An efficient cellular solution for the Partition problem

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Abstract. Numerical problems are not very frequently addressed in the P systems literature. In this paper we present an effective solution to the Partition problem via a family of deterministic P systems with active membranes using 2-division. The design of this solution is a sequel of several previous works on other problems, mainly the Subset-Sum and the Knapsack problems but also the VALIDITY and SAT. Several improvements are introduced and explained.

1 Introduction

Cellular Computing is an emergent branch in the field of Natural Computing. Since Gh. Păun introduced it (see [4]) much work has been done, but not always with the same approach. Computer scientists, biologists, formal linguists and complexity theoreticians have contributed enriching the field with their different points of view.

The present paper is focused in the design of a family of P systems that solves a numerical NP-complete problem, and in the formal verification of this solution. Also the similarities with the solutions presented in [6], [7], [9] and [10] will be highlighted and some conclusions will be extracted from them.

The analysis of the solution presented here will be done from the point of view of the complexity classes. A *complexity class* for a model of computation is a collection of problems that can be solved (or languages that can be decided) by some devices of this model with *similar* computational resources.

In this paper we present a *polynomial complexity class* in cellular computing with membranes inspired in some ideas of Gh. Păun ([3], section 7.1) discussed with some members of the Research Group on Natural Computing from the University of Seville. This class allows us to detect some intrinsic difficulties of the resolution of a problem in the model above mentioned.

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