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Emergent Computing: An Introduction to Selected Articles

Preface

It gives me great pleasure to write a short introduction to this issue, for it contains a selection of high quality papers that genuinely advance our understanding of emergent computing.

Emergent Computing studies and uses biologically and socially inspired systems in which complex behaviour at the global level emerges from the interaction of a set of simple components. The goal of Emergent Computing is to solve complex real-world problems. We need methods that find acceptable solutions in a constrained amount of time. Solutions are also required that are robust and which can evolve with changing circumstances. Many biological and social systems are very good at doing exactly this, and they can give us inspiration into new methods of problem solving.

Two papers are published that were originally presented at the first International Workshop on Emergent Computing WEC (held at the University of Santiago, Chile, November 2009). The workshop was well attended and generated much discussion and debate on some of the key questions being tackled by the emergent computing research community. The papers presented at the WEC have been extended and improved in order to respect the quality standards of the Fundamenta Informaticae journal.

The first paper selected for this issue discusses a new approach based on hyperheuristics for solving a complex combinatorial problem. In the paper "A Flexible and Self-Adaptive Hyperheuristic Approach for Capacitated Vehicle Routing Problems" the authors present a flexible and self adaptive hyper heuristic algorithm based on hill climbing (SHH-VRP). The algorithm is designed to solve the standard instances of the capacitated (and dynamic) vehicle routing problem. Given a fleet of vehicles with limited capacity and a set of customers which is known before the working day but they can also appear during the day, the goal is to find an optimal solution - the set of paths for vehicles where all customers are visited with minimum possible cost. This paper introduces a new approach based on hyperheuristics to tackle the some dynamic situations on VRP.

The second paper is "Approximations on Minimum Weight Triangulations and Minimum Weight Pseudo-Triangulations using Ant Colony Optimization Metaheuristic". The paper describes an interesting application of an ACO algorithm to computational geometry problems: the minimum weight triangulations problem and the minimum weight pseudo-triangulations problem. Authors propose two algorithms to solve both problems. Authors compared their propositions to Delaunay Triangulation (DT) and Greedy Pseudo-Triangulation (GPT).

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Prof. Dr. Maria Cristina Riff

Computer Science Department
Universidad Tecnica Federico Santa Maria
Valparaiso, CHILE

Editor