **neighbors(State, Neighbors)** and a heuristic evaluation relation, **h(State, Evaluation)**. You are to write the **neighbors** and **h** relations for the following domain:

8 Sliding Tile Puzzle (8STP):
State Representation:
An 8STP state describes which tiles are in which board locations. There are nine board locations and eight tiles and a blank. The tiles are numbered 1 through 8, and the blank is represented by the number 0. A state is represented by a list. In the list the first element indicates which tile is in the upper left hand location, the second element the upper middle location, etc.
Example: The board shown above is represented by the list [2, 8, 3, 4, 1, 6, 5, 7, 0].

Problem Representation:
The IDA* problem solver will be given problems to solve. The problem will be represented using a functor called "problem" and two arguments: initial state and goal state. For example:
problem([2, 8, 3, 4, 1, 6, 5, 7, 0], [1,2,3,4,5,6,7,8,0]).

neighbors(+State, -Neighbors) :
This predicate returns the list of all the states directly reachable from *State*, you will probably write a number of clauses for this predicate.

h(+State, -HeuristicValue):
This predicate returns the Manhattan Distance of *State* from the goal state. The goal state can be accessed by *h* by querying "*is_goal(GoalState)*".

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Resources:
There are a number of files available as resources for this assignment, they can be downloaded from this assignment's webpage. The files are:

1. The IDA* algorithm, entitled **idastar.pl**.
2. Sample problem files, entitled **problem*n*.pl**, where ***n*** is an integer.

Submission:
Submit the eight sliding tile puzzle domain description (the **neighbors** and **h** relations) in an ascii text file entitled **eightPuzzle.pl**. Any auxillary predicates that you have defined and used to simplify the writing of **neighbors** and **h**, also have to be included in **eightPuzzle.pl**.

Late Submissions:
If you submit your assignment after the due date but before two (2) days after the due date, then it will have 20% of its marks deducted. Assignments will not be accepted after that.

General Comments:
Your code can, obviously, use built-in and library predicates, but, except for *is_goal*/2, the only other predicates you can use are those you define in **eightPuzzle.pl**. You can write auxillary predicates to make the writing of **neighbors** and **h** easier, but they need to be defined.

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