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The Ability of Learning Automata in Solving Constraint Satisfaction Problems

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Abstract: In this paper we have investigated the performance of some stochastic methods for solving constraint satisfaction (CSP) and fuzzy constraint satisfaction problems (FCSP). The purpose of this paper is to study the abilities of learning automaton in solving these problems and comparing it with other stochastic methods. The results confirm those of [2] and show its superiority to other methods.

Keywords: CSP, FCSP, Learning Automaton, Stochastic Algorithms, Genetic Algorithms

1 - Introduction

Learning means the ability of the learner to correct its actions based on the experience of interacting with an environment. Mostly learning occurs in a stochastic environment, where there is a finite number of actions for the learner to choose. In the stochastic environment the learning agent receives responses from environment, which the agent uses to anticipate its next action. One of the simple but powerful kinds of the learning agents is the learning automaton, which was introduced by the work of Tsetlin in the early 1960's in the Soviet Union. One of the advantages of the learning automaton is that it can be implemented in a distributed manner, in order to solve the large complex systems [2].

In this paper we utilize the learning automaton to solve the constraint satisfaction problem (CSP). This problem occurs frequently in AI, and there is a vast amount of literature about the ways of solving it. In CSP there is a finite set of variables and associated with each variable is a finite set of values (labels). Moreover there is a set of constraints on choosing the values for the variables, and the problem solver searches for a consistent solution such that all constraints are satisfied.

The algorithms reported in the literature for solving constraint satisfaction problem can be classified into two groups: deterministic algorithms and stochastic algorithms. Most of the algorithms are of deterministic kind. To