

Preface

These proceedings contain the papers presented at the sixth annual Genetic and Evolutionary Computation Conference (GECCO 2004). The conference was held in Seattle, during June 26–30, 2004.

A total of 460 papers were submitted to GECCO 2004. After a rigorous double-blind reviewing process, 230 papers were accepted for full publication and oral presentation at the conference, resulting in an acceptance rate of 50%. An additional 104 papers were accepted as posters with two-page extended abstracts included in these proceedings.

This year's GECCO constituted the union of the Ninth Annual Genetic Programming Conference (which has met annually since 1996) and the Thirteenth International Conference on Genetic Algorithms (which, with its first meeting in 1985, is the longest running conference in the field). Since 1999, these conferences have merged to produce a single large meeting that welcomes an increasingly wide array of topics related to genetic and evolutionary computation.

Since the fifth annual GECCO conference, the proceedings have been published by Springer-Verlag as part of their Lecture Notes in Computer Science (LNCS) series. This makes the proceedings available in many libraries as well as online, widening the dissemination of the research presented at the conference. In addition to these proceedings volumes, each participant of the GECCO 2004 conference received a CD containing electronic versions of the papers presented.

A new track entitled 'Biological Applications' was introduced this year to emphasize the use of evolutionary computing methods to various biological applications, such as bioinformatics and others.

In addition to the presentation of the papers contained in the proceedings, the conference included 16 workshops, 32 tutorials by leading specialists, the Evolutionary Computation in Industry special track, and presentation of late-breaking papers.

GECCO is sponsored by the International Society for Genetic and Evolutionary Computation (ISGEC). The ISGEC by-laws contain explicit guidance on the organization of the conference, including the following principles:

- (i) GECCO should be a broad-based conference encompassing the whole field of genetic and evolutionary computation.
- (ii) Papers will be published and presented as part of the main conference proceedings only after being peer reviewed. No invited papers shall be published (except for those of up to three invited plenary speakers).
- (iii) The peer review process shall be conducted consistently with the principle of division of powers performed by a multiplicity of independent program committees, each with expertise in the area of the paper being reviewed.
- (iv) The determination of the policy for the peer review process for each of the conference's independent program committees and the reviewing of papers for each program committee shall be performed by persons who occupy their

- positions by virtue of meeting objective and explicitly stated qualifications based on their previous research activity.
- (v) Emerging areas within the field of genetic and evolutionary computation shall be actively encouraged and incorporated in the activities of the conference by providing a semi-automatic method for their inclusion (with some procedural flexibility extended to such emerging new areas).
 - (vi) The percentage of submitted papers that are accepted as regular full-length papers (i.e., not posters) shall not exceed 50%.

These principles help ensure that GECCO maintains high quality across the diverse range of topics it includes.

Besides sponsoring the conference, the ISGEC supports the field in other ways. ISGEC sponsors the biennial “Foundations of Genetic Algorithms” workshop on theoretical aspects of all evolutionary algorithms. The journals *Evolutionary Computation* and *Genetic Programming and Evolvable Machines* are also supported by ISGEC. All ISGEC members (including students) receive subscriptions to these journals as part of their membership. ISGEC membership also includes discounts on GECCO registration rates as well as discounts on other journals. More details on ISGEC can be found online at <http://www.isgrec.org>.

Many people volunteered their time and energy to make this conference a success. The following people in particular deserve the gratitude of the entire community for their outstanding contributions to GECCO 2004:

- Riccardo Poli, the General Chair of GECCO 2004 for his tireless efforts in organizing every aspect of the conference, which started well before GECCO 2003 took place in Chicago in July 2003;
- David E. Goldberg, John Koza and Riccardo Poli, members of the Business Committee, for their guidance and financial oversight;
- Stefano Cagnoni, for coordinating the workshops;
- Maarten Keijzer, for editing the late breaking papers;
- Past conference organizers, James Foster and Erick Cantú-Paz, for their constant help and advice;
- John Koza, for his efforts as publicity chair;
- Simon Lucas, for arranging competitions during GECCO 2004;
- Mike Cattolico, for local arrangements;
- Pat Cattolico, for her help in the local organization of the conference;
- Carol Hamilton, Ann Stolberg, and the rest of the AAAI staff for their outstanding efforts administering the conference;
- Thomas Preuss, for maintaining the ConfMaster Web-based paper review system;
- Gerardo Valencia, for Web programming and design;
- Jennifer Ballentine, Lee Ballentine and the staff of Professional Book Center, for assisting in the production of the proceedings;
- Alfred Hofmann and Ursula Barth of Springer-Verlag for the production of the GECCO 2004 proceedings; and

the Sponsors who made generous contributions to support student travel grants:

- Air Force Office of Scientific Research
- New Light Industries
- Philips Research
- Tiger Mountain Scientific
- Unilever.

The track chairs deserve special thanks. Their efforts in recruiting program committees, assigning papers to reviewers, and making difficult acceptance decisions in relatively short times, were critical to the success of the conference:

- Owen Holland, A-Life, Adaptive Behavior, Agents, and Ant Colony Optimization,
- Dipankar Dasgupta, Artificial Immune Systems
- James Foster and Wolfgang Banzhaf, Biological Applications
- Paul Darwen, Coevolution
- Hans-Georg Beyer, Evolution Strategies, Evolutionary Programming
- Dario Floreano, Evolutionary Robotics
- Edmund Burke, Evolutionary Scheduling and Routing
- Andy Tyrrell, Evolvable Hardware
- Dirk Thierens, Genetic Algorithms
- Lee Spector, Genetic Programming
- Pier Luca Lanzi, Learning Classifier Systems
- Andrea Tettamanzi, Real World Applications
- Mark Harman, Search Based Software Engineering

The conference was held in cooperation and/or affiliation with:

- The American Association for Artificial Intelligence (AAAI)
- The 2004 NASA/DoD Conference on Evolvable Hardware
- *Evolutionary Computation*
- *Genetic Programming and Evolvable Machines*
- *Journal of Scheduling*
- *Journal of Hydroinformatics*
- *Applied Soft Computing*

Above all, our special thanks are due to the numerous researchers and practitioners who submitted their best work to GECCO 2004, reviewed the work of others, presented tutorials, organized workshops, or volunteered their time in any other way. I am sure that the contributors to this proceedings will be proud of the results of their efforts and readers will get a glimpse of the current activities in the field of genetic and evolutionary computation.

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Kalyanmoy Deb
Editor-in-Chief, GECCO 2004