Candidate Proposal #2

Rush Hour State Space Problem Solver

By Matt Grzenda

For my CSC 466 research project I would like to do something in the realm of a state space problem solver. Specifically I would like to write a symbolic AI program which can solve a Rush Hour puzzle. My motivation for this comes from playing the game as a kid and getting struggling on some of the harder levels.

Since Rush Hour has a set of pre-defined rules and is more similar to a game, it is already relatively well defined. On top of this, there is not a high level of mathematics required to play Rush Hour puzzles. References for this type of project start with the General Problem Solver (GPS), which is said to be able to solve any state space problem. There are references to this in the Melanie Mitchell textbook for this course, along with the original research papers.

I would begin this project by playing this game and determining some heuristics on how to solve the puzzle. From here, I would then create the problem in Lisp and split the development process into seven parts.

The first part would be getting a program which can solve the Rush Hour problem with no other cars. The second part would be solving the Rush hour puzzle by having the program randomly move one car. The next step would be to have the program solve a puzzle by randomly moving an arbitrary number of cars either all vertical, or all horizontal. Next, I would move to having the program solve the puzzle by moving the cars in any direction possible. At this point I would then begin to implement heuristics which the program could use. First having the program solve the puzzle by using a set of pre-determined heuristics, and then moving on to the final version where the program creates its own heuristics.