KRR Assignment 1 | Sudoku

CS6770, IITM Feb 17, 2016

Aim:

To describe a domain and problem for a given puzzle in a rule based language called *Soar*. The goal is to obtain a good level of expertize with writing rules, interpret the problem space computational model, clever knowledge description to leverage features of Soar cognitive architecture, tradeoff efficiency in time and space.

Theme: Soar Plays Sudoku

The following assignment is going to be on building Soar agents that solve Sudoku puzzle. So, we recommend you to give a look to the reference material given below for installation and scripting rules in Soar.

1.Follow the link for installing Soar

`http://soar.eecs.umich.edu/articles/downloads/soar-suite/105-soar-tutorial-9-4-0`

2.Follow the link for starting up tutorial.

`http://web.eecs.umich.edu/~soar/downloads/Documentation/SoarTutorial/Soar%20Tutorial%20Part%201.pdf`

Problem statement:

Sudoku is a logic-based and combinatorial number-placement puzzle. The objective is to fill a 9x9 grid with digits so that each column, each row, and each of the nine 3x3 sub-grids that compose the grid contains all of the digits from 1 to 9.

It is assured that a well-posed puzzle has a unique solution.

Sudoku-solving agent:

1. The soar agent should take input of partly filled 9x9 Sudoku board, and output a maximally solved board using only inference techniques (no search).

2. The input will be given as text file with 9 lines with 9 space separated characters in each line. An empty cell is indicated by a '.'.

3. Agent must convert input to representation that fits to soar rule based system, and rules written should exploit this form of representation of board and the missing values are to be inferred for the empty cells.

4.The rules need to be scripted in Soar, and the final program can be run on either the Soar

debugger, or invoked from any of the programming languages that support interaction with Soar (preferably Java).

Hint: There are only a few *game rules* that one need to know in order to solve sudoku puzzles.

You should describe Sudoku domain using the features of Soar 9.4.

Sample Input:

```
5 1 . . . . 4 . 3
3 . . 1 8 . . . .
. 6 . 7 . . 1 . .
. 2 . . 9 1 . . .
. . 3 . . . 8 . .
. . . . . 6 . 9 .
. . . . . . . 7 5
. . 1 3 . . . . .
. . 9 . . 2 . . .
```

Sample Output:

```
5 1 7 6 2 9 4 8 3
3 9 4 1 8 5 7 2 6
8 6 2 7 4 3 1 5 9
6 2 8 4 9 1 5 3 7
9 4 3 2 5 7 8 6 1
1 7 5 8 3 6 2 9 4
2 8 6 9 1 4 3 7 5
7 5 1 3 6 8 9 4 2
4 3 9 5 7 2 6 1 8
```

Evaluation and Teamwork: You can work in teams of two, and each team can submit one solution. The evaluation will however be of the individuals.

You will be graded based on:

- Representation chosen.
- Structure and content of rules.
- Percentage of Sudoku board filled as compared to other students.
- Level of puzzles that your agent can solve. (Easy, Medium, Hard)

Submission Deadline:

11-March-2016-Friday