Symmetry in CSP solutions

Nicoleta Neagu and Boi Faltings

Artificial Intelligence Laboratory (LIA),
Computer Science Department, Swiss Federal Institute of Technology (EPFL)
CH-1015 Ecublens, Switzerland
{neagu, faltings}@lia.di.epfl.ch http://liawww.epfl.ch/

Abstract. In this paper we propose a method for finding symmetric solutions of in a CSP. This method is using local symmetries of the CSP structure in order to construct new solutions with specified difference from the old one, with minimal changes. The method is based on the concept of interchangeability between values in problem solutions; it is able to determine how changes propagates in a known solution by generating a minimal set of choices which need to be changed in order that the old solution transforms to a new, valid and symmetric solution.

Keywords: constraint satisfaction problems, interchangeability.

1 Introduction

There is a huge amount of work and research upon searching CSP solutions but few of them watch the relations between CSP solutions.

In certain settings, it is important not to generate solutions, but to modify an existing solution so that it satisfies additional or revised objectives. This occurs for example in: case-based reasoning, rescheduling, or reconfiguration.

We argue that a method based on interchangeability concept [1] can be used for finding symmetric solutions of the CSP.

We propose an algorithm which is finding the minimal changes in a given solution [2] and thus, finding a symmetric solution.Our main interest is to find a systematic computational way for detecting locally how changes propagates through an already known the CSP solution when values are substituted for a variable or a group of variables. More, it is important to determine a minimal set of variables which need to change in order to keep that solution valid for the given CSP.

On the basis of this work we believe that a method based on interchangeability has strong potential as an important strategy for identifying classes of equivalent solution and it strongly motivates for further research.

References

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