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Hybrid Metaheuristics

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Proceedings

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Preface

The International Workshop on Hybrid Metaheuristics reached its third edition with HM 2006. The active and successful participation in the past editions was a clear indication that the research community on metaheuristics and related areas felt the need for a forum to discuss specific aspects of hybridization of metaheuristics.

The selection of papers for HM 2006 consolidated some of the mainstream issues that have emerged from the past editions. Firstly, there are prominent examples of effective hybrid techniques whose design and implementation were motivated by challenging real-world applications. We believe this is particularly important for two reasons: on the one hand, researchers are conscious that the primary goal of developing algorithms is to solve relevant real-life problems; on the other hand, the path toward efficient solving methods for practical problems is a source of new outstanding ideas and theories.

A second important issue is that the research community on metaheuristics has become increasingly interested in and open to techniques and methods known from artificial intelligence (AI) and operations research (OR). So far, the most representative examples of such integration have been the use of AI/OR techniques as subordinates of metaheuristic methods. As a historical and etymological note, this is in perfect accordance with the original meaning of a *metaheuristic* as a “general strategy controlling a subordinate heuristic.”

The awareness of the need for a sound experimental methodology is a third keypoint. This aspect has gained more relevance and currency, even though there are still no widely agreed standard methodologies. As research on hybrid metaheuristics is mostly based on experimental methods, similar standards to those found in the evaluation of experiments in natural sciences can be expected.

Scientific testing, a fourth notable aspect, emerges as a fundamental methodology for understanding the behavior of algorithms. The goal of scientific testing is to abstract from actual implementations and study, empirically and through predictive models, the effect of algorithmic components. This research approach can be particularly useful in the case of conjectures on metaheuristic algorithm behavior that, while being widespread in the community, have not yet been the subject of validation.

Finally, a tendency to reconsider hybrid metaheuristics from a higher and more general perspective is emerging. Providing classifications, systematic analyses and surveys on important branches underlines a certain maturity of the relatively young field.

This progression can be observed by an increasing number of submissions to the workshop: we received 42 paper submissions to HM 2006. Each submitted paper was sent to at least three reviewers. We are very grateful to the members of the Program Committee and the additional reviewers for the effort they made

in carefully examining the papers and for the many valuable comments and suggestions they gave to the authors. Based on their comments, we finally accepted 13 submissions for publication and for presentation at HM 2006, resulting in an acceptance rate of roughly 31 %. In addition, we got one invited paper. The selection of papers was rather strict in order to guarantee the high quality of the proceedings and the workshop itself. We would like to thank all authors for their interest in our workshop.

The field of hybrid metaheuristics is the result of the composition of numerous streams in the field of algorithmics. However, these streams have increasingly come together and the main issues and characteristics of the field have evolved more clearly. For the future, we envision a scenario in which some challenges have to be faced:

- It should become common practice that experimental analysis meets high quality standards. This empirical approach is absolutely necessary to produce objective and reproducible results and to anchor the successes of metaheuristics in real-world applications.
- Hybrid metaheuristic techniques have to be openly compared not just among themselves but also with state-of-the-art methods, from whatever field they are. By following this approach, researchers would be able to design techniques that meet the goal of solving a real-world problem and to consider the other approaches as rich sources of design components and ideas.
- Scientific testing and theoretical models of algorithms for studying their behavior are still confined to a limited area of research. We believe that, by being able to explain rigorously algorithm behavior by means of sound empirical investigation and formal models, researchers would give the field a firmer status and give support to the development of real-world applications.

The achievement of these goals will take some time in view of the difficult theoretical and practical problems involved in these challenges. Nevertheless, research is very active and has already produced some remarkable results and studies in this direction.

August 2006

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