Genetic and Evolutionary Computation COnference (GECCO-2006)

CONFERENCE PROGRAM

July 8 – 12, 2006
Renaissance Seattle Hotel
Seattle, Washington, USA

A recombination of the
15th International Conference on Genetic Algorithms (IGCA) and
the 11th Genetic Programming Conference (GP)

sponsored by the
Association for Computing Machinery
Special Interest Group for Genetic and Evolutionary Computation

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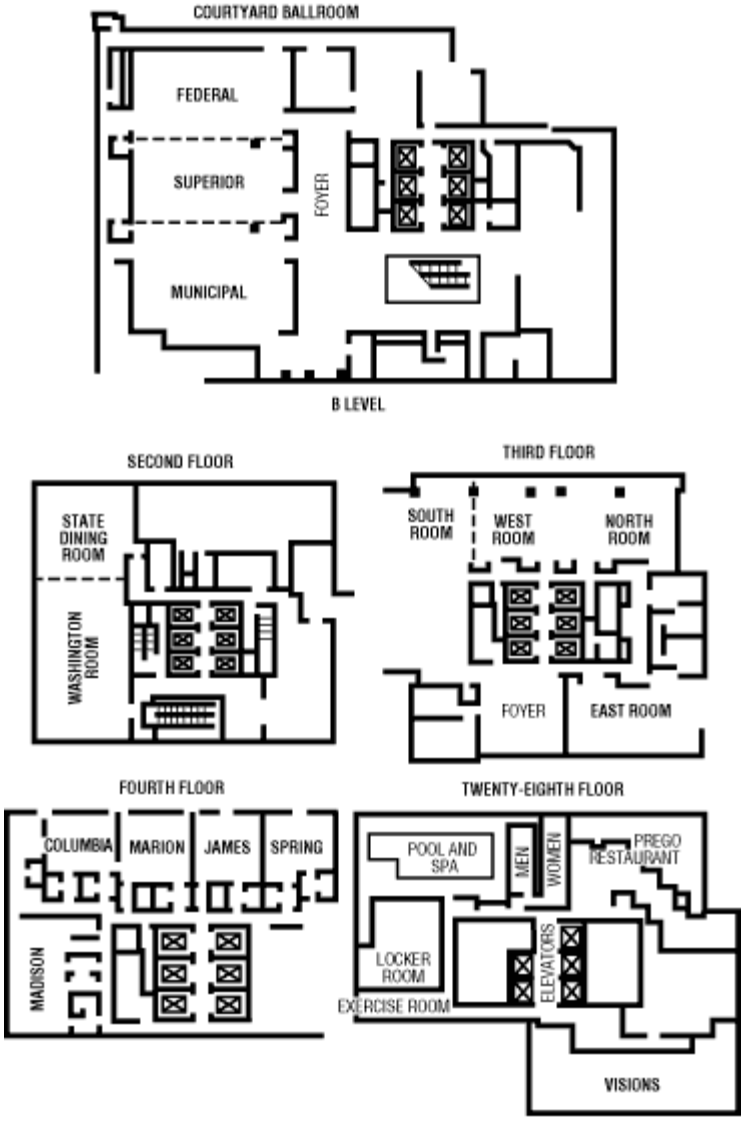
Hotel Layout



Registration Desk Open Hours

The Registration Desk is located in the Courtyard Ballroom Foyer, on B- Level. Open hours are:

Friday, July 7:	15:00 – 21:00
Saturday, July 8:	7:00 – 17:00
Sunday, July 9:	7:00 – 21:00
Monday, July 10:	7:00 – 17:00
Tuesday, July 11:	7:30 – 17:00
Wednesday, July 12:	8:00 – 12:30

Wireless Internet Lounges

FREE wireless Internet available in the common areas. Meeting rooms, also with FREE wireless Internet are reserved for you to meet with others without disturbing presentations. Bring your own laptop.

B Level: Courtyard Ballroom Foyer, Hotel Lobby
Fourth Floor: Foyer, Columbia
Twenty-Eighth Floor: Visions (Monday – Wednesday). Enjoy the view!

Internet Stations

Several Internet stations are available for use on a first-come, first-serve basis in the registration area in the Courtyard Foyer.

Coffee Breaks

Coffee breaks will be served in the Courtyard Ballroom Foyer, and the Third Floor Foyer

Exhibits

Exhibits are located in the Courtyard Ballroom Foyer. Please support those who support us.

Welcome

Welcome to GECCO 2006 Seattle! Once again, the City of Seattle plays host to our yearly gathering. Allow me to take this opportunity to welcome you, thank all those who have participated to create the current GECCO, and give you a short introduction to our days together.

There are hundreds of people to thank, close to 450 this year: Our Track Chairs and Program Committee members deserver our thanks for their efforts in compiling the fine papers in our Proceedings. The Workshop organizers, Tutorial providers, and the Invited speakers for their contribution in providing basic, focused, or advanced material for our continuing education. The members of the Evolutionary Computation in Practice track for their continued assistance at the interface of research and industry. Many are continuing with us after years of contribution. The Organizers and Chairs of our special events and competitions, for the opportunity they provide to showcase the most innovative of approaches in a fun and possibly rewarding way. The Business Committee for their commitment to GECCO, with the time and email processing that implies.

And lastly I must provide a special thanks to two people whose work and support helped me the most, our EiC Maarten Keijzer and the 2006 GECCO administrator Pat Cattolico. I know that Maarten, a good friend of many years, "made the time" to accept and perform this most important role at my request. I thank him publicly again. In addition to some of the pure administrative tasks, many of the traditional admin tasks for GECCO chairs were successfully transferred to Pat's charge. I and the Conference have benefited from her contributions.

I would like to call your attention to several events taking place in the Courtyard Ballroom on B-Level (meeting rooms Federal/Superior and Municipal combined).

Greet old friends and meet new ones at the **Opening Reception** on Sunday, 18:00 – 19:00 in the Courtyard Ballroom. The reception is free to all registered GECCO attendees. An assortment of hot and cold hors d'oeuvres, wine, and soft drinks will be served. Remember to bring your **Badge and Reception beverage tickets**.

Plan to attend the plenary sessions on Monday and Tuesday morning with our Keynote Speakers. On Monday, join, **Dr. William H. Calvin**, a theoretical neurobiologist at the University of Washington in Seattle, and the author of 12 books about brains and evolution. Dr. Calvin tries to extend Darwin's intellectual revolution to brain mechanisms.

On Tuesday, **Dr. Mike Hawrylycz**, Director of Informatics at the Allen Institute for Brain Science will give an overview of the Allen Brain Atlas, its database and informatics tools. The opportunities for computational discovery in this image based database are virtually limitless, and should be of great interest to those interested in applications of evolutionary computation.

The **Poster Session** on Tuesday evening begins at 19:00 with an assortment of hot and cold hors d'oeuvres, wine, beer, and soft drinks. Poster authors will be available to discuss their posters beginning at 19:30. Remember to bring your **Badge and Poster Session beverage tickets**.

Please remember to **cast your vote for Best Papers** by 17:00 Tuesday, July 11. **Best Paper Awards, Competition Winners, and Human-Competitive Results Awards** will be announced at the plenary session on Wednesday, 8:15-9:45. A meeting of the members of SIGEVO follows the awards. All are welcome. Here is an outline of the Program:

Saturday-Sunday, July 8-9	8:30 – 18:00:	Free Workshops and Tutorials
Sunday, July 9	19:00 – 22:00:	Opening Reception ***(Bring your beverage tickets!)***
Monday, July 10	8:15 – 9:45:	Keynote: **Dr. William H. Calvin**
	10:10 – 18:10:	Paper Presentations
Tuesday, July 11	8:15: – 9:45:	Keynote: **Dr. Mike Hawrylycz**
	10:10 – 18:10:	Paper Presentations
	19:00 – 22:00:	Poster Session ***(Bring your beverage tickets!)***
Wednesday, July 12	8:15 – 9:45:	Plenary Session: Best Paper, Competitions, and Humie Awards, followed by SIGEVO meeting, all are welcome.
	10:10 – 15:45:	Paper Presentations

Enjoy the Conference!
Mike Cattolico, Conference Chair

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Tim Taylor, *(Timberpost Ltd)*
Jürgen Teich, *(University of Erlangen-Nuremberg)*
Gianluca Tempesti, *(Ecole Polytechnique Federale de Lausanne (EPFL))*
Ankur Teredesai, *(RIT)*
Andrea G. B. Tettamanzi, *(University of Milan)*
Christof Teuscher, *(Los Alamos National Lab)*
Dirk Thierens, *(Universiteit Utrecht)*
Adrian Thompson, *(University of Sussex)*
Jonathan Timmis, *(University of York)*
Ashutosh Tiwari, *(Cranfield University)*
Andrea Toffolo, *(Dept. of Mechanical Engineering - University of Padova)*
Marco Tomassini, *(university of lausanne)*
Paolo Tonella, *(ITC-irst)*
Alexander Topchy, *(Nielsen Media Research)*
Jim Torresen, *(University of Oslo)*
Marc Toussaint, *(University of Edinburgh)*
Shigeyoshi Tsutsui, *(Hannan University)*
Kagan Tumer, *(NASA Ames Research Center)*
Andy Tyrrell, *(University of York)*
Prahlad Vadakkepat, *(National University of Singapore)*
David Van Veldhuizen, *(US Air Force)*
Frederik P. J. Vandecasteele, *(University of Idaho)*
Leonardo Vanneschi, *(University of Milano-Bicocca)*
Gilles Venturini, *(University of Tours)*
Jose L. Verdegay, *(Universidad de Granada)*
L. Gwenn Volkert, *(Kent State University)*
Michael Vose, *(U Tennessee, Knoxville)*
Joanne Walker, *(University of Wales, Aberystwyth)*
Matthew Wall, *(Oculus)*
Paul Walsh, *(Cork Institute of Technology)*
Ray Walshe, *(Dublin City University)*
Richard A Watson, *(University of Southampton)*
Joachim J Wegener, *(DaimlerChrysler AG)*
Ingo Wegener, *(Dept. of Computer Science, Univ. Dortmund)*
Karsten Weicker, *(HTWK Leipzig)*
Peter Alexander Whigham, *(Univ. of Otago)*
Ronald Lyndon While, *(The University of Western Australia)*
Tony White, *(Carleton University)*
R. Paul Wiegand, *(Naval Research Laboratory)*
Janet Wiles, *(The University of Queensland)*
Claus Wilke, *(University of Texas)*
Wendy Williams, *(Govt. of Canada)*
Stewart W. Wilson, *(Prediction Dynamics)*
Mark L. Wineberg, *(University of Guelph)*
Carsten Witt, *(FB Informatik, LS 2, Univ. Dortmund, 44221 Dortmund, Germany)*
Alden H. Wright, *(University of Montana)*
Annie S Wu, *(University of Central Florida)*
Zheng Yi Wu, *(Bentley Systems)*
Andy Wuensche, *(DDLab (www.ddlab.org))*
Takeshi Yamada, *(NTT Communication Science Labs.)*
Shengxiang Yang, *(Department of Computer Science)*
Gary G. Yen, *(Oklahoma State University)*
Tian-Li Yu, *(Illinois Genetic Algorithms Laboratory)*
Bo Yuan, *(The University of Queensland)*
Andreas H. Zell, *(University of Tuebingen)*
Qingfu Zhang, *(University of Essex)*
Gengui Zhou, *(Zhejiang University of Technology)*
Tom Ziemke, *(University of Skovde)*
Eckart Zitzler, *(ETH Zurich)*

Monday Keynote: William H. Calvin, Ph.D.
Theoretical Neurobiologist, University of Washington in Seattle, USA

William H. Calvin, Ph.D. is a theoretical neurobiologist at the University of Washington in Seattle, the author of 12 books including *The Cerebral Code* (MIT Press 1996), *How Brains Think* (Science Masters 1996), and, with the neurosurgeon George A. Ojemann, *Conversations with Neil's Brain* (Addison-Wesley 1994). His research interests include the recurrent excitatory circuitry of cerebral cortex used for split-second versions of the Darwinian bootstrapping of quality, the four-fold enlargement of the hominid brain during the ice ages, and the brain reorganization for language and planning. His language book, a collaboration with the linguist Derek Bickerton, is about the evolution of syntax, *Lingua ex machina: Reconciling Darwin and Chomsky with the Human Brain* (MIT Press, 2000). He has long been following the paleoclimate and oceanographic research on the abrupt climate changes of the ice ages, hoping to find a connection to the big-brain problem, and is the author of *The Atlantic Monthly's* cover story, "The Great Climate Flip-flop." His 2002 book, *A Brain for All Seasons: Human Evolution and Abrupt Climate Change*, brings his anthropology and climate interests back together again; it won the Phi Beta Kappa Book Award for Science. *A Brief History of the Mind: From Apes to Intellect and Beyond* is the latest, from Oxford University Press.

For more information, visit: WilliamCalvin.com

Tuesday Keynote: Mike Hawrylycz, Ph. D.,
Director, Informatics, Allen Institute for Brain Science, USA

Mapping and Mining The Allen Brain Atlas

The Allen Institute for Brain Science has been conducting a genome wide scan of expression patterns in the 20,000+ genes of the adult mouse. By using the technique of colorimetric riboprobe in situ hybridization, the protocol produces cellular level detail with diverse markers for cell types and anatomic structures. Mapping this data to a common anatomic framework is a major challenge that is central to all brain imaging efforts. At the Allen Institute we have implemented a robust and high throughput computational platform for mapping the 0.95micron/pixel 10x resolution data to a new 3D mouse reference atlas.

The result enables the development of a searchable 3D expression database for high level expression patterns across the mouse genome. Dr. Hawrylycz will give an overview of the Allen Brain Atlas, its database and informatics tools and indicate some possibilities for data mining. The opportunities for computational discovery in this image based database are virtually limitless and should be great interest to those interested in applications of evolutionary computation.

Dr. Hawrylycz studied applied mathematics at MIT and has worked in variety of applied fields of mathematics and computer science including image processing, computational finance, and bioinformatics.

He is the Director of Informatics at the Allen Institute for Brain Science.

For more information, visit www.brain-map.org

Papers Nominated for Best Paper Awards

In 2002, ISGEC created a best paper award for GECCO. We continue this tradition at GECCO-2006. The Track Chairs, Editor in Chief, and the Conference Chair nominated the papers that received the most nominations from Program Committee members and/or the highest evaluation scores for consideration by the conference.

The winners are chosen by secret ballot of the GECCO attendees after the papers have been orally presented at the conference. Please vote for at most one paper in each category and place your ballot in the box at the registration desk by 17:00 on Tuesday July 11. Your ballot to elect the best papers is part of your registration package. Winners will be announced on Wednesday during the plenary session, 8:30 – 10:00 in the Courtyard Ballroom.

The titles and authors of all papers nominated are given below:

Ant Colony Optimization and Swarm Intelligence:

An Ant-Based Algorithm for Finding Degree-Constrained Minimum Spanning Tree
Thang N. Bui *(Penn State Harrisburg)*
Catherine M. Zrncic *(Penn State Harrisburg)*

Particle Swarm with Speciation and Adaptation in a Dynamic Environment
Xiaodong Li *(School of Computer Science and IT, RMIT University)*
Juergen Branke *(Institute AIFB, University of Karlsruhe)*
Tim Blackwell *(Dept of Computing, Goldsmiths College, University of London)*

PSO and Multi-Funnel Landscapes: How cooperation might limit exploration
Andrew M. Sutton *(Colorado State University)*
Darrell Whitley *(Colorado State University)*
Monte Lunacek *(Colorado State University)*
Adele Howe *(Colorado State University)*

Artificial Immune Systems

Properties of the Bersini Experiment on Self-Assertion
Werner Dilger *(Chemnitz University of Technology)*
Steve Strangfeld *(Chemnitz University of Technology)*

Applicability Issues of the Real-Valued Negative Selection Algorithms
Zhou Ji *(St. Jude Children's Research Hospital)*
Dipankar Dasgupta *(The University of Memphis)*

Artificial Life, Evolutionary Robotics, Adaptive Behavior

Facilitating Neural Dynamics for Delay Compensation and Prediction in Evolutionary Neural Networks
Heejin Lim (Texas A&M University)
Yoonsuck Choe (Texas A&M University)

A Method for Parameter Calibration and Relevance Estimation in Evolutionary Algorithms
Volker Nannen *(Vrije Universiteit Amsterdam)*
A.E. Eiben *(Vrije Universiteit Amsterdam)*

Modular Thinking: Evolving Modular Neural Networks for Visual Guidance of Agents
Ehud Schlessinger *(Institute of Ophthalmology, University College London)*
Peter J. Bentley *(Department of Computer Science, University College London)*
R. Beau Lotto *(Institute of Ophthalmology, University College London)*

Biological Applications

Genetic Programming for Human Oral Bioavailability of Drugs
Francesco Archetti *(University of Milano-Bicocca)*
Stefano Lanzeni *(University of Milano-Bicocca)*
Enza Messina *(University of Milano-Bicocca)*
Leonardo Vanneschi *(University of Milano-Bicocca)*

Comparing Mathematical Models on the Problem of Network Inference
Christian Spieth *(Centre for Bioinformatics)*
Nadine Hassis *(Centre for Bioinformatics)*
Felix Streichert *(Centre for Bioinformatics)*
Jochen Supper *(Centre for Bioinformatics)*
Nora Speer *(Centre for Bioinformatics)*
Klaus Beyreuther *(Centre for Bioinformatics)*
Andreas Zell *(Centre for Bioinformatics)*

GA-BIPAD: A Genetic Algorithm-Based Multiple Local Alignment of Bipartite cis-Element Sequences
Chengpeng Bi *(Childrens Mercy Hospital)*
Peter K. Rogan *(Childrens Mercy Hospital)*

Coevolution

The Parallel Nash Memory for Asymmetric Games
Frans A Oliehoek *(University of Amsterdam)*
Edwin D de Jong *(Utrecht University)*
Nikos Vlassis *(University of Amsterdam)*

Archive-based Cooperative Coevolutionary Algorithms
Liviu Panait *(George Mason University)*
Sean Luke *(George Mason University)*
Joseph F. Harrison *(George Mason University)*

The Effects of Interaction Frequency on the Optimization Performance of Cooperative Coevolution
Elena Popovici *(George Mason University)*
Kenneth De Jong *(George Mason University)*

Robustness in Cooperative Coevolution
R. Paul Wiegand *(US Naval Research Laboratory)*
Mitchell A. Potter (US Naval Research Laboratory)

Estimation of Distribution Algorithms

Probabilistic Modeling for Continuous EDA with Boltzmann Selection and Kullback-Leibeler Divergence
Yunpeng Cai *(State Key Lab of Intelligent Technology and Systems, Tsinghua University)*
Xiaomin Sun *(State Key Lab of Intelligent Technology and Systems, Tsinghua University)*
Peifa Jia *(State Key Lab of Intelligent Technology and Systems, Tsinghua University)*

Evolution Strategies, Evolutionary Programming

Hierarchically Organised Evolution Strategies on the Parabolic Ridge
Dirk V. Arnold *(Faculty of Computer Science, Dalhousie University)*
Alexander MacLeod *(Faculty of Computer Science, Dalhousie University)*

Reconsidering the Progress Rate Theory for Evolution Strategies in Finite Dimensions
Anne Auger *(CoLab ETH Zurich)*
Nikolaus Hansen *(CoLab ETH Zurich)*

A Computational Efficient Covariance Matrix Update and a (1+1)-CMA for Evolution Strategies
Christian Igel *(Ruhr-Uni. Bochum)*
Thorsten Suttorp *(Ruhr-Uni. Bochum)*
Nikolaus Hansen *(Swiss Federal Institute of Technology (ETH) Zurich)*

On the Local Performance of Simulated Annealing and the (1+1) Evolutionary Algorithm
Thomas Jansen *(Universität Dortmund)*
Ingo Wegener *(Universität Dortmund)*

Evolutionary Combinatorial Optimization

A New Hybrid Evolutionary Algorithm for the k-cardinality Tree Problem
Christian Blum *(ALBCOM, LSI, Universitat Politècnica de Catalunya)*

Anisotropic Selection in Cellular Genetic Algorithms
David Simoncini *(Universite Nice Sophia Antipolis)*
Sébastien Verel *(Universite Nice Sophia Antipolis)*
Philippe Collard *(Universite Nice Sophia Antipolis)*
Manuel Clergue *(Universite Nice Sophia Antipolis)*

Adaptation for Parallel Memetic Algorithm Based on Population Entropy
Jing Tang *(Intelligent Systems Centre,Nanyang Technological University)*
Meng Hiot Lim *(Intelligent Systems Centre,Nanyang Technological University)*
Yew Soon Ong *(Intelligent Systems Centre,Nanyang Technological University)*

Evolutionary Multiobjective Optimization

Combining Gradient Techniques for Numerical Multi--Objective Evolutionary Optimization
Peter A.N. Bosman *(Centre for Mathematics and Computer Science)*
Edwin D. de Jong *(Utrecht University)*

Towards Estimating Nadir Objective Vector Using Evolutionary Approaches
Kalyanmoy Deb *(IIT Kanpur)*
Shamik Chaudhuri *(IIT Kanpur)*
Kaisa Miettinen *(Helsinki School of Economics)*

On The Effect of Populations in Evolutionary Multi-objective Optimization
Oliver Giel *(Fachbereich Informatik, Lehrstuhl 2, Universität Dortmund)*
Per Kristian Lehre *(Dept. of Computer and Information Science, Norwegian University of Science and Technology)*

Inside a Predator-Prey Model for Multi-Objective Optimization: A Second Study
Christian Grimme *(University of Dortmund)*
Karlheinz Schmitt *(University of Dortmund)*

Evolvable Hardware

Filter Approximation Using Explicit Time and Frequency Domain Specifications
Varun Aggarwal *(CSAIL, MIT)*
Wesley O. Jim *(CSAIlL, MIT)*
Una-May O'Reilly *(CSAIL, MIT)*

Genetic Algorithms

Comparing Evolutionary and Temporal Difference Methods in a Reinforcement Learning Domain
Matthew E. Taylor *(The University of Texas at Austin)*
Shimon Whiteson *(The University of Texas at Austin)*
Peter Stone *(The University of Texas at Austin)*

Dynamic Multi-Objective Optimization with Evolutionary Algorithms: A Forward-Looking Approach
Iason Hatzakis *(Massachusetts Institute of Technology)*
David R Wallace *(Massachusetts Institute of Technology)*

Papers Nominated for Best Paper Awards

Non-Wrapping Order Crossover: An Order Preserving Crossover Operator that Respects Absolute Position
Vincent A Cicirello *(The Richard Stockton College of New Jersey)*

Multi-Objective Test Problems, Linkages, and Evolutionary Methodologies
Kalyanmoy Deb *(IIT Kanpur)*
Ankur Sinha *(IIT Kanpur)*
Saku Kukkonen *(Lappeenranta University of Technology)*

An Empirical Investigation of How and Why Neutrality Affects Evolutionary Search
Edgar Galvan-Lopez *(University of Essex)*
Riccardo Poli *(University of Essex)*

Genetic Programming

Characterizing the Dynamics of Symmetry Breaking in Genetic Programming
Jason M. Daida *(The University of Michigan)*

Using Contextaware Crossover to Improve the Performance of GP
Hammad Majeed *(University of Limerick)*
Conor Ryan *(University of Limerick)*

Dynamics of Evolutionary Robustness
Alan T Piszcz *(Department of Computer Science, University of Idaho)*
Terence Soule *(Department of Computer Science, University of Idaho)*

Alternative Evolutionary Algorithms for Evolving Programs
Darrell Whitley *(Colorado State University)*
Ross Beveridge *(Colorado State University)*
Marc Richards *(Colorado State University)*
Andre Barreto *(Universidade Federal do Rio de Janeiro)*

Learning Classifier Systems and other Genetics-Based Machine Learning

Classifier Prediction based on Tile Coding
Pier Luca Lanzi *(Politecnico di Milano)*
Daniele Loiacono *(Politecnico di Milano)*
Stewart W Wilson *(Prediction Dynamics)*
David E Goldberg *(University of Illinois at Urbana Champaign)*

A Bayesian Approach to Learning Classifier Systems in Uncertain Environments
Davide Aliprandi *(Politecnico di Milano - Department of Electronics and Information)*
Alex Mancastroppa *(Politecnico di Milano - Department of Electronics and Information)*
Matteo Matteucci *(Politecnico di Milano - Department of Electronics and Information)*
Andrea Bonarini *(Politecnico di Milano - Department of Electronics and Information*)

Bounding XCS's Parameters for Unbalanced Datasets
Albert Orriols-Puig *(Enginyeria i Arquitectura La Salle - Universitat Ramon Llull)*
Ester Bernadó-Mansilla *(Enginyeria i Arquitectura La Salle - Universitat Ramon Llull*)

Real-World Applications

Automating the Drug Scheduling with Different Toxicity Clearance in Cancer Chemotherapy via Evolutionary Computation
Yong Liang *(Department of Computer Science and Engineering, The Chinese University of Hong Kong)*
Kwong-Sak Lueng *(Department of Computer Science and Engineering, The Chinese University of Hong Kong)*
Tony Shu Kam Mok (*Department of Clinical Oncology, The Chinese University of Hong Kong)*

Multiobjective Genetic Algorithms for Multiscaling Excited State Direct Dynamics in Photochemistry
Kumara Sastry *(University of Illinois at Urbana-Champaign)*
D. D. Johnson *(University of Illinois at Urbana-Champaign)*
Alexis L. Thompson *(University of Illinois at Urbana-Champaign)*
David E. Goldberg *(University of Illinois at Urbana-Champaign)*
Todd J. Martinez *(University of Illinois at Urbana-Champaign)*
Jeff Leiding *(University of Illinois at Urbana-Champaign)*
Jane Owens *(University of Illinois at Urbana-Champaign)*

The Complete-Basis-Functions Parameterization in ES and its Application to Laser Pulse Shaping
Ofer M. Shir *(Leiden Institute of Advanced Computer Science)*
Christian Siedschlag *(FOM-Instituut AMOLF)*
Thomas Bäck *(Leiden Institute of Advanced Computer Science)*
Marc J. J. Vrakking *(FOM-Instituut AMOLF)*

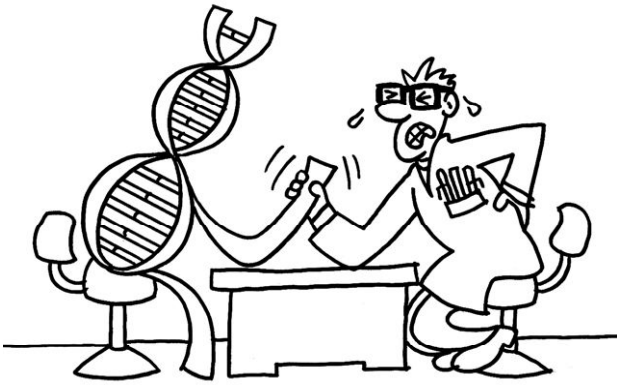
Search-Based Software Engineering

Clustering the Heap in Multi-Threaded Applications for Improved Garbage Collection
Myra B. Cohen *(Department of Computer Science and Engineering, University of Nebraska-Lincoln)*
Shiu Beng Kooi *(Department of Computer Science and Engineering, University of Nebraska-Lincoln)*
Witawas Srisa-an *(Department of Computer Science and Engineering, University of Nebraska-Lincoln)*

Search-based Determination of Refactorings for Improving the Class Structure of Object-Oriented Systems
Olaf Seng *(FZI Forschungszentrum Informatik)*
Johannes Stammel *(FZI Forschungszentrum Informatik)*
David Burkhart *(FZI Forsch)*

Human-Competitive Results Awards

Prizes Totaling $10,000 to be Awarded for Human-Competitive Results



Techniques of genetic and evolutionary computation are being increasingly applied to difficult real-world problems—often yielding results that are not merely interesting and impressive, but competitive with the work of creative and inventive humans.

At GECCO-2004, $5,000 in awards for human-competitive results were given for six human-competitive results produced by some form of genetic and evolutionary computation in the previous year. At GECCO-2005, $10,000 in awards were given.

This year, in a special technical session, Humie finalists will give short oral presentations about human-competitive results that they have produced by any form of genetic and evolutionary computation (e.g., genetic algorithms, genetic programming, evolution strategies, evolutionary programming, learning classifier systems, grammatical evolution, etc.).

An automatically created result is "human-competitive" if it satisfies at least one of the eight criteria below:

- The result was patented as an invention in the past, is an improvement over a patented invention, or would qualify today as a patentable new invention.
- The result is equal to or better than a result that was accepted as a new scientific result at the time when it was published in a peer-reviewed scientific journal.
- The result is equal to or better than a result that was placed into a database or archive of results maintained by an internationally recognized panel of scientific experts.
- The result is publishable in its own right as a new scientific result independent of the fact that the result was mechanically created.
- The result is equal to or better than the most recent human-created solution to a long-standing problem for which there has been a succession of increasingly better human-created solutions.
- The result is equal to or better than a result that was considered an achievement in its field at the time it was first discovered.
- The result solves a problem of indisputable difficulty in its field.
- The result holds its own or wins a regulated competition involving human contestants (in the form of either live human players or human-written computer programs).

The 2006 judging committee includes:

- Wolfgang Banzhaf (Editor-in-Chief of Genetic Programming and Evolvable Hardware journal)
- Darrell Whitley (Colorado State University)
- Erik Goodman (Chair of SIGEVO)
- Riccardo Poli (GECCO-2004 Chair)
- John R. Koza (Vice Chair of SIGEVO)

Every new result deemed by the committee to be human-competitive for the past year will get some cash award. The presentation session (Humies) takes place on Tuesday, 13:45-15:45, on B-Level in Federal/Superior. The judging committee will award prizes during Wednesday's plenary session 8:15-9:45 in the Courtyard Ballroom, B-Level.

Award prizes are sponsored by Third Millennium On-Line Products Inc.

Evolutionary Computation in Practice

In 2003, GECCO included a track on Evolutionary Computation in Industry, which contained presentations useful to managers, technology scouts, and other individuals interested in assessing the potentials of evolutionary algorithms to solve their industrial problems.

In 2005, the track was renamed as Evolutionary Computation in Practice (ECP) to reflect the change that our presentations have been extended to include military applications and topics related to technology transfer from academia to industry.

This year's topics include scheduling and distributed optimization, energy and resource, technology transfer, integrated optimization, and a panel discussion on how evolutionary computing based design optimization could become a regular business tool in industry.

Competitions

The competition presentation session takes place on Monday, 16:10-18:10 in the State room on floor 2. Winners will be announced on Wednesday during the plenary session, 8:15 - 9:45, in the Ballroom. The winner of each competition receives a certificate and a small cash prize. In the event that a competition has fewer than three entrants by the closing date, the competition will be cancelled.

Prime Prediction

Euler discovered that the polynomial $f(i) = i * i + i + 41$ produces primes for i from 0 to 39. (The primes produced for consecutive values of i are not necessarily consecutive.)

This GECCO 2006 competition consists in evolving a polynomial with integer coefficients such that given an integer value i as input produces the i-th prime number, $p(i)$, for the largest possible value of i. So, if $f(i)$ is the evolved function, we expect $f(1)$ to be 2, $f(2)$ to be 3, $f(3)=5$, $f(4)=7$, $f(5)=11$, etc. So, unlike Euler's polynomial, we require our evolved function to produce consecutive primes for consecutive values of the input i.

The winning criteria for this competition are:

Any evolutionary technique may be used to obtain the polynomial. Solutions that involve limited pre-processing of the input data (e.g. taking logarithms) or post-processing of the output produced by the polynomial (e.g. rounding to the nearest integer) will be accepted as entries. Polynomials with non-integer coefficients will also be accepted as entries.

Evolved solution will be ranked on the basis of:

- The accuracy of the evolved polynomial, as measured by the smallest value of i where $f(i) \neq (i)$.
- The compactness of the evolved polynomial, as measured by the ratio between accuracy (see above) and the size of the polynomial (measured in number of primitives).
- The extent to which evolution (as opposed to mathematical expertise, manual simplification, etc) has been the key component in achieving the resulting polynomial.
- The amount of pre- and post-processing and whether or not the coefficients of the polynomial are integers.

Judges:

Riccardo Poli *(Competitions Chair)*, Nicholas Freitag McPhee, *(University of Minnesota, Morris)*, Maurice Clerc

Competitions

Pasta Segmentation Competition

The pasta segmentation competition is an image processing problem. The problem consists in evolving a detection algorithm capable of separating pasta pixels from non-pasta pixels in pictures containing various kinds of (uncooked) pasta randomly placed on textured backgrounds. The problem is made harder by the varying lighting conditions and the presence, in some of the images, of "pasta noise" (i.e., small pieces of pasta representing alphanumeric characters) which must be labelled as background. Winning criteria for this competition are:

Any evolutionary technique may be used to obtain the desired pasta detection algorithm. Some post processing (whether automatic or manual) of the evolved solutions is also allowed. The output of evolved solutions should be numeric. A threshold will be applied to the output in order to determine the response of the detector when applied to each pixel.

Evolved solution will ranked on the basis of:

- Their accuracy on a separate test set (the test set is very similar to the training set in that it was acquired in the same conditions of light and with the same types of pasta and backgrounds). Accuracy will be evaluated by computing the ROC curve for the detector (which in turn is obtained by evaluating sensitivity and specificity for different settings of the threshold) and then calculating the area under the curve.
- The extent to which evolution (as opposed to image analysis expertise, manual modifications, etc) has been the key component in achieving the result.

Judges:

Riccardo Poli *(Competitions Chair)*, Stefano Cagnoni *(University of Parma, Italy)*, Nicholas Freitag McPhee, *(University of Minnesota, Morris)*, Ela Claridge *(University of Birmingham, UK)*

Tiny GA Competition

The aim of this competition is to produce the tiniest possible implementation of a genetic algorithm. The winning criteria for this competition are:

- Clarity of implementation and accompanying documentation.
- Readability and formatting of the code.
- Number of lines of code.
- Source file size.and size of compiled version of program (if any) under gcc or Java.
- Memory footprint when running.
- Degree to which feature requirements are met.

Judges:

Riccardo Poli *(Competitions Chair)*, Stefano Cagnoni *(University of Parma, Italy)*, Nicholas Freitag McPhee, *(University of Minnesota, Morris)*, Maarten Keijzer *(GECCO-2006 Editor-in-Chief)*

Room *(floor)*	8:30-10:20	10:20-10:40 Break	10:40-12:30	12:30-14:00 Lunch
Visions *(floor 28)*	**Graduate Student Workshop** *Terry Soule*		**Graduate Student Workshop** *(continued)*	
Madison *(floor 4)*	Intro **Grammatical Evolution** *Conor Ryan*		Advanced **Evolutionary Hardware** *Adrian Stoica*	
East *(floor 3)*	Intro **Ant Colony Optimization** *Christian Blum*		Advanced **GA Theory** *Michael Vose*	
North *(floor 3)*			Special **Evolutionary Design** *Ian Parmee*	
SouthWest *(floor 3)*	Advanced **Representations** *Franz Rothlauf*		Intro **Particle Swarm Intelligence** *Russell Eberhart*	
State *(floor 2)*				
Washington *(floor 2)*	Intro **Introduction to Genetic Algorithms** *Erik Goodman*		Intro **Introduction to Genetic Programming** *John R. Koza*	
Federal/Superior *(B-Level)*	**Medical Applications for Genetic and Evolutionary Computation Workshop (MedGEC)** *Stephen L. Smith, Stefano Cagnoni*		**MedGEC** *(continued)*	
Municipal *(B-Level)*	**Military and Security Applications of Evolutionary Computation Workshop** *Laurence Merkle, Misty Blowers, Stephen C. Upton*		**Military and Security Applications of Evolutionary Computation Workshop** *(continued)*	

Tutorial Key:

Intro: Introductory level **Advanced**: Advanced level **Special**: Special Topics

Coffee Breaks: Saturday and Sunday

Coffee breaks are served in the Courtyard Ballroom Foyer, and the Third Floor Foyer at:

- 10:20-10:40
- 15:50-16:10

Lunch: Saturday and Sunday

Lunch on Saturday and Sunday is on your own from 12:30-13:50.

Room	14:00-15:50	15:50-16:10 Break	16:10-18:00
Visions *(floor 28)*	**Graduate Student Workshop** *(continued)*		**Graduate Student Workshop** *(continued)*
Madison *(floor 4)*	Intro **Learning Classifier Systems** *Tim Kovacs*		
East *(floor 3)*	Advanced **No Free Lunch** *Darrell Whitley*		Intro **Probabilistic Model-Building GAs** *Martin Pelikan*
North *(floor 3)*	Special **Systems Biology & EC** *Stephan Bleuer, Philip Zimmerman, Eckart Zitzler*		Advanced **Bioinformatics** *James Foster, Jason. Moore*
SouthWest *(floor 3)*	Intro **Coevolution** *Sevan Ficici, Anthony Bucci*		Special **Fitness Landscape and Problem Difficulty** *Jean-Paul Watson*
State *(floor 2)*			
Washington *(floor 2)*	Advanced **GP Theory** *Riccardo Poli*		Special **Genetic and Evolutionary Computer Vision** *Stefano Cagnoni*
Federal/Superior *(B-Level)*	**Adaptive Representations Workshop** *Marc Toussaint, Edwin de Jong*		**Adaptive Representations Workshop** *(continued)*
Municipal *(B-Level)*	**Military and Security Applications of Evolutionary Computation Workshop** *(continued)*		**Military and Security Applications of Evolutionary Computation Workshop** *(continued)*

Room	8:30-10:20	10:20-10:40 Break	10:40-12:30	12:30-14:00 Lunch
Visions *(floor 28)*				
Madison *(floor 4)*	**Learning Classifier Systems Workshop** *Tim Kovacs, Xavier Llorà, Keiki Takadama*		**Learning Classifier Systems Workshop** *(continued)*	
East *(floor 3)*	**Complexity through Development and Self-Organizing Representations (CODESOAR) Workshop** *Julian Miller, Ivan Garibay, Sanjeev Kumar, Ozlem Garibay, Kivanc Oner*		**CODESOAR Workshop** *(continued)*	
North *(floor 3)*	Intro **Evolution Strategies** *Thomas Bäck*		Special **Experimental Research in EC** *Mike Preuss , Thomas Bartz-Beielstein*	
SouthWest *(floor 3)*	Advanced **Statistics for EC** *Steffen Christensen, Mark Wineberg*		Advanced **Coevolution** *Edwin de Jong, Paul Weigand, Kenneth Stanley*	
State *(floor 2)*			Special **Symbolic Regression in Genetic Programming** *Maarten Keijzer*	
Washington *(floor 2)*	Advanced **Constraint-Handling Techniques Used with EAs** *Carlos Coello Coello*		Special **Evolvable Hardware Applications** *Tetsuya Higuchi*	
Federal/Superior *(B-Level)*	**User-centric Evolutionary Computation Workshop** *Ian Parmee*		**User-centric Evolutionary Computation Workshop** *(continued)*	
Municipal *(B-Level)*	Special **Evolving Neural Networks** *Risto Miikkulainen*		Intro **A Unified Approach to EC** *Kenneth De Jong*	

Coffee Breaks

Coffee breaks are served in the Courtyard Ballroom Foyer, and the Third Floor Foyer at:

- 10:20-10:40
- 15:50-16:10

Lunch

Lunch is on your own from 12:30-13:50.

Room	14:00-15:50	15:50-16:10	16:10-18:00
Visions *(floor 28)*			
Madison *(floor 4)*	**Learning Classifier Systems Workshop** *(continued)*		**Learning Classifier Systems Workshop** *(continued)*
East *(floor 3)*	**CODESOAR Workshop** *(continued)*		**CODESOAR Workshop** *(continued)*
North *(floor 3)*			Special **Spatially Structured EAs** *Marco Tomassini*
SouthWest *(floor 3)*	Advanced **Evolutionary Practical Optimization** *Kalyanmoy Deb*		Advanced **Evolutionary Multiobjective Optimization** *Eckart Zitzler, Stefan Bleuler*
State *(floor 2)*	**Undergraduate Student Workshop** *Laurence Merkle , Clare Bates Congdon, Frank Moore*		**Undergraduate Student Workshop** *(continued)*
Washington *(floor 2)*			Special **Evolution and Resiliency** *Terry Soule*
Federal/Superior *(B-Level)*	**Optimization by Building and Using Probabilistic Models Workshop** *Peter Bosman , Jörn Grahl , Kumara Sastry, Martin Pelikan*		**Optimization by Building and Using Probabilistic Models Workshop** *(continued)*
Municipal *(B-Level)*	Special **Quantum Computing** *Lee Spector*		Advanced **Industrial Evolutionary Computing** *Arthur Kordon, Guido Smits, Mark Kotanchek*

Opening Reception

Opening Reception on Sunday, 18:00 – 19:00 in the Courtyard Ballroom. The reception is free to all registered GECCO attendees. An assortment of hot and cold hors d'oeuvres, wine, and soft drinks will be served. Remember to bring your **Badge and Reception beverage tickets**.

Sunday, July 9

19:00 – 22:00:	Opening Reception *(Courtyard Ballroom, B-Level)*

Monday, July 10

8:15 – 9:45	**Keynote: Dr. William H. Calvin** *(Courtyard Ballroom, B-Level)*
9:45 – 10:10	Coffee Break *(Courtyard Ballroom and Third Floor Foyers)*
10:10 – 12:10	Paper Presentations
12:35 – 13:45	Lunch on your own
13:45 – 15:45	Paper Presentations
15:45 – 16:10	Coffee Break *(Courtyard Ballroom and Third Floor Foyers)*
16:10 – 18:10	Paper Presentations

Tuesday, July 11

8:15 – 9:45	**Keynote: Dr. Mike Hawrylycz** *(Courtyard Ballroom, B-Level*
9:45 – 10:10	Coffee Break *(Courtyard Ballroom and Third Floor Foyers)*
10:10 – 12:10	Paper Presentations
12:10 – 13:45	Lunch on your own
13:45 – 15:45	Paper Presentations
15:45 – 16:10	Coffee Break *(Courtyard Ballroom and Third Floor Foyers)*
16:10 – 18:10	Paper Presentations
19:00 – 22:00:	Poster Session: a light food reception and beverages followed by poster presentations *(Courtyard Ballroom and Third Floor Foyers)*

Wednesday, July 12

8:15 – 9:45	**Plenary Session**: presentation of Best Paper Awards, Humie Awards, and Competition winners, followed by SIGEVO meeting, all are welcome.
9:45 – 10:10	Coffee Break *(Courtyard Ballroom and Third Floor Foyers)*
10:10 – 12:10	Paper Presentations
12:10 – 13:45	Lunch on your own
13:45 – 15:45	Paper Presentations

Instructions for Paper Presentations

Speakers presenting papers are allotted the following presentations time, which includes equipment set up, presentation, and questions period. **If a session is without a chair**, we ask the last scheduled speaker to perform those duties.

- Speakers presenting **accepted papers** during the technical sessions are allocated **30 minutes** for each presentation.
- Speakers in the **Late Breaking Papers** sessions are allocated **20 minutes** for each presentation. The **last scheduled speaker** in an LBP session is asked to **chair the session**.
- Speakers in the **Evolutionary Computing in Practice** (ECP) sessions are allocated **30 minutes** for each presentation.

Instructions for Session Chairs

- Keep the session on schedule:
  Please adhere to the scheduled order of talks, as well as presentation times. If a speaker is absent, we ask you to announce a short break until the next presentation is due to start. Do not start early, as participants may be moving between sessions/presentations.
- Introduce each speaker
- Moderate questions
- Arrive a few minutes early to check on room and equipment set-up. Please let conference organizers know immediately if problems arise or adjustments are needed.

Instructions for Poster Presenters

Poster presenters may set up their posters in the Courtyard Ballroom on Tuesday beginning at 17:30.

Monday-Wednesday Paper Presentations

Floor	Room	Monday July 10			Tuesday July 11			Wednesday July 12	
		10:10–12:10	13:45–15:45	16:10–18:10	10:10–12:10	13:45–15:45	16:10–18:10	10:10–12:10	13:45–15:45
28	Visions						GP-3		
4	Columbia	Wireless Internet Lounge *(bring your own laptop)*							
4	Marion						EH★		
4	James	ECP-1	EDA-2	SBSE-2	ECP-3	EDA★	ECP-4	ECP-5	COEV-2
4	Madison	EMO★	ESEP★		COEV★	ECO★	LCS★	EMO-3	ECO-4
3	North	BA★	LCS-2	ACSI★	LBP-3	ALERAB-2	RWA-5	ALERAB-3	LBP-5
3	SouthWest	GA-1	GA-2	GA★ *(to 18::40)*	GA-4	GA-5	GA-7	GA-8	
3	East	GP-1	ALERAB★	GP★	GP-2	ACSI-2	RWA-4	GP-4	LBP-6
2	Washington	LCS-1	EMO-1	LBP-2	EMO-2	AIS★	ACSI-3	ECO-3	LCS-4
2	State	LBP-1	ECP-2	COMP	SBSE★	ESEP-2	BA-2	LBP-4	ECP-6
B Level	Federal / Superior	RWA★	HCR	RWA-1	RWA-2	RWA-3		RWA-6	RWA-7 *(to 16:15)*
B Level	Municipal		ECO-2	GA-3	LCS-3	GA-6		GA-9	

Poster Session

Tuesday, July 11

- 17:30: Poster authors may begin to set up posters
- 19:00: Reception begins
- 19:30 – 22:00: Authors available to discuss their posters

Key

★	Best Paper Nominations	**EH**	Evolvable Hardware
ALERAB	A-Life, Evolutionary Robotics and Adaptive Behavior	**EMO**	Evolutionary Multiobjective Optimization
ACSI	Ant Colony Optimization and Swarm Intelligence	**ESEP**	Evolutionary Strategies, Evolutionary Programming
AIS	Artificial Immune Systems	**GA**	Genetic Algorithms
BA	Biological Applications	**GP**	Genetic Programming
COEV	Coevolution	**HCR**	Human-Competitive Results
COMP	Competitions	**LBP**	Late-Breaking Papers
ECO	Evolutionary Combinatorial Optimization	**LCS**	Learning Classifier Systems and Other Genetics-Based Machine Learning
ECP	Evolutionary Computation in Practice	**RWA**	Real-World Applications
EDA	Estimation of Distribution Algorithms	**SBSE**	Search-Based Software Engineering

Keynote Speaker — MONDAY 8:15 – 9:45

William Calvin, Ph. D. Theoretical Neurobiologist, University of Washington in Seattle, USA

Room: **Courtyard Ballroom**

Dr. William Calvin is a theoretical neurobiologist at the University of Washington in Seattle, the author of 12 books including *The Cerebral Code* (MIT Press 1996), *How Brains Think* (Science Masters 1996), and, with the neurosurgeon George A. Ojemann, *Conversations with Neil's Brain* (Addison-Wesley 1994).

Coffee Break — MONDAY 9:45 – 10:10

Coffee breaks are served in the **Courtyard Ballroom Foyer** and the **Third Floor Foyer**

Paper Presentations — MONDAY 10:10 – 12:10

Real-World Applications: Best Papers

Session Chair: Room: **Federal/Superior**

10:10-10:40 ★Multiobjective Genetic Algorithms for Multiscaling Excited State Direct Dynamics in Photochemistry
Kumara Sastry, D. D. Johnson, Alexis L. Thompson, David E. Goldberg, Todd J. Martinez, Jeff Leiding, Jane Owens

10:40-11:10 ★Automating the Drug Scheduling with Different Toxicity Clearance in Cancer Chemotherapy via Evolutionary Computation
Yong Liang, Kwong-Sak Lueng, Tony Shu Kam Mok

11:10-11:40 ★The Complete-Basis-Functions Parameterization in ES and its Application to Laser Pulse Shaping
Ofer M. Shir, Christian Siedschlag, Thomas Bäck, Marc J. J. Vrakking

Late Breaking Papers-1

Session Chair: Room: **State**

10:10-10:30 Constructional selection, methylation and adaptable representation: preliminary findings
Susan Khor

10:30-10:50 Motivations for Exhaustive Search Based on Evolutionary Algorithms
Sanza Kazadi, Jonathan Lee, David Zitter

10:50-11:10 The BQP Problem and Exhaustive Search Algorithms Based on Evolutionary Algorithms
Sanza Kazadi, Daniel Min, Casey Cho

11:10-11:30 Model for Evolutionary Technology - An Automatically Defined Terminal Approach
Bin-Tzong Chie, Chih-Chien Wang

11:30-11:50 Using RFID and a Low Cost Robot to Evolve Foraging Behavior
Abraham L. Howell, Roy T.R. McGrann, Richard R. Eckert, Hiroki Sayama

11:50-12:10 Evolvable Hardware Approach Using Evolutionary Algorithms and FPGAs
Thyago Sellmann Pinto Cesar Duque, Alexandre Cláudio Botazzo Delbem

Learning Classifier Systems and other Genetics-Based Machine Learning-1: Prediction Update, Clustering, and Kernels

Session Chair: Tim Kovacs Room: **Washington**

10:10-10:40	Prediction Update Algorithms for XCSF: RLS, Kalman Filter, and Gain Adaptation *Pier Luca Lanzi, Daniele Loiacono, Stewart W Wilson, David E Goldberg*
10:40-11:10	Information Preserving Multi-Objective Feature Selection for Unsupervised Learning *Ingo Mierswa, Michael Wurst*
11:10-11:40	On semi-supervised clustering via multiobjective optimization *Julia Handl, Joshua Knowles*
11:40-12:10	Evolutionary Learning with Kernels: A Generic Solution for Large Margin Problems *Ingo Mierswa*

Genetic Programming-1: Design

Session Chair Room: **East**

10:10-10:40	Synthesis of Interest Point Detectors Through Genetic Programming *Leonardo Trujillo, Gustavo Olague*
10:40-11:10	Canonical Form Functions as a Simple Means for Genetic Programming to Evolve Human-Interpretable Functions *Trent McConaghy, Georges Gielen*
11:10-11:40	A Hybridized Genetic Parallel Programming based Logic Circuit Synthesizer *Wai Shing Lau, Kin Hong Lee, Kwong Sak Leung*
11:40-12:10	Automated Synthesis of a Human-Competitive Solution to the Challenge Problem of the 2002 International Optical Design Conference by Means of Genetic Programming and a Multi-Dimensional Mutation Operation *Lee W Jones, Sameer H. Al-Sakran, John R. Koza*

Genetic Algorithms-1: Theory

Session Chair: David E. Goldberg Room: **SouthWest**

10:10-10:40	Properties of Symmetric Fitness Functions *Sung-Soon Choi, Yung-Keun Kwon, Byung-Ro Moon*
10:40-11:10	A General Coarse-Graining Framework for Studying Simultaneous Inter-Population Constraints Induced by Evolutionary Operations *Keki Burjorjee, Jordan B Pollack*
11:10-11:40	On the Utility of the Multimodal Problem Generator for Assessing the Performance of Evolutionary Algorithms *Fernando G. Lobo, Claudio F. Lima*
11:40-12:10	Fluctuating Crosstalk, Deterministic Noise, and GA Scalability *Paul Winward, David E. Goldberg*

Paper Presentations — MONDAY 10:15 – 12:15

Biological Applications: Best Papers

Session Chair: James Foster — Room: **North**

10:10-10:40	★Comparing Mathematical Models on the Problem of Network Inference *Christian Spieth, Nadine Hassis, Felix Streichert, Jochen Supper, Nora Speer, Klaus Beyreuther, Andreas Zell*
10:40-11:10	★Genetic Programming for Human Oral Bioavailability of Drugs *Francesco Archetti, Stefano Lanzeni, Enza Messina, Leonardo Vanneschi*
11:10-11:40	★GA-BIPAD: A Genetic Algorithm-Based Multiple Local Alignment of Bipartite cis-Element Sequences *Chengpeng Bi , Peter K. Rogan*
11:40-12:10	Using Genetic Programming To Classify Node Positive Patients in Bladder Cancer *A A Almal, A P Mitra, R H Datar, P F Lenehan, D W Fry, R J Cote, W P Worzel*

Evolutionary Multiobjective Optimization: Best Papers

Session Chair: Carlos Coello Coello — Room: **Madison**

10:10-10:40	★On The Effect of Populations in Evolutionary Multi-objective Optimization *Oliver Giel, Per Kristian Lehre*
10:40-11:10	★Towards Estimating Nadir Objective Vector Using Evolutionary Approaches *Kalyanmoy Deb, Shamik Chaudhuri, Kaisa Miettinen*
11:10-11:40	★Inside a Predator-Prey Model for Multi-Objective Optimization: A Second Study *Christian Grimme, Karlheinz Schmitt*
11:40-12:10	★Combining Gradient Techniques for Numerical Multi--Objective Evolutionary Optimization *Peter A.N. Bosman, Edwin D. de Jong*

Evolutionary Computation in Practice-1 Scheduling and Distributed Optimization

Session Chair: David Davis — Room: **James**

10:10-10:40	Space based schedule applications: why simple methods work best *Darrell Whitley, Colorado State University*
10:40-11:10	A distributed evolutionary simulated annealing algorithm for combinatorial optimization problems *Terence Fogarty, London South Bank University*
11:10-11:40	No-Cost, Distributed Genetic Algorithm and its Application to Scheduling *David Powell, Elon University*
11:40-12:10	Scheduling a Billion-dollar Business by Integrating a Genetic Algorithm and an Ant Colony Optimizer *David Davis, VGO Associates*

Lunch — MONDAY 12:10 – 13:45

Lunch is on your own from 12:10 to 13:45.

Human-Competitive Results

Session Chair: John Koza Room: **Federal/Superior**

13:45-15:45 Humie finalists will give short oral presentations about human-competitive results that they have produced by any form of genetic and evolutionary computation (e.g., genetic algorithms, genetic programming, evolution strategies, evolutionary programming, learning classifier systems, grammatical evolution, etc.)

Evolutionary Combinatorial Optimization-1: Problems on Graphs

Session Chair: Ekart Zitzler Room: **Municipal**

13:45-14:15 ★A New Hybrid Evolutionary Algorithm for the k-cardinality Tree Problem
Christian Blum

14:15-14:45 How Randomized Search Heuristics Find Maximum Cliques in Planar Graphs
Tobias Storch

14:45-15:15 An Effective Genetic Algorithm for the Minimum-Label Spanning Tree Problem
Jeremiah Nummela, Bryant A Julstrom

15:15-15:45 Maximum Cardinality Matchings on Trees by Randomized Local Search
Oliver Giel, Ingo Wegener

Evolutionary Computation in Practice-2: Energy and Resource

Session Chair: Tina Yu Room: **State**

13:45-14:15 Petroleum Reservoirs: Model Calibration and Uncertainty Assessment of Production Forecasts
Alexandre Castellini, Chevron

14:15-14:45 Application of a genetic algorithm with casting process simulation
Volker Kokot, MAGMA Giessereitechnologie GmbH

14:45-15:15 EC and IEC for MEMS design
Raffi Roupen Kamalian, Kyushu University

15:15-15:45 Co-evolving Fitness Predictors for Accelerating and Reducing Evaluations
Hod Lipson, Cornell University

Evolutionary Multiobjective Optimization-1: Alternative Methods and Algorithm Improvements

Session Chair: Arturo Hernández-Aguirre Room: **Washington**

13:45-14:15 Incorporating Directional Information within a Differential Evolution Algorithm for Multi-objective Optimization
Antony W. Iorio, Xiaodong Li

14:15-14:45 Reference Point Based Multi-Objective Optimization Using Evolutionary Algorithms
Kalyanmoy Deb, J. Sundar

14:45-15:15 A New Proposal for Multi-Objective Optimization using Differential Evolution and Rough Sets Theory
Alfredo G. Hernández-Díaz, Luis V. Santana-Quintero, Carlos A. Coello Coello, Julián Molina Rafael Caballero

15:15-15:45 An Efficient Multi-objective Evolutionary Algorithm with Steady-State Replacement Model
Dipti Srinivasan, Lily Rachmawati

Artificial Life, Evolutionary Robotics, Adaptive Behavior: Best Paper Nominations

Session Chair: Room: **East**

13:45-14:15	★Facilitating Neural Dynamics for Delay Compensation and Prediction in Evolutionary Neural Networks *Heejin Lim, Yoonsuck Choe*
14:15-14:45	★A Method for Parameter Calibration and Relevance Estimation in Evolutionary Algorithms *Volker Nannen, A.E. Eiben*
14:45-15:15	★Modular Thinking: Evolving Modular Neural Networks for Visual Guidance of Agents *Ehud Schlessinger, Peter J. Bentley, R. Beau Lotto*
15:15-15:45	Robustness Analysis of Genetic Programming Controllers for Unmanned Aerial Vehicles *Gregory J. Barlow, Choong K. Oh*

Genetic Algorithms-2: Operators

Session Chair: Christopher Stephens Room: **SouthWest**

13:45-14:15	Crossover Gene Selection by Spatial Location *David M Cherba, William Punch*
14:15-14:45	Multi--Attractor Gene Reordering for Graph Bisection *Inwook Hwang, Yong-Hyuk Kim, Byung-Ro Moon*
14:45-15:15	A Crossover for Complex Building Blocks Overlapping *Miwako Tsuji, Masaharu Munetomo, Kiyoshi Akama*
15:15-15:45	Optimal Mutation Rates for Genetic Search *Jorge Cervantes, Christopher R Stephens*

Learning Classifier Systems and other Genetics-Based Machine Learning-2: Reinforcement Learning and Behavior

Session Chair: Stewart W. Wilson Room: **North**

13:45-14:15	Multi-Step Environment Learning Classifier Systems applied to Hyper-Heuristics *Javier G. Marín-Blázquez, Sonia Schulenburg*
14:15-14:45	Standard and Averaging Reinforcement Learning in XCS *Pier Luca Lanzi, Daniele Loiacono*
14:45-15:15	On-Line Evolutionary Computation for Reinforcement Learning in Stochastic Domains *Shimon Whiteson, Peter Stone*
15:15-15:45	Analysis of the Difficulty of Learning Goal-Scoring Behaviour for Robot Soccer *Jeff Riley, Vic Ciesielski*

Evolution Strategies, Evolutionary Programming: Best Paper Nominations

Session Chair: Thomas Bartz-Beielstein Room: **Madison**

13:45-14:15	★On the Local Performance of Simulated Annealing and the (1+1) Evolutionary Algorithm *Thomas Jansen, Ingo Wegener*
14:15-14:45	★Hierarchically Organised Evolution Strategies on the Parabolic Ridge *Dirk V. Arnold, Alexander MacLeod*
14:45-15:15	★A Computational Efficient Covariance Matrix Update and a (1+1)-CMA for Evolution Strategies *Christian Igel, Thorsten Suttorp, Nikolaus Hansen*
15:15-15:45	★Reconsidering the Progress Rate Theory for Evolution Strategies in Finite Dimensions *Anne Auger, Nikolaus Hansen*

Estimation of Distribution Algorithms-2: Efficiency Enhancement

Session Chair: Peter A.N. Bosman Room: **James**

13:45-14:15	Sporadic Model Building for Efficiency Enhancement of Hierarchical BOA *Martin Pelikan, Kumara Sastry, David E. Goldberg*
14:15-14:45	Evaluation Relaxation Using Substructural Information and Linear Estimation *Kumara Sastry, Claudio F. Lima, David E. Goldberg*

Coffee Break **MONDAY 15:45 – 16:10**

Coffee break is served in the **Courtyard Ballroom Foyer** and the **Third Floor Foyer**

Real-World Applications-1

Session Chair: Room: **Federal/Superior**

16:10-16:40	Biobjective Evolutionary and Heuristic Algorithms for Intersection of Geometric Graphs *Rajeev Kumar, Pramod K Singh, Bhargab B Bhattacharya*
16:40-17:10	Evolutionary Search for Optimal Combinations of Markers in Clothing Manufacturing *Bogdan Filipic, Iztok Fister, Marjan Mernik*
17:10-17:40	Evolutionary Optimization of ZIP60: A Controlled Explosion in Hyperspace *Dave Cliff*
17:40-18:10	Behavioural GP Diversity for Dynamic Environments: an application in hedge fund investment *W. Yan, C. D. Clack*

Genetic Algorithms-3: Dynamic Optimization

Session Chair: Hisashi Handa Room: **Municipal**

16:10-16:40	A Comparative Study of Immune System Based Genetic Algorithms in Dynamic Environments *Shengxiang Yang*
16:40-17:10	The Effect of Crossover on the Behavior of the GA in Dynamic Environments: A Case Study using the Shaky Ladder Hyperplane-Defined Functions *William Rand, Rick Riolo, John H. Holland*
17:10-17:40	Fitness Function for Finding out Robust Solutions on Time-Varying Functions *Hisashi Handa*

Competitions

Session Chair: Riccardo Poli Room: **State**

16:10-18:10	Competition finalists will give short oral presentations about the results that they have produced.

Late Breaking Papers - 2

Session Chair: Room: **Washington**

16:10-16:30	Changes in Genetic Representation *Sanza Kazadi, Taeho Lee, Daniel Noh*
16:30-16:50	Niched Co-Evolution Strategies to Address Non-uniqueness in Engineering Design *Emily Zechman, Ranji Ranjithan, Li Liu*
16:50-17:10	Two Heuristic Operations to Improve the Diversity of Two-objective Pareto Solutions *Rinku Dewri, Darrell Whitley*
17:10-17:30	Solving Multiobjective Shortest Path Problems by Using Ant Colony Optimization Combined with a new Heuristic-Value-Concept - The Look-Ahead-Heuristic *Marco Fischer, Sascha Häckel, Kaminski Jens*
17:30-17:50	No Free Lunch and Algorithmic Randomness *Simon McGregor*
17:50-18:10	Solving Expensive Multiobjective Optimization Problems: A Fast Pareto Genetic Algorithm Approach *Hamidreza Eskandari, Christopher D. Geiger*

Genetic Programming: Best Papers

Session Chair: Room: **East**

16:10-16:40 ★Characterizing the Dynamics of Symmetry Breaking in Genetic Programming
Jason M. Daida

16:40-17:10 ★Alternative Evolutionary Algorithms for Evolving Programs
Darrell Whitley, Ross Beveridge , Marc Richards , Andre Barreto

17:10-17:40 ★Dynamics of Evolutionary Robustness
Alan T Piszcz, Terence Soule

17:40-18:10 ★Using Contextaware Crossover to Improve the Performance of GP
Hammad Majeed, Conor Ryan

Genetic Algorithms: Best Papers

Session Chair: Dirk Thierens Room: **SouthWest**

16:10-16:40 ★Comparing Evolutionary and Temporal Difference Methods in a Reinforcement Learning Domain
Matthew E. Taylor, Shimon Whiteson, Peter Stone

16:40-17:10 ★Dynamic Multi-Objective Optimization with Evolutionary Algorithms: A Forward-Looking Approach
Iason Hatzakis, David R Wallace

17:10-17:40 ★An Empirical Investigation of How and Why Neutrality Affects Evolutionary Search
Edgar Galvan-Lopez, Riccardo Poli

17:40-18:10 ★Multi-Objective Test Problems, Linkages, and Evolutionary Methodologies
Kalyanmoy Deb, Ankur Sinha, Saku Kukkonen

18:10-18:40 ★Non-Wrapping Order Crossover: An Order Preserving Crossover Operator that Respects Absolute Position
Vincent A Cicirello

Ant Colony Optimization and Swarm Intelligence: Best Papers

Session Chair: Christian Blum Room: **North**

16:10-16:40 ★An Ant-Based Algorithm for Finding Degree-Constrained Minimum Spanning Tree
Thang N. Bui, Catherine M. Zrncic

16:40-17:10 ★PSO and Multi-Funnel Landscapes: How cooperation might limit exploration
Andrew M. Sutton, Darrell Whitley, Monte Lunacek, Adele Howe

17:10-17:40 ★Particle Swarm with Speciation and Adaptation in a Dynamic Environment
Xiaodong Li, Juergen Branke, Tim Blackwell

Search-Based Software Engineering-2: Software Testing

Session Chair: John Andrew Clark Room: **James**

16:10-16:40 Improving Evolutionary Real-Time Testing
Marouane Tlili, Stefan Wappler, Harmen Sthamer, Joachim Wegener

16:40-17:10 Evolutionary Unit Testing of Object-Oriented Software Using Strongly-Typed Genetic Programming
Stefan Wappler, Joachim Wegener

17:10-17:40 Reformulation of the Generation of Conformance Testing Sequences to the Asymmetric Travelling Salesman Problem
Jitian Xiao, Chiou Peng Lam, Huaizhong Li, Jun Wang

17:40-18:10 The State Problem for Test Generation in Simulink
Yuan Zhan, John A. Clark

Keynote Speaker — Tuesday 8:15 – 9:45

Dr. Mike Hawrylycz Director, Informatics, Allen Institute for Brain Science, USA

Room: **Courtyard Ballroom**

Mapping and Mining The Allen Brain Atlas: an overview of the Allen Brain Atlas, its database and informatics tools and indicate some possibilities for data mining. The opportunities for computational discovery in this image based database are virtually limitless and should be great interest to those interested in applications of evolutionary computation.

Coffee Break — Tuesday 9:45 – 10:10

Coffee break is served in the **Courtyard Ballroom Foyer** and the **Third Floor Foyer**

Paper Presentations — Tuesday 10:10 – 12:10

Real-World Applications-2

Session Chair: Room: **Federal/Superior**

10:10-10:40	Evolving Musical Performance Profiles Using Genetic Algorithms with Structural Fitness *Qijun Zhang, Eduardo Reck Miranda*
10:40-11:10	Reward Allotment in an Event-driven Hybrid Learning Classifier System for Online Soccer Games *Yuji Sato, Yosuke Akatsuka, Takenori Nishizono*
11:10-11:40	Genetic Algorithms for Action Set Selection Across Domains: A Demonstration *Greg Lee, Vadim Bulitko*
11:40-12:10	Innovization: Innovating Design Principles Through Optimization *Kalyanmoy Deb, Aravind Srinivasan*

Learning Classifier Systems and other Genetics-Based Machine Learning-3: Conditions and Matching

Session Chair: Pier Luca Lanzi Room: **Municipal**

10:10-10:40	A Representational Ecology for Learning Classifier Systems *James A. R. Marshall, Tim Kovacs*
10:40-11:10	Using Convex Hulls to Represent Classifier Conditions *Pier Luca Lanzi, Stewart W. Wilson*
11:10-11:40	Hyper-ellipsoidal Conditions In XCS: Rotation, Linear Approximation, and Solution Structure *Martin V. Butz, Pier Luca Lanzi, Stewart W. Wilson*
11:40-12:10	Fast Rule Matching for Learning Classifier Systems via Vector Instructions *Xavie Llorà, Kumara Sastry*

Search-Based Software Engineering: Best Paper Nominations and Software Quality

Session Chair: Phil McMinn Room: **State**

10:10-10:40	★Clustering the Heap in Multi-Threaded Applications for Improved Garbage Collection *Myra B. Cohen, Shiu Beng Kooi, Witawas Srisa-an*
10:40-11:10	★Search-based Determination of Refactorings for Improving the Class Structure of Object-Oriented Systems *Olaf Seng, Johannes Stammel, David Burkhart*
11:10-11:40	A Novel Approach to Optimize Clone Refactoring Activity *Salah Bouktif, Giuliano Antoniol, Ettore Merlo, Markus Neteler*
11:40-12:10	Simulated Annealing for improving software quality prediction *Salah Bouktif, Houari Sahraoui, Giuliano Antoniol*

Evolutionary Multiobjective Optimization-2: Local Search, Data Structures and Test Problems

Session Chair: Eckart Zitzler Room: **Washington**

10:10-10:40	Local Search for Multiobjective Function Optimization: Pareto Descent Method *Ken Harada, Jun Sakuma, Shigenobu Kobayashi, Kokolo Ikeda, Isao Ono*
10:40-11:10	Rotated Test Problems for Assessing the Performance of Multiobjective Optimization Algorithms *Antony W Iorio, Xiaodong Li*
11:10-11:40	An Efficient Approach to Unbounded Bi-Objective Archives - Introducing the Mak_Tree Algrorithm *Adam Michael Berry, Peter Vamplew*
11:40-12:10	Hybridization of Genetic Algorithm and Local Searchin Multiobjective Function Optimization: Recommendation of GA then LS *Ken Harada, Kokolo Ikeda, Shigenobu Kobayashi, Jun Sakuma, Isao Ono*

Genetic Programming-2: Speed up techniques

Session Chair: Room: **East**

10:10-10:40	Genetically programmed strategies for Chess endgame *Nicolas Lassabe, Stéphane Sanchez, Hervé Luga, Yves Duthen*
10:40-11:10	ALPS: The Age-Layered Population Structure for Reducing the Problem of Premature Convergence *Gregory S. Hornby*
11:10-11:40	A Multi-chromosome Approach to Standard and Embedded Cartesian Genetic Programming *James Alfred Walker, Julian Francis Miller, Rachel Cavill*
11:40-12:10	Embedded Cartesian Genetic Programming and the Lawnmower and Hierarchical-if-and-only-if Problems *James Alfred Walker, Julian Francis Miller*

Genetic Algorithms-4: New Approaches

Session Chair: Riccardo Poli Room: **SouthWest**

10:10-10:40	Combining Genetic Algorithms with Squeaky-Wheel Optimization *Justin Terada, Hoa Vo, David Joslin*
10:40-11:10	The LEM3 Implementation of Learnable Evolution Model and Its Testing on Complex Function Optimization Problems *Janusz Wojtusiak, Ryszard S. Michalski*
11:10-11:40	A New Generation Alternation Model for Differential Evolution *Nasimul Noman, Hitoshi Iba*
11:40-12:10	Structure and Metaheuristics *Yossi Borenstein, Riccardo Poli*

Late Breaking Papers-3

Session Chair: Room: **North**

10:10-10:30	A Multi-Population Parallel Genetic Algorithm for Continuous Galvanizing Line Scheduling *Muzaffer Kapanoglu, Ilker Ozan Koc*
10:30-10:50	Solving Multi-level Lot Sizing Problem with Memetic Algorithm Based on Refinement Procedure *Hae-Joong Kim, Sung-Won Jung, Eoksu Sim, Jungsub Lee, Jinwoo Park*
10:50-11:10	Evolutionary Method of Genetic Network Programing *Shinji Eto, Shingo Mabu, Kotaro Hirasawa, Jinglu Hu*
11:10-11:30	Automatic Negotiation using LCS-based Multi-Agent Systems *Luis Miramontes Hercog, Terence Claus Fogarty*
11:30-11:50	Comparison between Centralized Global Optimization and Distributed Local Optimization for Traffic Jam Avoidance *Ken Ohara, Yusuke Nojima, Hisao Ishibuchi*
11:50-12:10	Developing Scheduling Policies In Dynamic Job Shops Using Pitts-Based Learning *Muzaffer Kapanoglu, Mete Alikalfa*

Coevolution: Best Papers

Session Chair: Kenneth Stanley Room: **Madison**

10:10-10:40	★Archive-based Cooperative Coevolutionary Algorithms *Liviu Panait, Sean Luke, Joseph F. Harrison*
10:40-11:10	★The Effects of Interaction Frequency on the Optimization Performance of Cooperative Coevolution *Elena Popovici, Kenneth De Jong*
11:10-11:40	★The Parallel Nash Memory for Asymmetric Games *Frans A Oliehoek, Edwin D de Jong, Nikos Vlassis*
11:40-12:10	★Robustness in Cooperative Coevolution *R. Paul Wiegand, Mitchell A. Potter*

Paper Presentations — Tuesday 10:10 – 12:10

Evolutionary Computation in Practice-3: Technology Transfer

Session Chair: Rajkumar Roy — Room: **James**

10:10-10:40	Practical EC Practiced in Academia: How challenging has it been to me? *Kalyanmoy Deb, IIT*
10:40-11:10	Design for product-embedded disassembly *Kazuhiro Saitou, University of Michigan*
11:10-11:40	Technology transfer *Ian Parmee, Advanced Computational Technologies*
11:40-12:10	Technology Transfer from Universities to Industry – A Personal View *Thomas Baeck, NuTech Solutions*

Lunch — Tuesday 12:10 – 13:45

Lunch is on your own from 12:10 to 13:45.

Paper Presentations — Tuesday 13:45 – 15:45

Real-World Applications-3

Session Chair: — Room: **Federal/Superior**

13:45-14:15	Multi-Objective Optimisation of the Protein-Ligand Docking Problem in Drug Discovery *A Oduguwa, A Tiwari, S Fiorentino, R Roy*
14:15-14:45	On the Benefits of Inoculation, an Example in Train Scheduling *Yann L Semet, Marc Schoenauer*
14:45-15:15	A Genetic Algorithm with a Variable-Length Genotype and Embryogeny for Microstructured Optical Fibre Design *Steven Manos, Leon Poladian, Peter J Bentley, Maryanne Large*
15:15-15:45	Mixed-Integer Optimization of Coronary Vessel Image Analysis using Evolution Strategies *Rui Li, Michael T. M. Emmerich, Jeroen Eggermont, Ernst G. P. Bovenkamp, Jouke Dijkstra, Thomas Baeck, Johan H.C. Reiber*

Genetic Algorithms-6: Representations and Operators

Session Chair: Kalyanmoy Deb — Room: **Municipal**

13:45-14:15	How an Optimal Observer can Collapse the Search Space *Christophe Philemotte, Hugues Bersini*
14:15-14:45	gLINC: Identifying Composability using Group Perturbation *David Jonathan Coffin, Christopher D Clack*
14:45-15:15	Comparison of Multi-Modal Optimization Algorithms Based on Evolutionary Algorithms *Gulshan Singh, Kalyanmoy Deb*
15:15-15:45	Strong Recombination, Weak Selection, and Mutation *Alden H. Wright, J. Neal Richter*

Evolution Strategies, Evolutionary Programming-2: Optimization, Adaptation, Hybridization

Session Chair: Anne Auger Room: **State**

13:45-14:15 Probabilistic Runtime Analysis of (1+,lambda)ES Using Isotropic Mutations
Jens Jaegerskuepper

14:15-14:45 On the Analysis of the (1+1) Memetic Algorithm
Dirk Sudholt

14:45-15:15 A Comparative Study of Differential Evolution Variants for Global Optimization
Efrén Mezura-Montes, Jesús Velázquez-Reyes, Carlos A. Coello Coello

15:15-15:45 The Dispersion Metric and the CMA Evolution Strategy
Monte Lunacek, Darrell Whitley

Artificial Immune Systems

Session Chair: Gary Lamont Room: **Washington**

13:45-14:15 ★Properties of the Bersini Experiment on Self-Assertion
Werner Dilger, Steve Strangfeld

14:15-14:45 ★Applicability Issues of the Real-Valued Negative Selection Algorithms
Zhou Ji, Dipankar Dasgupta

14:45-15:15 A Retrovirus Inspired Algorithm for Virus Detection & Optimization
Kenneth S Edge, Gary B Lamont, Richard A Raines

15:15-15:45 Immune Anomaly Detection Enhanced with Evolutionary Paradigms
Marek Ostaszewski, Franciszek Seredynski, Pascal Bouvry

Ant Colony Optimization and Swarm Intelligence-2: Ant Colony Optimization

Session Chair: Christian Blum Room: **East**

13:45-14:15 A New Ant Colony Algorithm for Multi-Label Classification with Applications in Bioinformatics
Allen Chan, Alex A Freitas

14:15-14:45 An Agent-Based Algorithm for Generalized Graph Colorings
Thang N. Bui, ThanhVu H. Nguyen

14:45-15:15 A New Version of the Ant-Miner Algorithm Discovering Unordered Rule Sets
James Smaldon, Alex A. Freitas

Genetic Algorithms-5: Graphs

Session Chair: Bryant Julstrom Room: **SouthWest**

13:45-14:15 Geometric Crossover for Multiway Graph Partitioning
Yong-Hyuk Kim, Yourim Yoon, Alberto Moraglio, Byung-Ro Moon

14:15-14:45 A Tree-Based Genetic Algorithm for Building Rectilinear Steiner Arborescences
William A Greene

14:45-15:15 Spectral Techniques for Graph Bisection in Genetic Algorithms
Jacob G Martin

15:15-15:45 Neighbourhood Searches for the Bounded Diameter Minimum Spanning Tree Problem Embedded in a VNS, EA, and ACO
Martin Gruber, Jano van Hemert, Günther R. Raidl

Artificial Life, Evolutionary Robotics, Adaptive Behavior-2

Session Chair: Room: **North**

13:45-14:15	Parisian Evolution with Honeybees for Three-dimensional Reconstruction *Gustavo Olague, Cesar Puente*
14:15-14:45	Emergent Mating Topologies in Spatially Structured Genetic Algorithms *Joshua L Payne, Margaret J Eppstein*
14:45-15:15	Comparing Genetic Robustness in Generational vs. Steady State Evolutionary Algorithms *Josh Jones, Terence Soule*
15:15-15:45	Memory Analysis and Significance Test for Agent Behaviours *DaeEun Kim*

Evolutionary Combinatorial Optimization: Best Papers and New Techniques

Session Chair: Room: **Madison**

13:45-14:15	★Anisotropic Selection in Cellular Genetic Algorithms *David Simoncini, Sébastien Verel, Philippe Collard, Manuel Clergue*
14:15-14:45	Deceptiveness and Neutrality - the ND family of fitness landscapes *William Beaudoin, Sébastien Verel, Philippe Collard, Cathy Escazut*
14:45-15:15	★Adaptation for Parallel Memetic Algorithm Based on Population Entropy *Jing Tang, Meng Hiot Lim, Yew Soon Ong*
15:15-15:45	A GA-Based Method to Produce Generalized Hyper-heuristics for the 2D-Regular Cutting Stock Problem *H. Terashima-Marin, C. J. Farías-Zárate, P. Ross, M. Valenzuela-Rendón*

Estimation of Distribution Algorithms: Best Paper and Real-valued EDAs and EDA applications

Session Chair: Peter A.N. Bosman Room: **James**

13:45-14:15	The Correlation-Triggered Adaptive Variance Scaling IDEA *Jörn Grahl, Peter A.N. Bosman, Franz Rothlauf*
14:15-14:45	★Probabilistic Modeling for Continuous EDA with Boltzmann Selection and Kullback-Leibeler Divergence *Yunpeng Cai, Xiaomin Sun, Peifa Jia*
14:45-15:15	Optimising Cancer Chemotherapy Using an Estimation of Distribution Algorithm and Genetic Algorithms *Andrei V. Petrovski, Siddhartha Shakya, John McCall*

Coffee Break **Tuesday 15:45 – 16:10**

Coffee break is served in the **Courtyard Ballroom Foyer** and the **Third Floor Foyer**

Real-World Applications - 4

Session Chair: Room: **East**

16:10-16:40 A Crossover Operator for the k-anonymity Problem
Monte Lunacek, Darrell Whitley, Indrakshi Ray

16:40-17:10 Genetic Algorithms for Positioning and Utilizing Sensors in Synthetically Generated Landscapes
Haluk Topcuoglu, Murat Ermis

17:10-17:40 Designing Safe, Profitable Automated Stock Trading Using Evolutionary Algorithms
Harish K Subramanian, Subramanian Ramamoorthy, Peter Stone, Benjamin J Kuipers

17:40-18:10 3D Airspace Sectoring by Evolutionary Computation
Daniel Delahaye, Stéphane Puechmorel

Real-World Applications-5

Session Chair: Room: **North**

16:10-16:40 Selective Self-Adaptive Approach to Ant System for Solving Unit Commitment Problem
Dr. Songsak Chusanapiputt, Mr. Dulyatat Nualhong, Dr. Sujate Jantarang, Dr. Sukuvit Phoomvuthisarn

16:40-17:10 Pareto Front Genetic Programming Parameter Selection Based on Design of Experiments and Industrial Data
Flor A. Castillo, Arthur Kordon, Guido Smits, Ben Christenson, Dee Dickerson

17:10-17:40 Towards an evolutionary tool for the allocation of supermarket shelf space
Anna I Esparcia-Alcazar, Lidia Lluch-Revert, Jose Miguel Albarracin-Guillem, Marta E Palmer-Gato, Ken C Sharman

17:40-18:10 Evolution of Driving Agent, Remotely Operating a Scale Model of a Car with Obstacle Avoidance Capabilities
Ivan Tanev, Michal Joachimczak, Katsunori Shimohara

Evolvable Hardware

Session Chair: Gregory Hornby Room: **Marion**

16:10-16:40 ★Filter Approximation Using Explicit Time and Frequency Domain Specifications
Varun Aggarwal, Wesley O. Jim, Una-May O'Reilly

16:40-17:10 Evolutionary Design of Fault-Tolerant Analog Control for a Piezoelectric Pipe-Crawling Robot
Geoffrey Anton Hollinger, David A Gwaltney

17:10-17:40 A Dynamically Constrained Genetic Algorithm For Hardware-software Partitioning
Pierre-André Mudry, Guillaume Zufferey, Gianluca Tempesti

Biological Applications-2: Bioinformatics

Session Chair: Jason Moore Room: **State**

16:10-16:40 The Role of Diverse Populations in Phylogenetic Analysis
Tiffani L. Williams, Marc L. Smith

16:40-17:10 Identification of Weak Motifs in Multiple Biological Sequences using Genetic Algorithm
Topon Kumar Paul, Hitoshi Iba

17:10-17:40 Inference of Genetic Networks using S-system: Information Criteria for Model Selection
Nasimul Noman, Hitoshi Iba

17:40-18:10 Coordination number prediction using Learning Classifier Systems: Performance and interpretability
Jaume Bacardit, Michael Stout, Natalio Krasnogor, Jonathan D. Hirst, Jacek Blazewicz

Genetic Programming-3: Theory

Session Chair: Room: **Visions**

16:10-16:40	ORDERTREE: A New Test Problem for Genetic Programming *Tuan-Hao Hoang, Hoai Xuan Nguyen, Hien Thi Nguyen, R.I(Bob) McKay, Daryl Essam*
16:40-17:10	A Quantitative Study of Neutrality in GP Boolean Landscapes *Leonardo Vanneschi, Yuri Pirola, Philippe Collard, Marco Tomassini, Sebastien Verel, Giancarlo Mauri*
17:10-17:40	Convergence to Global Optima for Genetic Programming Systems with Dynamically Scaled Operators *L. M. Schmitt, S. Droste*

Genetic Algorithms-7: Representations

Session Chair: Franz Rothlauf Room: **SouthWest**

16:10-16:40	A Splicing/Decomposable Encoding and Its Novel Operators for Genetic Algorithms *Yong Liang, Kwong-Sak Lueng, Kin-Hong Lee*
16:40-17:10	Selecting for Evolvable Representations *Joseph S Reisinger, Risto Miikkulainen*
17:10-17:40	Conquering hierarchical difficulty by explicit chunking: Substructural chromosome compression *Tian-Li Yu, David E Goldberg*
17:40-18:10	A Hybrid of Genetic Algorithm and Bottleneck Shifting for Flexible Job Shop Scheduling Problem *Jie Gao, MItsuo Gen, Linyan Sun*

Ant Colony Optimization and Swarm Intelligence-3: Particle Swarm Optimization

Session Chair: Xiaodong Li Room: **Washington**

16:10-16:40	Adaptively Choosing Niching Parameters in a PSO *Stefan C Bird, Xiaodong Li*
16:40-17:10	The Gregarious Particle Swarm Optimizer (G-PSO) *Srinivas Pasupuleti, Roberto Battiti*
17:10-17:40	A New Discrete Particle Swarm Algorithm Applied to Attribute Selection in a Bioinformatics Data Set *Elon S. Correa, Alex A. Freitas, Colin G. Johnson*
17:40-18:10	Adaptive Diversity in PSO *Christopher K. Monson, Kevin D. Seppi*

Paper Presentations — Tuesday 16:10 – 18:10

Learning Classifier Systems and other Genetics-Based Machine Learning: Best Papers

Session Chair: Martin V. Butz — Room: **Madison**

16:10-16:40 ★Bounding XCS's Parameters for Unbalanced Datasets
Albert Orriols-Puig, Ester Bernadó-Mansilla

16:40-17:10 ★A Bayesian Approach to Learning Classifier Systems in Uncertain Environments
Davide Aliprandi, Alex Mancastroppa, Matteo Matteucci, Andrea Bonarini

17:10-17:40 ★Classifier Prediction based on Tile Coding
Pier Luca Lanzi, Daniele Loiacono, Stewart W Wilson, David E Goldberg

Evolutionary Computation in Practice-4: Technology Transfer/Design

Session Chair: Rajkumar Roy and Jiachuan Wang — Room: **James**

16:10-16:40 Results of the First Survey of Practitioners of Evolutionary Computation
Gregory Hornby, NASA Ames

16:40-17:10 Industry-Academia Collaboration in Government-Funded Research and Development
Talib Hussain, BBN Technologies

17:10-17:40 Making evolutionary computing popular in the Steel Industry
Rajkumar Roy, Cranfield University

17:40-18:10 Integrated and Innovation Design Automation of Mechatronic Systems
Jiachuan Wang, United Technologies Research Center

Poster Session — Tuesday 19:00 – 22:00

The **Poster Session** on Tuesday evening begins at 19:00 with an assortment of hot and cold hors d'oeuvres, wine, beer, and soft drinks. Poster authors will be available to discuss their posters beginning at 19:30. Remember to bring your **Badge and Poster Session beverage tickets**.

Ant Colony Optimization and Swarm Intelligence

Introducing Recombination with Dynamic Linkage Discovery to Particle Swarm Optimization
Ming-chung Jian, Ying-ping Chen

Ant colony optimization technique for equilibrium assignment in congested transportation networks
Matteo Matteucci, Lorenzo Mussone

Dynamic Fitness Inheritance Proportion For Multi-Objective Particle Swarm Optimization
Margarita Reyes-Sierra, Carlos A. Coello Coello

The Brueckner Network: An Immobile Sorting Swarm
William A. Tozier, Michael R. Chesher, Tejinderpal S. Devgan

Artificial Immune Systems

An Artificial Immune System and its Integration into an Organic Middleware for Self-Protection
Andreas Pietzowski, Benjamin Satzger, Wolfgang Trumler, Theo Ungerer

A Dynamic Approach to Artificial Immune Systems utilizing Neural Networks
Stefan Schadwinkel, Werner Dilger

Artificial Life, Evolutionary Robotics, Adaptive Behavior

Using a Genetic Algorithm to Evolve Cellular Automata for 2D/3D Computational Development: Shape Generation
Arturo Chavoya, Yves Duthen

Genomic Computing Networks Learn Complex POMDPs
David Montana, Eric VanWyk, Marshall Brinn, Joshua Montana, Stephen Milligan

The Baldwin Effect under Spatial Isolation and Autonomous Reproduction
Hai Liang Peng, Joc Cing Tay

Biological Applications

Peptide Data Mining: From Virtual Design to Knowledge Extraction
Ignasi Belda, Ivan Traus, Susana Gordo, Teresa Tarragó, Sergio Madurga, Xavier Llorà, Ernest Giralt

A Genetic Algorithm with Backtracking for Protein Structure Prediction
Clayton Matthew Johnson, Anitha Katikireddy

String Transformation-Based Bayesian Classification or Proteins
Timothy Meekhof, Gary W. Daughdrill, Robert B. Heckendorn

A Hybrid Genetic Search for Multiple Sequence Alignment
Seung-Hyun Moon, Sung-Soon Choi, Byung-Ro Moon

Comparing Evolutionary Algorithms on the Problem of Network Inference
Christian Spieth, Rene Worzischek, Felix Streichert, Jochen Supper, Nora Speer, Andreas Zell

Evolving Boolean Networks to find Intervention Points in Dengue Pathogenesis
Philip Tan, Joc Cing Tay

Genetic Algorithms are Suitable for Driving Microbial Ecosystems in Desirable Directions
Frederik P.J. Vandecasteele, Thomas F. Hess, Ronald L. Crawford

Coevolution

High-Order Punishment and the Evolution of Cooperation
Bastian Baranski, Thomas Bartz-Beielstein, Ruediger Ehlers, Thusinthan Kajendran, Bjoern Kosslers, Joern Mehnen, Tomasz Polaszek, Ralf Reimholz, Jens Schmidt, Simon Steeg, Karlheinz Schmitt, Danny Seis, Rafael Slodzinski, Nils Wiemann, Marc Zimmermann

Red Queen dynamics in a predator-prey ecosystem
Walter de Back, Marco Wiering, Edwin D de Jong

Indirect Co-evolution for understanding Belief in an Incomplete Information Dynamic Game
Nanlin Jin

Actively Probing and Modeling Users in Interactive Coevolution
Michael D Schmidt, Hod Lipson

Estimation of Distribution Algorithms

Levels of Abstraction in Modeling and Sampling: The Feature-Based Bayesian Optimization Algorithm
Moshe Looks

Hierarchical BOA on Random Decomposable Problems
Martin Pelikan, Kumara Sastry, Martin V. Butz, David E. Goldberg

Does Overfitting Affect Performance in Estimation of Distribution Algorithms
Hao Wu, Jonathan L Shapiro

Evolution Strategies, Evolutionary Programming

A Simple Line Search Operator for Ridged Landscapes
Andrea Soltoggio

Evolutionary Combinatorial Optimization

A Genetic Algorithm for the Longest Common Subsequence Problem
Brenda Hinkemeyer, Bryant A. Julstrom

A Combinatorial Genetic Algorithm for the Configuration of the 2dF/AAOmega Spectrograph at the Anglo-Australian Observatory
Steven Manos, Geraint F Lewis

Measuring the Evolvability Landscape to study Neutrality
Verel Sébastien, Collard Philippe, Clergue Manuel

Genetic Local Search for Multicast Routing
Mohammed S. Zahrani, Martin J. Loomes, James A. Malcolm, Andreas A. Albrecht

Evolutionary Multiobjective Optimization

Incorporation of Decision Maker's Preference into Evolutionary Multiobjective Optimization Algorithms
Hisao Ishibuchi, Yusuke Nojima, Kaname Narukawa, Tsutomu Doi

The Multi-Objective Constrained Assignment Problem
Mark P Kleeman, Gary B. Lamont

A New Multi-Objective Evolutionary Algorithm for Solving High Complex Multi-Objective Problems
Kangshun Li, Xuezhi Yue, Lishan Kang, Zhangxin Chen

Comparison of Multi-Objective Evolutionary Algorithms in Optimizing Combinations of Reinsurance Contracts
Ingo Oesterreicher, Andreas Mitschele, Frank Schlottmann, Detlef Seese

A Multi-objective Evolutionary Algorithm with Weighted-Sum Niching for Convergence on Knee Regions
Lily Rachmawati, Dipti Srinivasan

Genetic Algorithms

Instance Similarity and the Effectiveness of Case Injection in a Genetic Algorithm for Binary Quadratic Programming
Jason Amunrud, Bryant A Julstrom

A Comparative Study of Evolutionary Optimization Techniques in Dynamic Environments
Demet Ayvaz, Haluk Topcuoglu, Fikret Gurgen

The No Free Lunch and Realistic Search Algorithms
Yossi Borenstein, Riccardo Poli

Classes of Problems in the Black Box Scenario
Yossi Borenstein, Riccardo Poli

A Genetic Model Based on Simulated Crossover of Quaternary Genes for Quadratic Fitness
Marco Carpentieri, Vito Fedullo

Variable Length Genetic Algorithms with Multiple Chromosomes on a Variant of the Onemax Problem: Investigating changes in chromosome length.
Rachel Cavill, Stephen L Smith, Andy M Tyrrell

Improving Genetic Algorithm Performance with Intelligent Mappings from Chromosomes to Solutions
Justin Collins, David Joslin

The Snake in the Box Problem. Mathematical Conjecture and a Genetic Algorithm Approach
Pedro A. Diaz-Gomez, Dean F. Hougen

A New Approach for Shortest Path Routing Problem by Random Key-based GA
Mitsuo Gen, Lin Lin

Solving Identification Problem for Asynchronous Finite State Machines Using Genetic Algorithms
Xiaojun Geng

iECGA: Integer Extended Compact Genetic Algorithm
Ping-chu Hung, Ying-ping Chen

Analyzing Active Interactive Genetic Algorithms using Visual Analytics
Xavier Llorà, Kumara Sastry, Francesc Alías, David E Goldberg, Michael E Welge

Extraction of Landscape Information based on a Quality Control Approach and Its Applications to Mutation in GA
Mitsukuni Matayoshi, Morikazu Nakamaura, Hayao Miyagi

Generalized Cycle Crossover for Graph Partitioning
Alberto Moraglio, Yong-Hyuk Kim, Yourim Yoon, Byung-Ro Moon, Riccardo Poli

Mating Networks in Steady State Genetic Algorithms are Scale Free
M. Kivanc Oner, Ivan I. Garibay, Annie S. Wu

Distributed Genetic Algorithm for Energy-Efficient Resource Management in Sensor Networks
Qinru Qiu, Qing Wu, Daniel Burns, Douglas Holzhauer

Estimating the Destructiveness of Crossover on Binary Tree Representations
Luke J. Sheneman, James A. Foster

Multi-Objective Diversity Maintenance
Paul Snijders, Edwin D de Jong, Bart de Boer, Franjo Weissing

Game Theory as a New Paradigm for Phenotype Characterization of Genetic Algorithms
Otávio Noura Teixeira, Felipe Houat de Brito, Artur Noura Teixeira, Roberto Célio Limão de Oliveira

Leveraging Domain-Expert Knowledge in a Genetic Algorithm for Civil Engineering Design Optimization
Hoa Vo, Justin Terada, David Joslin, Jeff Dragovich

Dominance Learning in Diploid Genetic Algorithms for Dynamic Optimization Problems
Shengxiang Yang

Both Robust Computation and Mutation Operation in Dynamic Evolutionary Algorithm are Based on Orthogonal Design
Sanyou Zeng, Rui Wang, Hui Shi, Guang Chen, Hugo de Garis, Lishan Kang

Evolvable Hardware

Exploring Network Topology Evolution Through Evolutionary Computations
Sami J. Habib, Alice C. Parker

Genetic Programming

Relaxed Genetic Programming
Luis E Da Costa, Jacques-Andre Landry

Improving GP Classifier Generalization Using a Cluster Separation Metric
Ashley L George, Malcolm I. Heywood

Genetic Programming with Primitive Recursion
Stefan Kahrs

Nonlinear Parametric Regression in Genetic Programming
Yung-Keun Kwon, Sung-Soon Choi, Byung-Ro Moon

Pareto-coevolutionary Genetic Programming Classifier
Michal Lemczyk, Malcolm Heywood

Alternative Cross-Over Strategies and Selection Techniques for Grammatical Evolution Optimized Neural Networks
Alison A. Motsinger, Lance W. Hahn, Scott M. Dudek, Kelli Ryckman, Marylyn D. Ritchie

Investigation on Artificial Ant using Analytic Programming
Zuzana Oplatková, Ivan Zelinka

A Survey of Mutation Techniques in Genetic Programming
Alan T Piszcz, Terence Soule

Genetic Programming: Optimal Population Sizes for Varying Complexity Problems
Alan T Piszcz, Terence Soule

Predicting Currency Exchange Rates by Genetic Programming with Trigonometric Functions and High-Order Statistics
Roy Schwaerzel, Tom Bylander

When Lisp if Faster then C
Boerge Svingen

Redundant Genes and the Evolution of Robustness
Russell Thomason, Terence Soule

Learning Classifier Systems and other Genetics-Based Machine Learning

Ensemble Selection for Evolutionary Learning using Information Theory and Price's Theorem
Stuart W Card, Chilukuri K Mohan

FTXI: Fault Tolerance XCS in Integer
Hong-Wei Chen, Ying-Ping Chen

Multiobjective Genetic Rule Selection as a Data Mining Postprocessing Procedure
Hisao Ishibuchi, Yusuke Nojima, Isao Kuwajima

Estimating Photometric Redshifts with Genetic Algorithms
Nick Miles, Alex Freitas, Stephen Serjeant

An Anticipatory Approach to Improve XCSF
Amin Nikanjam, Adel Rahmani

An Open-set Speaker Identification System using Genetic Learning Classifier System
WonKyung Park, Jae C. Oh, Misty K. Blowers, Matt B. Wolf

Evolving Cooperative Behavior in a Power Market
Dipti Srinivasan, Dakun Woo, Lily Rachmawati, Kong Wei Lye

Sets of Receiver Operating Characteristic Curves and their Use in the Evaluation of Multi-Class Classification
Stephan M. Winkler, Michael Affenzeller, Stefan Wagner

Real-World Applications

Candlestick Stock Analysis with Genetic Algorithms
Peter Belford

Genetic Algorithms and Mixed Integer Linear Programs for Optimal Strategies in a Student's Sports" Activity"
Thomas Butter, Franz Rothlauf, Jörn Grahl, Tobias Hildenbrand, Jens Arndt

Human Competitive Security Protocols Synthesis
Hao Chen, John Clark, Jeremy Jacob

Genetic Algorithms to optimise the time to make Stock Market investment.
David de la Fuente, Alejandro Garrido, Jaime Laviada, Alberto Gómez

Evolutionary Design of Pseudorandom Sequence Generators based on Cellular Automata and its applicability in current Cryptosystems
David Fernando Delgado Chaparro, David Fernando Vidal Orozco, German Jairo Hernandez Perez

Evolving hash functions by means of Genetic Programming
César Estébanez, Julio César Hernández-Castro, Arturo Ribagorda, Pedro Isasi

Evolutionary Interactive Music Composition
Tao-yang Fu, Tsu-yu Wu, Chin-te Chen, Kai-chu Wu, Ying-ping Chen

Hybrid Search for Cardinality Constrained Portfolio Optimization
Miguel A Gomez, Carme X Flores, Maria A Osorio

A Case-Study about Shift Work Management at a Hospital Emergency Department with Genetic Algorithms
Alberto Gomez, David De la Fuente, Javier Puente, Jose Parreno

Multi-objective Genetic Algorithms for Pipe Arrangement Design
Satoshi Ikehira, Hajime Kimura

An Evolutionary Approach to Camera-Based Projector Calibration
Clayton Matthew Johnson, Anu Bhat, William C. Thibault

Autonomous Evolutionary Music Composer
Yaser Khalifa, Mohamed Basel Al-Mourad

A Unified Optimization Framework for Microelectronics Industry
Yiming Li, Cheng-Kai Chen, Yen-Yu Cho

Characterizing Large Text Corpora Using a Maximum Variation Sampling Genetic Algorithm
Robert M Patton, Thomas E Potok

Real-time Construction of Aircraft Landing Schedules Using an Evolutionary Algorithm
Neil B Urquhart

Comparative Analysis of the Sailor Assignment Problem
Joseph R Vannucci , J Deon Garrett, Dipankar Dasgupta

Search-Based Approaches to the Component Selection and Prioritization Problem
Mark Harman, Alexandros Skaliotis, Kathleen Steinhofel, Paul Baker

A Specification-Based Fitness Function for Evolutionary Testing of Object-Oriented Programs
Yoonsik Cheon, Myoung Kim

Towards Effective Adaptive Random Testing for Higher-Dimensional Input Domains
Johannes Mayer

Single and Multi-objective Genetic Operators in Object-Oriented Conceptual Software Design
Christopher L Simons, Ian C Parmee

Pairwise Sequence Comparison for Fitness Evaluation in Evolutionary Structural Software Testing
H. Turgut Uyar, A. Sima Uyar, Emre Harmanci

Tuning Experiments with an Adaptive Computational Framework
Joseph A. Lewis, Chris Ansoff

Plenary Session — Wednesday 8:15 – 9:45
Awards and SIGEVO Meeting

Room: **Courtyard Ballroom**

Best Paper Awards, Competition Winners, and Humie Awards will be announced. A meeting of the members of SIGEVO follows the awards. All are welcome.

Coffee Break — Wednesday 9:45 – 10:10

9:45-1:10 Coffee break is served in the **Courtyard Ballroom Foyer** and the **Third Floor Foyer**

Paper Presentations — Wednesday 10:10 – 12:10

Real-World Applications-6

Session Chair: Room: **Federal/Superior**

10:10-10:40 Optimization of NC Tool Paths for Five-Axis Milling using Evolutionary Algorithms on Wavelets
Klaus Weinert, Andreas Zabel, Heinrich Müller, Petra Kersting

10:40-11:10 On Evolving Buffer Overflow Attacks Using Genetic Programming
Hilmi Gunes Kayacik, Malcolm Heywood, Nur Zincir-Heywood

11:10-11:40 A Neural Evolutionary Approach to Financial Modeling
Antonia Azzini, Andrea G.B. Tettamanzi

11:40-12:10 Evolutionary Motion Design for Humanoid Robots
Toshihiko Yanase, Hitoshi Iba

Genetic Algorithms-9: Adaptation

Session Chair: Ying-ping Chen Room: **Municipal**

10:10-10:40 Use of Statistical Outlier Detection Method in Adaptive Evolutionary Algorithms
James M Whitacre, Tuan Q Pham, Ruhul A Sarker

10:40-11:10 Credit Assignment in Adaptive Evolutionary Algorithms
James M Whitacre, Tuan Q Pham, Ruhul A Sarker

11:10-11:40 Revisiting Evolutionary Algorithms with On-the-Fly Population Size Adjustment
Fernando G. Lobo, Claudio F. Lima

11:40-12:10 Adaptive Discretization for Probabilistic Model Building Genetic Algorithms
Chao-Hong Chen, Wei-Nan Liu, Ying-ping Chen

Late Breaking Papers-4

Session Chair: Room: **State**

10:10-10:30	Variable Neighborhood Particle Swarm Optimization Algorithm *Ajith Abraham, Hongbo Liu, Tae-Gyu Chang*
10:30-10:50	Image Noise Cancellation Using a Hybrid Clonal Selection Algorithm and Cellular Neural Network *Te-Jen Su, Hsiao-Ching Lin, Chiao-Yu Chuang*
10:50-11:10	Cellular Neural Networks for Medical Image Noise Cancellation Based on Particle Swarm Optimization *Te-Jen Su, Hsin-Chih Wang*
11:10-11:30	Bilaterally Symmetrical Encoding in the Evolution of Artificial Neural Networks for Symmetry Detection *Derek James, Philip Tucker, Anthony Maida*
11:30-11:50	Constraint Handling in Genetic Algorithms via Artificial Immune Systems *Heder S. Bernardino, Helio J.C. Barbosa, Afonso C.C. Lemonge*
11:50-12:10	Artificial Immune System for Discovering Heuristics in Othello *Milad Lagevardi, Joseph Lewis*

Evolutionary Combinatorial Optimization-3: Cutting, Packing and Assignment Problems

Session Chair: Christian Blum Room: Washington

10:10-10:40	The Quadratic Multiple Knapsack Problem and Three Heuristic Approaches to It *Amanda Hiley, Bryant A Julstrom*
10:40-11:10	A GA-ACO-Local Search Hybrid Algorithm for Solving Quadratic Assignment Problem *Yi-Liang Xu, Meng-Hiot Lim, Yew-Soon Ong, Jing Tang*

Genetic Programming-4: Classification

Session Chair: Room: **East**

10:10-10:40	Algebraic Simplification of GP Programs During Evolution *Phillip Wong, Mengjie Zhang*
10:40-11:10	Improving Cooperative GP Ensemble with Clustering and Pruning for Pattern Classification *Gianluigi Folino, Clara Pizzuti, Giandomenico Spezzano*
11:10-11:40	Genetic Programming for Agricultural Purposes *Clément Chion, Luis Da Costa, Jacques-André Landry*
11:40-12:10	MOGE: GP Classification Problem Decomposition using Multi-objective Optimization *Andrew R McIntyre, Malcolm I Heywood*

Genetic Algorithms-8: Applications

Session Chair: Kumara Sastry Room: **SouthWest**

10:10-10:40	Distributed Evaluation Functions for Fault Tolerant Multi-Rover Systems *Adrian K Agogino, Kagan Tumer*
10:40-11:10	Robot Gaits Evolved by Combining Genetic Algorithms and Binary Hill Climbing *Lena Mariann Garder, Mats Erling Høvin*
11:10-11:40	Segmentation of Medical Images Using a Genetic Algorithm *Payel Ghosh, Melanie Mitchell*
11:40-12:10	A Fast Hybrid Genetic Algorithm for the Quadratic Assignment Problem *Alfonsas Misevicius*

Artificial Life, Evolutionary Robotics, Adaptive Behavior-3

Session Chair: Room: **North**

10:10-10:40	A Computational Theory of Adpative Behavior Based on an Evolutionary Reinforcement Mechanism *J. J McDowell, Paul L. Soto, Jesse Dallery, Saule Kulubekova*
10:40-11:10	Adaption in Distributed Systems - An Evolutionary Approach *Stephan Otto, Stefan Kirn*
11:10-11:40	Growth of Self-Canceling Code in Evolutionary Systems *Xue Zhong, Terence Soule*
11:40-12:10	Dominance hierarchies and social diversity in multi-agent systems *Michael Kirley*

Evolutionary Multiobjective Optimization-3: Applications

Session Chair: Kalyanmoy Deb Room: **Madison**

10:10-10:40	Design Synthesis of Microelectromechanical Systems Using Genetic Algorithms with Component-Based Genotype Representation *Ying Zhang, Raffi Kamalian, Alice M. Agogino, Carlo H. Sequin*
10:40-11:10	Multiobjective Genetic Algorithms for Materialized View Selection in OLAP Data Warehouses *Michael K Lawrence*
11:10-11:40	Multi-objective Evolutionary Optimization for Visual Data Mining with Virtual Reality Spaces: Application to Alzheimer Gene Expressions. *Julio J. Valdes, Alan J. Barton*

Evolutionary Computation in Practice-5: Integrated Optimization

Session Chair: David Davis Room: **James**

10:10-10:40	How Optimization Can Change a Business *David Davis, VGO Associates*
10:40-11:10	Two Examples of Integrated Optimization *Thomas Baeck, NuTech Solutions*
11:10-11:40	Optimization as a Business Tool: Challenges *Rajkumar Roy, Cranfield University*
11:40-12:10	Optimizing Optimization Implementation *Charlie Guthrie, Chevron*

Lunch — Wednesday 12:10 – 13:45

Lunch is on your own from 12:10 to 13:45.

Paper Presentations — Wednesday 13:45 – 15:45

Real-World Applications-7

Session Chair: Room :**Federal/Superior**

13:45-14:15	Multi-Objective PID-Controller Tuning for a Magnetic Levitation System using NSGA-II *Gerulf K. M. Pedersen, Zhenyu Yang*
14:15-14:45	Effective Genetic Approach for Optimizing Advanced Planning and Scheduling in Flexible Manufacturing System *HaiPeng Zhang, MItsuo Gen*
14:45-15:15	Cutting Stock Waste Reduction Using Genetic Algorithms *Yaser Khalifa, Ossama Salem, Adham Shahin*
15:15-15:45	Evolving a Real-World Vehicle Warning System *Nate Kohl, Kenneth Stanley, Risto Miikkulainen, Michael Samples, Rini Sherony*

Evolutionary Computation in Practice-6: Panel Discussion

Session Chair: Rajkumar Roy Room: **State**

13:45-15:45	How Evolutionary Computing based Design Optimization could become a Regular Business Tool in Industry

Learning Classifier Systems and other Genetics-Based Machine Learning - 4: Fitness and Advanced Recombination

Session Chair: Xavier Llorà Room: **Washington**

13:45-14:15	Evolving Ensemble of Classifiers in Random Subspace *Albert Hung-Ren Ko, Robert Sabourin, Alceu de Souza Britto, Jr.*
14:15-14:45	Smart Crossover operator with multiple parents for a Pittsburgh Learning Classifier System *Jaume Bacardit, Natalio Krasnogor*
14:45-15:15	Studying XCS/BOA Learning in Boolean Functions: Structure Encoding and Random Boolean Functions *Martin V. Butz, Martin Pelikan*

Late Breaking Papers-5

Session Chair: Room: **East**

13:45-14:05	Hill-climbing through "random chemistry" for detecting epistasis *Margaret J. Eppstein, Joshua L. Payne, Bill C. White, Jason H. Moore*
14:05-14:25	Pair Swap Strategy in Quantum-Inspired Evolutionary Algorithm *Shigeru Nakayama, Takahiro Imabeppu, Satoshi Ono*
14:25-14:45	A Case-Study about Shift Work Management at a Hospital Emergency Department with Genetic Algorithms *Alberto Gomez, David De la Fuente, Nazario Garcia, Jaime Laviada*
14:45-15:05	Clonal Selection Algorithm for IIR Equalizer Design *Te-Jen Su, Hsiao-Ching Lin, Wen-Pin Tsai*
15:05-15:25	A Comparison of EvolutionaryComputing Techniques Used to Model Bi-Directional Reflectance Distribution Functions *Edwin Roger Banks, Edwin Núñez, Paul Agarwal, Marshall McBride, Ronald Liedel, Claudette Owens*
15:25-15:45	Evolutionary Data Mining for Link Analysis: Preliminary Experiments on a Social Network Test Bed *William Hsu, Andrew King, Martin Paradesi, Tejaswi Pydimarri, Tim Weninger*

Late-Breaking Papers-6

Session Chair: Room: **North**

13:45-14:05	Using Differential Evolution for GEP Constant Creation *Qiongyun Zhang, Chi Zhou, Weimin Xiao, Peter C. Nelson, Xin Li*
14:05-14:25	On How Solution Populations Can Guide Revision of Model Parameters *Steven O Kimbrough, David H Wood*
14:25-14:45	Solving Nonlinear Equation Systems Using Evolutionary Algorithms *Crina Grosan, Ajith Abraham*
14:45-15:05	The Inequality Process as an Evolutionary Process *John Angle*

Evolutionary Combinatorial Optimization - 4: Scheduling

Session Chair: Room: **Madison**

13:45-14:15	Combining Simplex with Niche-based Evolutionary Computation for Job-Shop Scheduling *Syhlin Kuah, Joc Cing Tay*
14:15-14:45	GRASP-Evolution for Constraint Satisfaction Problems *Manuel Cebrián, Iván Dotú*
14:45-15:15	Comparison of Genetic Representation Schemes for Scheduling Soft Real-Time Parallel Applications *Yoginder S. Dandass, Amit C. Bugde*

Coevolution-2

Session Chair: Sean Luke Room: **James**

13:45-14:15	A Game-Theoretic Investigation of Selection Methods in Two-Population Coevolution *Sevan G Ficici*
14:15-14:45	Coevolution of Neural Networks using a Layered Pareto Archive *German A Monroy, Kenneth O Stanley, Risto Miikkulainen*
14:45-15:15	DECA: Dimension Extracting Coevolutionary Algorithm *Edwin D de Jong, Anthony Bucci*
15:15-15:45	Heterogeneous Cooperative Coevolution: Strategies of Integration between GP and GA *Leonardo Vanneschi, Giancarlo Mauri, Andrea Valsecchi, Stefano Cagnoni*

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