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An agent-based approach to the configuration of algorithms including, but not limited to, metaheuristics is proposed in this work. Metaheuristics are algorithmic techniques that look for good solutions by changing a current set of solutions from the search space. They are examples of algorithms where parameters need to be set up as good as possible, like genetic parameters in the Evolutionary Computation domain. Usually, control parameters are set by hand or in the spirit of brute-force mechanisms, which are inherently time-consuming. Yet the selection of the most adequate parameter values is a recognized arduous work in the metaheuristics community; furthermore, not all metaheuristics are auto-adaptive. Some methods for configuring metaheuristic algorithms have been already proposed in the literature. However, the problem of configuring metaheuristics continues being a very difficult problem with very few published research works, and therefore it remains a current open question.

Instead of requiring that users fine-tune metaheuristics' parameters by experimenting, which is costly in human and time resources, this thesis proposes for that purpose an agent-based approach, which is guided by cooperation among agents in a multiagent system. The agents carry out an optimization process: the process of configuring metaheuristics through the fine-tuning of their parameters. The application of agent-based methods from Artificial Intelligence emerges as a valuable approach because it allows users and developers to delegate functions and efforts to the computers, thus automating or semi-automating the configuration process without a human supervision. Consequently, this thesis aims also to develop a flexible and easy-to-use multiagent system for these purposes, the practical aspects being its major contributions.

In pursuing these aims, a multiagent system (i.e. +CARPS: Multi-Agent System for Configuring Algorithms in Real Problem Solving) based on collaborative, distributed, FIPA-compliant JADE agents was designed, implemented and tested. +CARPS consists of different types of cooperatives agents that concurrently support the autonomous configuration of metaheuristic algorithms. Among the most important aspects concerning +CARPS agents' activities are the following: user mediators interact with the users to retrieve from the system data related to the problems to be solved, to the metaheuristics to be configured, among other information; starting configuration builders and instantiation strategy managers determine the values for the parameters to fine-tune by constructing initial configurations and by applying different instantiation strategies, respectively; algorithm configurators apply optimization procedures to obtain and improve solutions to the configuration problem; algorithm solvers run the metaheuristics with the appropriate input information and retrieve results when their execution is finished; and solution managers control the process of organizing and classifying obtained solutions. All types of agents included in the architecture are introduced, as well as their characteristics, communication, and interaction protocols.

Other important contributions of this work are to provide the needed infrastructure to support the agent-based configuration of metaheuristics, as well as to develop a framework in which monitoring of their control factors becomes an easy task. At the same time, the agent architecture can be seen as a powerful tool, useful for conducting experiments when executing metaheuristic algorithms, but, in the first place, as a suitable approach that makes use of agent technology issues to contribute to the configuration of algorithms.