

CS4320/5314 – Artificial Intelligence

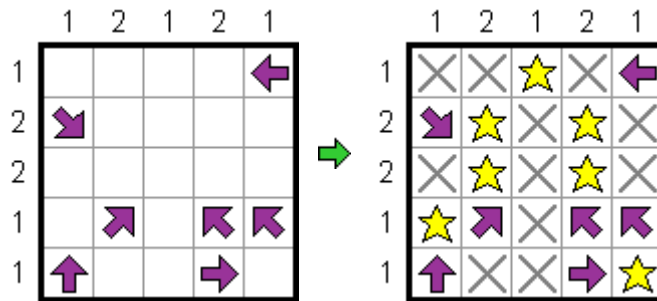
Spring 2009

Lab 1

Search

Due electronically before 11:59 p.m., Wednesday, February 11, 2009

Your assignment consists of writing programs that apply different search methods to find a solution to the following type of puzzle, called Shinro or Starlit Sky:



We can see the problem statement on the left and the solution on the right. Solving the problem consists of finding which of the squares contain stars and which don't. The numbers at the top indicate the number of stars that each column contains, similarly, the numbers to the left indicate the how many stars the corresponding row contains. Each arrow points to exactly one star and each star has exactly one arrow pointing to it.

Your assignment consists of implementing the following three search methods to solve this problem:

- Depth-first search
- Breadt-first search
- Heuristic search (where you are also required to design an effective heuristic function).

The example above shows a 5-by-5 board as an example, but your program must work for square boards of any size. To test your program, you can find examples of this type of problem at www.janko.at/Raetsel/Sternenhimmel/index.htm.

Prepare a report containing the following:

Introduction – Description of the problem you are trying to solve

Proposed solution – How did you solve (or attempt to solve) the problem? Provide an informal, high-level description

Implementation – Description of your code (not the actual code). Explain the design choices you made, data structures and programming techniques you used, your user interface, input and output, etc.

Experimental results – Describe the experiments you performed to test your algorithms. The experiments must be described in a way that allows anybody to replicate them using your code.

Conclusions – Explain what you learned from the project.

Work on teams of size 1 to 3. No more than one CS graduate student per team is allowed.