

Rating and Generating Sudoku Puzzles Based on Constraint Satisfaction Problems

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Abstract : Sudoku is a logic-based combinatorial puzzle game which people in different ages enjoy playing it. The challenging and addictive nature of this game has made it a ubiquitous game. Most magazines, newspapers, puzzle books, etc. publish lots of Sudoku puzzles every day. These puzzles often come in different levels of difficulty so that all people, from beginner to expert, can play the game and enjoy it. Generating puzzles with different levels of difficulty is a major concern of Sudoku designers. There are several works in the literature which propose ways of generating puzzles having a desirable level of difficulty. In this paper, we propose a method based on constraint satisfaction problems to evaluate the difficulty of the Sudoku puzzles. Then, we propose a hill climbing method to generate puzzles with different levels of difficulty. Whereas other methods are usually capable of generating puzzles with only few number of difficulty levels, our method can be used to generate puzzles with arbitrary number of different difficulty levels. We test our method by generating puzzles with different levels of difficulty and having a group of 15 people solve all the puzzles and recording the time they spend for each puzzle.

Keywords : constraint satisfaction problem, generating Sudoku puzzles, hill climbing

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