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Preface

We are pleased to introduce the reader to the proceedings of the Fifth International Conference on Parallel Problem Solving from Nature, PPSN V – International Conference on Evolutionary Computation, held in Amsterdam, September 27-30, 1998. PPSN V is organized in cooperation with the International Society for Genetic Algorithms (ISGA) and the Evolutionary Programming Society (EPS), reflecting the beneficial interaction between the conference activities in Europe and the USA in the field of evolutionary computation.

Following the 1990 meeting in Dortmund [1], this biennial event was held in Brussels [2], Jerusalem [3], and Berlin [4], where it was decided that the 1998 location should be Amsterdam with Agoston E. Eiben as the general chair.

The scientific content of the PPSN conference focuses on the topic of problem solving paradigms gleaned from a natural model, including (but not limited to) organic evolution, neural network based learning processes, immune systems, life and its properties in general, DNA strands, and chemical and physical processes. The term *natural computing* perfectly summarizes the essential idea of the PPSN conference series, and the organizers of PPSN V are delighted that the Leiden Center for Natural Computation (LCNC) is involved in the organization of this conference.

As with the previous PPSN meetings, these proceedings also emphasize the topic of evolution, represented in computer science by the field of *evolutionary computation* with its evolutionary algorithms. Historically this field has been represented by areas such as genetic algorithms, evolution strategies, evolutionary programming, genetic programming, and classifier systems. In recent years these artificial terminological boundaries have been dropped to the benefit of a more general understanding of evolutionary principles applied to different search spaces with different aims, such as problem solving, investigating evolutionary principles, or understanding life. In these proceedings, the reader will find a variety of sections focusing on aspects of evolutionary algorithms, such as for instance Convergence Theory, Multi-Criteria and Constrained Optimization, Coevolution and Learning, just to name a few. Besides these evolutionary themes, there are also contributions on other aspects of natural computation, such as Cellular Automata, Fuzzy Systems and Neural Networks or Ant Colonies, Immune Systems, and Other Paradigms.

In total, these proceedings contain 100 contributions which were selected from 185 papers submitted to the conference organizers. The members of the program committee (listed on the following pages) undertook the extremely challenging task of submitting their scientific reviews to facilitate the final decision making for the acceptance of the top 54% of all submissions. We are very grateful to these reviewers for their willingness to volunteer their scientific expertise to ensure the decision making process was as fair as possible. We would also like to thank the EvoNet Electronic Communication Committee for its support with

the Web-based submission and review procedure which greatly simplified the review process, facilitating a smooth exchange of papers and reviews. As this software was used for the very first time in a real conference setting, inevitably a few technical problems occurred and a special thanks is owed to those reviewers who provided their reviews in a very short time. We are confident that the – debugged – system will provide a good support for future events.

Following the PPSN spirit, PPSN V is a poster-only conference, i.e., all papers are presented as posters to facilitate personal discussion and exchange of ideas between the presenter and the audience. Although this might imply a smaller audience than would be the case for an oral presentation, it gives presenters a better chance to communicate with the people most interested in their topic, and to chat with them in a more relaxed atmosphere. Consequently, posters are not “second-class” papers as in some other conferences – they are the preferred method of open presentation. The 100 papers presented at the conference are grouped into 5 groups of about 20 papers each. To simplify orientation within a session, and to allow the audience to get a good overview of posters, each poster session is introduced by a volunteer giving a brief overview. We believe that this is very helpful for the conference participants, and we appreciate the efforts of these volunteers for helping with this.

The conference includes oral presentations from three invited speakers including Grzegorz Rozenberg (DNA Computing), Nicholas Gessler (Artificial Culture: Experiments in Synthetic Anthropology), and Lawrence Davis (Commercial Applications of Evolutionary Algorithms: Some Case Studies), all addressing hot topics in the context of natural computation.

On the first day of the conference, September 27th, eight tutorials will be given by well-known experts in evolutionary computation and related fields. These tutorials are designed for an audience looking for some particular aspects of the state of the art. The list of tutorials and their presenters can be found on the introductory pages.

Finally, we would like to thank our sponsors, who helped in many different ways to make this conference possible. These sponsors are (in alphabetic order) the European Network of Excellence on Evolutionary Computation (EvoNet), Informatik Centrum Dortmund (ICD), Institute for Programming Technology and Algorithmics (IPA), International Society for Genetic Algorithms (ISGA), Leiden Center for Natural Computing (LCNC), the Municipality of Amsterdam, Philips, Siemens AG, and the Stichting European Evolutionary Computing Conferences (EECC), a Dutch-based non-profit-making organization aimed at the support of European research and organizational activities in the field of natural and evolutionary computation. The continuous support and invaluable help of Nathalie Limonta at Ecole Polytechnique was highly appreciated and we also would like to thank Ben Pechter for his efforts to make PPSN V a success.

We feel these proceedings bear witness to the fruitful cooperation and exchange of ideas between evolutionary computation groups from all parts of the world and mark some major progress in the field – and we look forward to seeing

how the Amsterdam environment with its coffee-shops and nightlife will help to support this development, and smoothen the cultural barriers . . .
Have fun at the conference, and with the proceedings !

July 1998

Agoston E. Eiben, General Chair
Thomas Bäck and Marc Schoenauer, Program Co-Chairs
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Evolutionary Computation for Multiobjective Optimization

Marco Dorigo,
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Ant Colony Optimization

Agoston E. Eiben and Zbigniew Michalewicz,
*Leiden University, The Netherlands, and
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Parameter Control, Adaptation, and Self-Adaptation in Evolutionary Algorithms

Christian Jacob,
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany:
Evolutionary Algorithms and Agent-Based Distributed Systems

Riccardo Poli and William B. Langdon,
The University of Birmingham, UK:
Introduction to Genetic Programming

Joachim Sprave,
Universität Dortmund, Germany:
Evolutionary Algorithms: Spatially Structured Populations and Parallelism

Hans-Michael Voigt,
Gesellschaft zur Förderung angewandter Informatik e.V., Berlin, Germany:
Introduction to Quantitative Genetics with Applications to Evolutionary Computation

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