

Genetic and Evolutionary Computation Conference (GECCO-2003)

12-16 July 2003
Saturday-Wednesday
Chicago, Illinois USA



CONFERENCE PROGRAM

Genetic and Evolutionary Computation Conference
July 12 – 16, 2003

Holiday Inn Mart Plaza
Chicago, Illinois, USA

A Recombination of the Eighth Annual Genetic Programming Conference and the
Twelfth International Conference on Genetic Algorithms

International Society for Genetic and Evolutionary Computation, Inc.
In Association with the American Association for Artificial Intelligence

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Registration Times

Sunday – Tuesday, July 13-15: 7:30 – 17:00, Wednesday, July 16: 7:30 – 12:00

The registration will take place in the foyer on the 14th Floor. The staff at the registration desk will happily answer any questions you may have about the conference.

Exhibits

Visit exciting exhibits from these and other vendors.

- Kluwer Academic Publishers
- Springer Verlag
- Sun Microsystems
- EvoNet
- Applied AI Systems, Inc.

All exhibits will be located in the foyer on the 14th Floor. Exhibition times are 13:00 – 17:30 on Saturday, July 12; 8:30 – 17:30 Sunday through Tuesday, July 13-15; and from 8:30 – 13:30 on Wednesday, July 16 (or as posted in the foyer on the 14th Floor).

Instructions for Presenters and Session Chairs:

Talks in the regular technical sessions, Monday through Wednesday, are scheduled for 30 minutes. This includes 20 minutes of presentation and 10 minutes of questions. Late Breaking Paper (LBP) talks should take no more than 10 minutes total (7 minutes of presentation with 3 minutes of questions). Set-up of necessary presentation equipment should be calculated into the allotted presentation time.

The duties of session chairs are: Keep the session on schedule, introduce speakers, and moderate the question portion. Session chairs should 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. 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. Out of consideration for other speakers and all participants, please stay on schedule. If a session is without a chair, we ask the last scheduled speaker to perform those duties.

Special Note: Monday, GA Theory 1 and RWA Learning will be from 10:00 – 11:10, and GA Theory 2 and RWA Vision & Learning will be from 13:45 – 14:30 in the Sauganash Ballroom. These changes allow organizers set-up time for the Kluwer *No Free Lunch* lunch.

GECCO-2003 Organizers

INTERNATIONAL SOCIETY FOR GENETIC AND EVOLUTIONARY COMPUTATION, INC.

In association with the American Association for Artificial Intelligence (AAAI), 445 Burgess Drive, Menlo Park, CA 94025

CONFERENCE CHAIR: James A. Foster

PROCEEDINGS EDITOR-IN-CHIEF: Erick Cantú-Paz

BUSINESS COMMITTEE: David E. Goldberg and John Koza

WORKSHOPS CHAIR: Alwyn Barry

GRADUATE STUDENT WORKSHOP: Maarten Keijzer, Sean Luke, Terry Riopka

ISGEC Bylaws establish Program Policy Committees drawn from EC editors and book authors in six areas: Genetic Algorithms, Genetic Programming, Evolution Strategies and Evolutionary Programming, Learning Classifier Systems, Evolvable Hardware, and Real World Applications. Chairs of these committees are also chairs of corresponding GECCO tracks. Additional tracks are operated by Special Program Committees, chaired by the track chair.

PROGRAM AND POLICY COMMITTEE CHAIRS

Genetic Algorithms

Kalyanmoy Deb (chair), David Coley, Rolf Drechsler, David E. Goldberg, John Holland, Sam Kwong, Zbigniew Michalewicz, Frederick Petry, Wallace Tang, Michael Vose

Genetic Programming

Una-May O'Reilly (chair), David Andre, Vladan Babovic, Wolfgang Banzhaf, James A. Foster, Hitoshi Iba, Christian Jacob, Robert E. Keller, John Koza, Riccardo Poli, Man Leung Wong

Real-World Applications

David Davis & Rajkumar Roy (chairs), Peter Bentley, Lance Chambers, Dipankar Dasgupta, Francisco Herrera, Witold Pedrycz, Elisabeth Rudnick, Jose Luis Verdegay

Artificial Immune Systems

Dipankar Dasgupta

Evolution Strategies and Evolutionary Programming

Hans-Georg Beyer (chair), Palmen Angelov, Günter Rudolph

Search Based Software Engineering

Mark Harman & Joachim Wegner

A-Life, Adaptive Behavior, Agents, and Ant Colony Optimization

Russell Standish (chair)

Learning Classifier Systems

Stewart Wilson (chair), Larry Bull

DNA, Molecular, and Quantum Computing

Natasha Jonoska (chair)

Evolvable Hardware

Julian Miller (chair), Moshe Sipper, Adrian Thompson

Evolutionary Robotics

Mitchell A. Potter & Alan C. Schultz (chairs)

Evolutionary Scheduling and Routing

Kathryn A. Downsland (chair)

Coevolution

Graham Kendall

LATE BREAKING PAPERS CHAIR: Bart Rylander

STUDENT HOUSING REPRESENTATIVE: Ashley Morris

ADMINISTRATIVE ASSISTANCE: Carol Hamilton, Elizabeth Ericson, Ann Stolberg

SUPPORT FOR STUDENT TRAVEL DONATED BY:

Air Force Office of Scientific Research
Navy Center for Applied Research in Artificial Intelligence
National Science Foundation
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Hongnian Yu	Ricardo Zebulum	Andreas Zell	Byoung-Tak Zhang	Enrique Alba
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Hans-Georg Beyer	Bv Babu	Fevzi Belli	Peter Bosman	Terry Bossomaier
Jürgen Branke	Magdalena Bugajska	Stefano Cagnoni	Erick Cantú-Paz	Uday Chakraborty
Weng-Tat Chan	Alastair Channon	Ying-Ping Chen	Junghuei Chen	Manuel Clergue
Carlos Coello Coello	David Coley	Philippe Collard	Clare Bates Congdon	David Corne
Ernesto Costa	Bart Craenen	Kalyanmoy Deb	Brahma Deo	Antonio Della Cioppa
A Santos Del Riego	Dirk Devogelaere	Der-Rong Din	Kathryn Dowsland	Gerry Dozier
Rolf Drechsler	Norberto Eiji Nawa	Christos Emmanouilidis	Hector Erives	Felipe Espinoza
Dario Floreano	Cyril Foulupt	Carlos Fonseca	Ivan Garibay	Alessio Gaspar
Zhou Gengui	Tushar Goel	Fabio González	Kendall Graham	John Grefenstette
Darko Grundler	Dongbing Gu	Charles Guthrie	Hani Hagras	Hisashi Handa
Georges Harik	Mark Harman	Inman Harvey	Michael Herdy	Jürgen Hesser
Mika Hirvensalo	Tadashi Horiuchi	Kosuke Imamura	Iñaki Inza	Thomas Jansen
Yaochu Jin	Natasha Jonoska	Bryant Julstrom	Balakrishnan Karthik	Sanza Kazadi
Michael Kirley	Joshua Knowles	Arthur Kordon	Sam Kwong	William Langdon
Pedro Larrañaga	Warren Liao	Fernando Lobo	Manuel Lozano	Jose Antonio Lozano
Sean Luke	John Lusth	Evelyne Lutton	Ana Madureira	Arita Masanori
Giancarlo Mauri	Jon McCormack	Lisa Meeden	Jörn Mehnen	Ole Mengshoel
Mark Meysenburg	Julian Miller	Chilukuri Mohan	Byung-Ro Moon	Alberto Moraglio
Yunjun Mu	Sibylle Mueller	Masaharu Munetomo	Zensho Nakao	Tomooaru Nakashima
Bart Naudts	David Newth	Stefano Nolfi	Gabriela Ochoa	Victor Oduguwa
Charles Ofria	Gustavo Olague	Markus Olhofer	Una-May O'Reilly	Franz Oppacher
Jim Ouimet	Charles Palmer	Liviu Panait	Gary Parker	Anil Patel
Tom Portegys	Mitchell A. Potter	Walter Potter	Dilip Pratihar	Adam Prügel-Bennett
William Punch	Günter Raidl	Khaled Rasheed	Tapabrata Ray	Patrick Reed
John Reif	Andreas Reinholz	Jose Riquelme	Denis Robilliard	Franz Rothlauf
Bart Rylander	Eugene Santos	Kumara Sastry	David Schaffer	Martin Schmidt
Alan C. Schultz	Sandip Sen	Franciszek Seredynski	Jane Shaw	Anabela Simões
Abhishek Singh	Jim Smith	Alan Soper	V. Sundararajan	Gil Syswerda
Ernesto Tarantino	Hugo Terashima-Marin	Lothar Thiele	Dirk Thierens	Andy Tomlinson
Shigeyoshi Tsutsui	Clarissa Van Hoyweghen	David Van Veldhuizen	Manuel Vazquez-Outomuro	Roger Wainwright
Matthew Wall	Ingo Wegener	Joachim Wegener	Darrill Whitley	Kay Wiese
Wendy Williams	Stewart Wilson	Mark Wineberg	Alden Wright	Annie Wu
Ayse Yilmaz	Tian-Li Yu	Lyudmila A. Zinchenko		

Best-Paper Awards

As part of the double-blind peer review, the 34 papers listed below were nominated for consideration for a best paper award. The winners of this award will be selected by secret vote by the registered attendees to the conference. For the voting, you should have received three (3) ballots to elect the best papers with your registration package (one ballot for each day of the technical sessions). If you did not receive three ballots, please contact the registration desk immediately.

Papers compete in different categories according to the deme to which they were submitted (e.g., GA papers compete only against other GA papers). Please return your ballot to the registration desk at the end of each day, so we can count the votes and announce the winners promptly.

Selected best paper award winners will be invited to submit an expanded version of their paper to the Kluwer journal *Genetic Programming and Evolvable Machines*. Throughout this schedule, nominated papers are highlighted with a star (★) to make them easier to find. All papers have the deme they were submitted to listed along the title to help with write-in votes.

- Immune Inspired Somatic Contiguous Hypermutation for Function* (AIS), Johnny Kelsey, Jonathan Timmis
- Efficiency and Reliability of DNA-based Memories* (DMQ), Max Garzon, Andrew Neel, Hui Chen
- Hardware Evolution of Analog Speed Controllers for a DC Motor* (EH), David Gwaltney, Michael Ferguson
- Integration of Genetic Programming and Reinforcement Learning for Real Robots* (ER), Shotaro Kamio, Hideyuki Mitsuhashi, Hitoshi Iba
- Co-Evolving Task-Dependent Visual Morphologies in Predator-Prey Experiments* (ER), Gunnar Buason, Tom Ziemke
- The Steady State Behavior of (m/m_i,l)-ES on Ellipsoidal Fitness Models Disturbed by Noise* (ES/EP), Hans-Georg Beyer, Dirk Arnold
- On the Optimization of Monotone Polynomials by the (1+1) EA and Randomized Local Search* (ES/EP), Ingo Wegener, Carsten Witt
- Ruin and Recreate Principle Based Approach for the Quadratic Assignment Problem* (ES/EP), Alfonsas Misevicius
- Evolutionary Computing as a Tool for Grammar Development* (ES/EP), Guy De Pauw
- Adaptive Elitist-population Based Genetic Algorithm for Multimodal Function Optimization* (GA), Kwong-Sak Leung, Yong Liang
- Scalability of Selectorecombinative Genetic Algorithms for Problems with Tight Linkage* (GA), Kumara Sastry, David E. Goldberg
- Effective Use of Directional Information in Multi-Objective Evolutionary Computation* (GA), Martin Brown, Robert Smith
- Are Multiple Runs of Genetic Algorithms Better Than One?* (GA), Erick Cantú-Paz, David E. Goldberg
- Selection in the Presence of Noise* (GA), Jürgen Branke, Christian Schmidt
- Difficulty of Unimodal and Multimodal Landscapes in Genetic Programming* (GP), Leonardo Vanneschi, Marco Tomassini, Manuel Clergue, Philippe Collard
- Dynamic Maximum Tree Depth – A Simple Technique for Avoiding Bloat in Tree-Based GP* (GP), Sara Silva, Jonas Almeida
- Generative Representations for Evolving Families of Designs* (GP), Gregory Hornby
- Fundamental Mechanisms Concerning Trees in Standard GP* (GP), Jason Daida, Adam Hilss
- Visualizing Tree Structures in Genetic Programming* (GP), Jason Daida, Adam Hilss, David Ward, Stephen Long
- Methods for Evolving Robust Programs* (GP), Liviu Panait, Sean Luke
- Population Implosion in Genetic Programming* (GP), Sean Luke, Gabriel Balan, Liviu Panait
- Designing Efficient Exploration with MACS: Modules and Function Approximation* (LCS), Pierre Gérard, Olivier Sigaud
- Tournament Selection: Stable Fitness Pressure in XCS* (LCS), Martin Butz, Kumara Sastry, David E. Goldberg
- Towards Building Block Propagation in XCS: A Negative Result and Its Implications* (LCS), Kurian Tharakunnel, Martin Butz, David E. Goldberg
- Quantum-Inspired Evolutionary Algorithm-Based Face Verification* (RWA), Jun-Su Jang, Kuk-Hyun Han, Jong-Hwan Kim
- Mining Comprehensive Clustering Rules with an Evolutionary Algorithm* (RWA), Ioannis Sarafis, Phil Trinder, Ali Zalzal
- System-Level Synthesis of MEMS Via Genetic Programming and Bond Graphs* (RWA), Zhun Fan, Kisung Seo, Jianjun Hu, Ronald C. Rosenberg, Erik Goodman
- Active Guidance for a Finless Rocket using Neuroevolution* (RWA), Faustino Gomez, Risto Miikkulainen
- Extracting Test Sequences from a Markov Software Usage Model by ACO* (SBSE), Karl Doerner, Walter Gutjahr
- Modeling the Search Landscape of Metaheuristic Software Clustering Algorithms* (SBSE), Brian Mitchell, Spiros Mancoridis
- A Non-Dominated Sorting Particle Swarm Optimizer for Multiobjective Optimization* (AAAA), Xiaodong Li
- Emergence of Collective Behavior in Evolving Populations of Flying Agents* (AAAA), Lee Spector, Jon Klein, Christopher Perry, Mark Feinstein
- Finite Population Models of Co-Evolution and Its Application to Haploidy Versus Diploidy* (COEV), Anthony Liekens, Huub ten Eikelder, Peter Hilbers
- A Game-Theoretic Memory Mechanism for Coevolution* (COEV), Sevan Ficici, Jordan Pollack

About the Evolutionary Computation in Industry Track

This year's GECCO includes, for the second year, a track on Evolutionary Computation in Industry (ECI). The presentations in this track will be of most use to managers, technology scouts, and other individuals interested in assessing the potential of evolutionary algorithms to solve their industrial optimization problems. The goal of the presenters in this track is to tell you about the realities and possibilities of evolutionary computation applications and to describe successful industrial applications, rather than to focus on technical details and the particular approaches taken.

There are six sessions in the Evolutionary Computation in Industry track:

- The first session contains **an introduction to evolutionary computation in industry**, including two presentations describing successful industrial projects. (Monday July 14, 13:15–14:30)
- The second session concerns **evolutionary computation and design**, and includes three presentations describing the solution of design problems using evolutionary algorithms. (Monday July 14, 15:00–16:15)
- The third session concerns **evolutionary computation and data mining**. The session will focus on the newly-evolving field of *classifier systems* and their application to learning generalizations and rules from databases and simulations. (Tuesday July 15, 13:15–14:30)
- The fourth session concerns **innovative uses of evolutionary algorithms**, and will showcase the state of the art in various domains. (Tuesday July 15, 15:00–16:15)
- The fifth session concerns **evolutionary computation and logistics**, and includes talks showing a variety of ways in which evolutionary algorithms can be combined with other algorithms to produce cutting-edge solutions to real problems. (Wednesday July 16, 13:15–14:30)
- The sixth session concerns **lessons learned in evolutionary computation applications**, and includes two presentations detailing the things to do and not to when applying an evolutionary algorithm application in a practical setting. The session will conclude with a brief discussion planning for next year's Evolutionary Computation in Industry track. (Wednesday July 16, 15:00–16:15)

All ECI sessions will take place in the Western Stage House.

Schedule at a Glance Saturday, July 12th Workshops			
	8:30 – 12:30	12:30 to 14:00	14:00 – 16:00
Shakespeare	Learning, Adaptation, and Approximation in Evolutionary Computation	Lunch on your own	Learning, Adaptation, and Approximation in Evolutionary Computation
American	Workshop on Memetic Algorithms (WOMA-IV)		Workshop on Memetic Algorithms (WOMA-IV)
Steamboat 2	Interactive Evolutionary Search and Exploration Systems		Grammatical Evolution Workshop (GEWS)
Western Stage House	Evolutionary Algorithms for Dynamic Optimization Problems		Challenges in Real World Optimisation Using Evolutionary Computing
Lake House	Analysis and Design of Representations and Operators (ADoRo)		Application of Hybrid Evolutionary Algorithms to NP-complete Problems
Merchant's Hotel	Biological Applications for Genetic and Evolutionary Computation (BioGEC)		
Bull's Head	Evolvable Hardware		Undergraduate Student Workshop
Marquette Room	International Workshop on Learning Classifier Systems		International Workshop on Learning Classifier Systems
Mark Beaubien	Graduate Student Workshop		Graduate Student Workshop

REGISTRATION: 7:30 - 17:00 in foyer of 14th Floor

COFFEE BREAKS: 10:20 – 10:40 and 15:50 – 16:10

There will be coffee stations in the Front Hall.

Workshops Schedule Saturday July 12

Full Day Workshops (8:30 – 18:00)

Graduate Student Workshop <i>Sean Luke, Maarten Keitzer, Terry Riopka</i>	Mark Beaubien
International Workshop on Learning Classifier Systems <i>Wolfgang Stolzmann, Pier-Luca Lanzi, Stewart Wilson</i>	Marquette Room
Learning, Adaptation, and Approximation in Evolutionary Computation <i>Sibylle Mueller, Petros Koumoutsakos, Marc Schoenauer Yaochu Jin, Sushil Louis, Khaled Rasheed</i>	Shakespeare
Workshop on Memetic Algorithms 2003 (WOMA-IV) <i>Peter Merz, William E. Hart, Natalio Krasnogor, Jim E. Smith</i>	American

Morning Workshops (8:30 – 12:30)

Analysis and Design of Representations and Operators (AdoRo'2003) <i>Franz Rothlauf and Dirk Thierens</i>	Lake House
Evolutionary Algorithms for Dynamic Optimization Problems <i>Jürgen Branke</i>	Western Stage House
Interactive Evolutionary Search and Exploration Systems <i>Ian Parmee</i>	Steamboat 2
Biological Applications for Genetic and Evolutionary Computation (BioGEC'2003) <i>Wolfgang Banzhaf and James Foster</i>	Merchant's Hotel
Evolvable Hardware <i>John C. Gallagher</i>	Bull's Head

Afternoon Workshops (14:00 – 18:00)

Application of Hybrid Evolutionary Algorithms to NP-complete Problems <i>Francisco Baptista Pereira, Ernesto Costa, Günther Raidl</i>	Lake House
Challenges in Real World Optimization Using Evolutionary Computing <i>Rajkumar Roy, Ashutosh Tiwari</i>	Western Stage House
Grammatical Evolution Workshop (GEWS'2003) <i>Michael O'Neill, Conor Ryan</i>	Steamboat 2
Undergraduate Student Workshop <i>Mark M. Meysenburg</i>	Bull's Head

Schedule at a Glance
Sunday July 13
Tutorials

	8:30 – 10:15	10:35 - 12:20	12:20 - 13:50	13:50 - 15:35	15:55 - 17:40	18:30 - 19:30
Steamboat 1	Genetic Programming Theory 1	Software Testing via Evolutionary Computation		Quantum Computing for Genetic Programmers	Intro to Ant Colony Optimization	Reception in Wolf Point Ballroom. 15 th floor
American	Intro to Genetics	Industrial Applications of Evolvable Hardware		Anticipatory Classifier Systems	Grammatical Evolution	
Bull's Head	Intro to Genetic Programming	Genetic Programming Theory II		Intro to Evolution Strategies	Intro to Learning Classifier Systems	
Merchant's Hotel	Bioinformatics with Evolutionary Computation	Using Appropriate Statistics		Mathematical Theory of Evolutionary Computation	Intro to Data Mining & Machine Learning	
Western Stage House	Testing & Evaluating Evolutionary Computation Algorithms	Multiobjective Optimization with Evolutionary Computation		Intro to Immune System Computing	Unified Approach to Evolutionary Computation	
Lake House	The Design of Innovation	Evolutionary Robotics		Evolving Neural Network Ensembles	Computational Complexity and Evolutionary Computation	
Shakespeare	Representations for Evolutionary Algorithms	Intro to Genetic Algorithms		Bionics: Building on Biological Evolution	Visualization in Evolutionary Algorithms	
Steamboat 2	Evolvable Hardware	Intro to Parallel Genetic Algorithms			Neutral Evolution in Evolutionary Computation	

REGISTRATION: 87:30 – 17:00 in foyer of 14th Floor

COFFEE BREAKS: 10:15 - 10:35 and 15:30 – 15:55

There will be coffee stations in the Front Hall

LUNCH: 12:20 – 13:50 on your own.

RECEPTION: 18:30 – 19:30 in Wolf Point Ballroom, 15th Floor.

Tutorial Schedule

Sunday July 13

Session 1 (8:30—10:15)

Introduction to Genetic Programming, <i>John Koza</i>	Bull's Head
Introduction to Genetics, <i>Annie S. Wu</i>	American
Genetic Programming Theory I, <i>William Langdon and/or Riccardo Poli</i>	Steamboat 1
Bioinformatics with Evolutionary Computation, <i>Daniel Howard</i>	Merchant's Hotel
Testing & Evaluating Evolutionary Computation Algorithms, <i>Darrell Whitley</i>	Western Stage House
The Design of Innovation: Lessons from and for Competent GAs, <i>David E. Goldberg</i>	Lake House
Evolvable Hardware, <i>Didier Keymeulen</i>	Steamboat 2
Representations for Evolutionary Algorithms, <i>Franz Rothlauf</i>	Shakespeare

Session 2 (10:35—12:20)

Introduction to Genetic Algorithms, <i>Robert Heckendorn</i>	Shakespeare
Introduction to Parallel Genetic Algorithms, <i>Erick Cantú-Paz</i>	Steamboat 2
Genetic Programming Theory II, <i>William Langdon and/or Riccardo Poli</i>	Bull's Head
Software Testing via Evolutionary Computation, <i>Joachim Wegener and/or Mark Harman</i>	Steamboat 1
Industrial Applications of Evolvable Hardware, <i>Tetsuya Higuchi</i>	American
Evolutionary Robotics: History, Methods, and New Trends, <i>Dario Floreano</i>	Lake House
Using Appropriate Statistics, <i>Steffan Christensen</i>	Merchant's Hotel
Multiobjective Optimization with Evolutionary Computation, <i>Carlos Coello</i>	Western Stage House

Session 3 (13:50—15:35)

Introduction to Evolution Strategies, <i>Hans-Georg Beyer</i>	Bull's Head
Introduction to Immune System Computing, <i>Stephanie Forrest</i>	Western Stage House
Mathematical Theory of Evolutionary Computation, <i>Michael Vose</i>	Merchant's Hotel
Bionics: Building on Biological Evolution, <i>Ingo Rechenberg</i>	Shakespeare
Evolving Neural Network Ensembles, <i>Xin Yao</i>	Lake House
Anticipatory Classifier Systems, <i>Wolfgang Stolzmann</i>	American
Quantum Computing for Genetic Programmers, <i>Lee Spector</i>	Steamboat 1

Session 4 (15:55—17:40)

Introduction to Learning Classifier Systems, <i>Stewart Wilson</i>	Bull's Head
Introduction to Ant Colony Optimization, <i>Martin Middendorf</i>	Steamboat 1
Introduction to Data Mining and Machine Learning, <i>Hillol Kargupta</i>	Merchant's Hotel
Neutral Evolution in Evolutionary Computation, <i>Tina Yu</i>	Steamboat 2
Unified Approach to Evolutionary Computation, <i>Ken DeJong</i>	Western Stage House
Computational Complexity and Evolutionary Computation, <i>Ingo Wegener</i>	Lake House
Grammatical Evolution, <i>Conor Ryan and/or Michael O'Neill</i>	American
Visualization in Evolutionary Computation, <i>Christian Jacob</i>	Shakespeare

18:30 – 19:30

OPENING RECEPTION

WOLF POINT BALLROOM, 15TH FLOOR

Greet old friends and meet new ones at the conference's opening reception! Also visit with keynote speaker, John Holland. Dr. Holland will be presenting Monday morning at 8:00 in the Sauganash Ballroom.

The reception is free to all registered GECCO attendees. Hot hors d'oeuvres, vegetables, and wine will be served.

Your badge is your admission ticket, please remember to wear it.

Schedule at a Glance						
Monday July 14						
	Sauganash Ballroom East	Sauganash Ballroom West	Western Stage House	Merchant's Hotel	Steamboat Hotel	Shakespeare Hotel
8:00-9:30	Plenary session in Sauganash Ballroom . John Holland					
9:30-10:00	Coffee Break					
10:00-11:40	GA Theory 1	RWA Learning	GA Multiobjective 1	COEV Theory & Practice	★GP Best Paper Nominees 1	GA Applications 1
11:40-13:15	Kluwer "No Free Lunch" lunch (with a free box lunch) in the Sauganash Ballroom.					
13:15-14:30	GA Theory 2	RWA Vision & Imaging 1	ECI Applications in Industry	COEV Applications	★GP Best Paper Nominees 2	GA Multiobjective 2/Tech
14:30-15:00	Coffee Break					
15:00-16:15	GA Theory 3	RWA Vision & Imaging 2	ECI Computation and Design	★COEV Best Paper Nominees	GP Analysis	GA Techniques/Theory
16:15-16:45	Coffee Break					
16:45-18:00	GA Theory 4	RWA Misc	GA Applications 2	LBP 1	GP Applications	★EH & ES/EP Best Paper Nominees

REGISTRATION: 7:30 - 17:00 in foyer of 14th Floor

COFFEE BREAKS: 9:30 - 10:00, 14:30 – 15:00 and 16:15 – 16:45. Coffee Stations are located in the Front Hall.

LUNCH: 11:40 – 13:15 on your own, but are invited to attend the free Kluwer "No Free Lunch" lunch (with a free box lunch) featuring the 15 books in the Genetic Algorithms and Genetic Programming book series from Kluwer Academic Publishers, including world premiere showing of the Genetic Programming IV video (42 minutes)

★“Best of GECCO” paper nominations. Remember to vote on the best papers and submit your ballot at the registration desk.

Monday July 14, 8:00 – 9:30

KEYNOTE TALK

Sauganash Ballroom

Genetic Algorithms as an Engine for the Study of Complex Adaptive Systems.

John Holland

University of Michigan

Structural hierarchies, wherein building blocks at one level are combined to form building blocks at the next level, are central to our understanding of the world. The ability of genetic algorithms to locate good building block combinations, when supplied with an appropriate representation, makes them a useful tool for understanding this process, and the advent of agent-based models puts emphasis on extending this ability to the formation of structural hierarchies.

There are three kinds of models relevant to building this capacity: (i) models of open-ended evolution, where agents of ever greater complexity provide ‘niches’ for still other agents; (ii) models of the ways in which signaling networks, such as food webs and bio-circuits, increase in complexity; (iii) models of social processes, such as language-acquisition, that allow combinatoric use of a small ‘vocabulary’ to describe novel situations. These models share features that make exploratory studies with genetic algorithms feasible.

John H. Holland is Professor of Computer Science and Engineering and Professor of Psychology at the University of Michigan; he is also External Professor and member of the Executive Committee of the Board of Trustees at the Santa Fe Institute. He was made a MacArthur Fellow in 1992 and is a Fellow of the World Economic Forum. He serves on standing panels for the Packard Foundation and the McDonnell Foundation.

Dr. Holland has been interested for more than 40 years in what are now called complex adaptive systems (CAS). He formulated genetic algorithms, classifier systems and the Echo models as tools for studying the dynamics of such systems. His books, *HIDDEN ORDER* (1995) and *EMERGENCE* (1998), summarize many of his thoughts about CAS.

Meet John Holland at the Conference Reception Sunday evening, 18:30 – 19:30 in the Wolf Point Ballroom on the 15th floor.

Monday July 14, 10:00 – 11:40

GA THEORY 1* **SAUGANASH BALLROOM EAST** **CHAIR: M. D. VOSE**

EC Theory: A Unified Viewpoint
Christopher Stephens, Adolfo Zamora
Coarse-Graining in Genetic Algorithms: Some Issues and Examples
Andrés Contreras, Jonathan Rowe, Christopher Stephens
Distances between Populations
Mark Wineberg, Franz Oppacher

RWA LEARNING* **SAUGANASH BALLROOM WEST** **CHAIR: DAVID DAVIS**

Spatial Operators for Evolving Dynamic Bayesian Networks from Spatio-Temporal Data
Allan Tucker, Xiaohui Liu, David Garway-Heath
A Methodology for Combining Symbolic Regression and Design of Experiments to Improve Empirical Model
Flor Castillo, Kenric Marshall, James Green, Arthur Kordon
Studying the Advantages of a Messy Evolutionary Algorithm for Natural Language Tagging
Lourdes Araujo

GA MULTIOBJECTIVE 1 **WESTERN STAGE HOUSE** **CHAIR: K. RASHEED**

A Specialized Island Model and its Application in Multiobjective Optimization
Ningchuan Xiao, Marc Armstrong
HEMO: A Sustainable Multi-Objective Evolutionary Optimization Framework
Jianjun Hu, Kisung Seo, Zhun Fan, Ronald C. Rosenberg, Erik Goodman
A Similarity-Based Mating Scheme for Evolutionary Multiobjective Optimization
Hisao Ishibuchi, Youhei Shibata
Evolutionary Multiobjective Optimization for Generating an Ensemble of Fuzzy Rule-Based Classifiers
Hisao Ishibuchi, Takashi Yamamoto

COEV THEORY & PRACTICE **MERCHANT’S HOTEL** **CHAIR: PAUL WIEGAND**

Exploring the Explorative Advantage of the Cooperative Coevolutionary (1+1) EA
Thomas Jansen, R. Paul Wiegand
Learning the Ideal Evaluation Function
Edwin De Jong, Jordan Pollack
Representation Development from Pareto-Coevolution
Edwin De Jong
Focusing versus Intransitivity. Geometrical Aspects of Co-evolution
Anthony Bucci, Jordan Pollack

★GP BEST PAPER NOMINEES 1 **STEAMBOAT HOTEL** **CHAIR: UNA-MAY O’REILLY**

★*Dynamic Maximum Tree Depth - A Simple Technique for Avoiding Bloat in Tree-Based GP*
Sara Silva, Jonas Almeida
★*Population Implosion in Genetic Programming*
Sean Luke, Gabriel Balan, Liviu Panait
★*Fundamental Mechanisms Concerning Trees in Standard GP*
Jason Daida, Adam Hilss
★*Difficulty of Unimodal and Multimodal Landscapes in Genetic Programming*
Leonardo Vanneschi, Marco Tomassini, Manuel Clergue, Philippe Collard

GA APPLICATIONS 1 **SHAKESPEARE HOTEL** **CHAIR: I. WEGENER**

Reinforcement Learning Estimation of Distribution Algorithm
Topon Kumar Paul, Hitoshi Iba
Pruning Neural Networks with Distribution Estimation Algorithms
Erick Cantú-Paz
Design of Multithreaded Estimation of Distribution Algorithms
Jiri Ocenasek, Josef Schwarz, Martin Pelikan
Hybridization of Estimation of Distribution Algorithms with A Repair Method for Solving Constraint S
Hisashi Handa

* These sessions are from 10:00 – 11:10

Monday July 14, 13:15 – 14:30

- GA THEORY 2*** **SAUGANASH BALLROOM EAST** **CHAIR: J. ROWE**
The Underlying Similarity of Diversity Measures Used in Evolutionary Computation
Mark Wineberg, Franz Oppacher
Schema Analysis of Average Fitness in Multiplicative Landscape
Hiroshi Furutani
- RWA VISION & IMAGING 1*** **SAUGANASH BALLROOM WEST** **CHAIR: ERIK GOODMAN**
Web-Page Color Modification for Barrier-Free Color Vision with Genetic Algorithm
Manabu Ichikawa, Kiyoshi Tanaka, Shoji Kondo, Koji Hiroshima, Kazuo Ichikawa, Shoko Tanabe, Kiichiro Fukami
Evolving Sensor Suites for Enemy Radar Detection
Ayse Yilmaz, Brian N. McQuay, Han Yu, Annie Wu, John C. Sciortino, Jr.
- ECI APPLICATIONS IN INDUSTRY** **WESTERN STAGE HOUSE** **CHAIR: R. ROY AND D. DAVIS**
Overview of the ECI Track
Rajkumar Roy, David Davis
A Case Study of Collaboration on Experimental Optimization in the Aerospace Industry
Mark Jakiela
Discovery of Efficient Routing Policies in Ad Hoc Wireless Networks
Harris Zebrowitz
- COEV APPLICATIONS** **MERCHANT'S HOTEL** **CHAIR: BIR BHANU**
PalmPrints: A Novel Co-Evolutionary Algorithm for Clustering Finger Images
Nawwaf Kharma, Ching Suen, Pei-Fang Guo,
Evolving RoboCup Keepaway Players through Task Decomposition
Shimon Whiteson, Nate Kohl, Risto Miikkulainen, Peter Stone,
Coevolution and Linear Genetic Programming for Visual Learning
Krzysztof Krawiec, Bir Bhanu
- ★GP BEST PAPER NOMINEES 2** **STEAMBOAT HOTEL** **CHAIR: JOHN KOZA**
★ *Visualizing Tree Structures in Genetic Programming*
Jason Daida, Adam Hilss, David Ward, Stephen Long
★ *Methods for Evolving Robust Programs*
Livi Panait, Sean Luke
★ *Generative Representations for Evolving Families of Designs*
Gregory Hornby
- GA MULTIOBJECTIVE 2/TECH.** **SHAKESPEARE HOTEL** **CHAIR: C. C. COELLO**
Real-Parameter Genetic Algorithms for Finding Multiple Optimal Solutions in Multi-Modal Optimization
Pedro Ballester, Jonathan N. Carter
Constrained Multi-Objective Optimization Using Steady State Genetic Algorithms
Deepti Chafekar, Jiang Xuan, Khaled Rasheed
Generalization of Dominance Relation-Based Replacement Rules for Memetic EMO Algorithms
Tadahiko Murata, Shiori Kaige, Hisao Ishibuchi

* These sessions are from 13:45 – 14:30.

Monday July 14, 15:00 – 16:15

GA THEORY 3

SAUGANASH BALLROOM EAST

CHAIR: K. SASTRY

Implicit Paralellism

Michael Vose, Alden Wright, Michael Vose, Jonathan Rowe

Two Broad Classes of Functions for Which a No Free Lunch Result Does Not Hold

Matthew Streeter

On the Treewidth of NK Landscapes

Yong Gao, Joseph Culberson

RWA VISION & IMAGING 2

SAUGANASH BALLROOM WEST

CHAIR: BIR BHANU

Learning Composite Features for Object Recognition

Yingqiang Lin, Bir Bhanu,

GenTree: An Interactive Genetic Algorithms System for Designing 3D Polygonal Tree Models

Clare Bates Congdon, Ray Mazza

Improved Image Halftoning Technique Using GAs with Concurrent Inter-block Evaluation

Emi Myodo, Hernan Aguirre, Kiyoshi Tanaka

ECI EVOLUTIONARY ALGORITHMS

AND DESIGN

WESTERN STAGE HOUSE

CHAIR: R. JAKIELA

An Industrial Application Using Evolutionary Computation for Design

Rajkumar Roy

Evolutionary Computation and Mechanical Design: Past Successes and Future Directions

Mark Jakiela

Genetic Algorithms in Engineering Design - Evolving from Research to Routine Industrial Practices

Siu Tong

★COEV BEST PAPER NOMINEES

MERCHANT'S HOTEL

CHAIR: SEVAN FICICI

★ *Finite Population Models of Co-Evolution and its Application to Haploidy Versus Diploidy*

Anthony Liekens, Huub ten Eikelder, Peter Hilbers

★ *A Game-Theoretic Memory Mechanism for Coevolution*

Sevan Ficici, Jordan Pollack

The Paradox of the Plankton – Oscillations and Chaos in Multispecies Evolution

Jeffrey Horn, James Catron

GP ANALYSIS

STEAMBOAT HOTEL

CHAIR: WOLFGANG BANZHAF

What Makes A Problem GP-Hard? Identifying Context-Free Mechanisms

Jason Daida, Hsiaolei Li, Ricky Tang, Adam Hilss

On the Avoidance of Fruitless Wraps in Grammatical Evolution

Conor Ryan, Maarten Keijzer, Miguel Nicolau

Structural Emergence with Order Independent Representations

R. Muhammad Atif Azad, Conor Ryan

GA TECHNIQUES/THEORY

SHAKESPEARE HOTEL

CHAIR: R. SMITH

Quad Search and Hybrid Genetic Algorithms

Darrell Whitley, Deon Garrett, Jean-Paul Watson

The Structure of Evolutionary Exploration: On Crossover, Building Blocks, and Estimation-of-Distribution Algorithms

Marc Toussaint

The State Problem for Evolutionary Testing

Mike Holcombe, Phil McMinn

Monday July 14, 16:45 – 18:00

GA THEORY 4

SAUGANASH BALLROOM EAST

CHAIR: C. STEPHENS

Introduction to Entropy-Based Measures of Gene Significance and Epistasis

Dong-Il Seo, Yong-Hyuk Kim, Byung-Ro Moon

Tightness Time for the Linkage Learning Genetic Algorithm

Ying-ping Chen, David E. Goldberg

Optimal Sampling and Speed-up for Genetic Algorithms on the Sampled OneMax Problem

Tian-Li Yu, David E. Goldberg, Kumara Sastry

Real Royal Road Functions for Constant Population Size

Tobias Storch, Ingo Wegener

RWA MISC

SAUGANASH BALLROOM WEST

CHAIR: SEAN FORMAN

Congressional Districting Using a TSP-based Genetic Algorithm

Sean Forman, Yading Yue

GA-based Inference of Euler Angles for Single Particle Analysis

Shusuke Saeki, Kiyoshi Asai, Katsutoshi Takahashi, Yutaka Ueno, Katsunori Isono, Hitoshi Iba

The General Yard Allocation Problem

Ping Chen, Zhaohui Fu, Andrew Lim, Brian Rodrigues

Using Genetic Algorithms for Data Mining Optimization in an Educational Web-based System

Behrouz Minaei-Bidgoli, William Punch III

GA APPLICATIONS 2

WESTERN STAGE HOUSE

CHAIR: H. ISHIBUCHI

Designing A Hybrid Genetic Algorithm for the Linear Ordering Problem

Gaofeng Huang, Andrew Lim

A Generalized Feedforward Neural Network Architecture and its Training using Two Stochastic Search M

Abdesselam Bouzerdoum, Rainer Mueller

A Hybrid Genetic Algorithm for the Hexagonal Tortoise Problem

Heemahn Choe, Sung-Soon Choi, Byung-Ro Moon

Genetic Algorithm Optimized Feature Transformation – A Comparison with Different Classifiers

Zhijian Huang, Min Pei, Erik Goodman, Yong Huang, Gaoping Li

LBP 1

MERCHANT'S HOTEL

CHAIR: BART RYLANDER

An Evolutionary Optimization algorithm Based on Bacterial Reproduction

Mohamed Awadallah, Erik Buehler, Sanjoy Das

A Distance Function-Based Multi-Objective Evolutionary Algorithm

Wei-Chun Chang, Alistair Sutcliffe, Richard Neville

An Empirical Study of the Accelerating Phenomenon in Genetic Parallel Programming

Sin Man Cheang, Kin Hong Lee, Kwong Sak Leung

A Robust Master-Slave Distribution Architecture for Evolutionary Computations

Christian Gagne, Marc Parizeau, Marc Dubreuil

Using an Evolution Strategy for a University Timetabling System with a Web Based Interface to Gather Real Student Data

Thomas B. George, Vitaliy Opalikhin, Chan-Jin Chung

A Study of Evolutionary Acceleration

S. Kazadi, S. Cheung, C. Ogletree, S. Kim, C. Lee, A. Min

Mobile Robot Simultaneous Localization and Mapping Using a Evolutionary Particle Filter

N.M. Kwok, S. Kwong

GP APPLICATIONS

STEAMBOAT HOTEL

CHAIR: LEE SPECTOR

Multi-agent Learning of Heterogeneous Robots by Evolutionary Subsumption

Hongwei Liu, Hitoshi Iba

Evolutionary Computation Method for Promoter Site Prediction in DNA

Daniel Howard, Karl Benson

Dense and Switched Modular Primitives for Bond Graph Model Design

Kisung Seo, Zhun Fan, Jianjun Hu, Erik Goodman, Ronald Rosenberg,

★EH & ES/EP

BEST PAPER NOMINEES

SHAKESPEARE HOTEL

CHAIR: DIDIER KEYMEULEN

★ *Hardware Evolution of Analog Speed Controllers for a DC Motor*

David Gwaltney, Michael Ferguson

Active Control of Thermoacoustic Instability in a Model Combustor with Neuromorphic Evolvable Hardware

John Gallagher, Saranyan Vignanam

★ *On the Optimization of Monotone Polynomials by the (1+1) EA and Randomized Local Search*

Ingo Wegener, Carsten Witt

<p align="center">Schedule at a Glance Tuesday July 15</p>						
	Sauganash Ballroom East	Sauganash Ballroom West	Western Stage House	Merchant's Hotel	Steamboat Hotel	Shakespeare Hotel
8:00-9:30	Plenary session: Richard Lenski					
9:30-10:00	Coffee Break					
10:00-11:40	★GA Best Paper Nominees 1	RWA Industrial 1	★LCS Best Paper Nominees	★ER Best Paper Nominees	GA Applications 3	SBSE
11:40-13:15	Lunch (on your own)					
13:15-14:30	★GA Best Paper Nominees 2	RWA Industrial 2	ECI New Approaches to Data Mining	LBP 2	GA Operators 1	★SBSE Best Paper Nominees
14:30-15:00	Coffee Break					
15:00-16:15	GA Operators 2	RWA Bioinformatics 1	ECI Innovative Applications	LBP 3	★AAAA Best Paper Nominees	★ES/EP Best Paper Nominees
16:15-16:45	Coffee Break					
16:45-18:00	GA Applications 4	RWA Bioinformatics 2	GA Operators 3	LBP 4	AAAA Runtime Details	ES/EP Theory & Practice
19:00-22:00	Poster session: Wolf Point Ballroom, 15th floor					

REGISTRATION: 8:00 - 17:00 in foyer of 14th Floor

COFFEE BREAKS: 9:30 - 10:00, 14:30 – 15:00 and 16:15 – 16:45. Coffee stations are located in the Front Hall

LUNCH: 11:40 – 13:15 on your own.

★“Best of GECCO” paper nominations. Remember to vote on the best papers and submit your ballot at the registration desk.

POSTER SESSION: 19:00 to 22:00 in the Wolf Point Ballroom on the 15th floor. Dessert, coffee and wine will be served.

Tuesday July 15, 8:00 – 9:30

KEYNOTE TALK

Sauganash Ballroom

How the Digital Leopard Got His Spots: Thinking About Evolution Inside the Box

Richard Lenski

Michigan State University

The field of evolutionary biology has strong theoretical and empirical foundations, yet it often suffers from an inability to pin down exactly what happened and how. These limitations reflect the extinction of intermediate forms and incomplete knowledge of the genetic and developmental mechanisms that produce most organismal features. Hence, evolutionary biologists often rely on plausibility arguments, which are sometimes criticized as ‘just-so’ stories. Experiments using organisms with rapid generations, such as bacteria, can overcome some of these limitations, but certain aspects remain obscure. Experiments with digital organisms and other computational systems offer the unique opportunity to observe evolutionary change and dissect its products in perfect detail (without the confining assumptions of more standard numerical simulations). To illustrate, I will present some experiments on the evolutionary origin of novel functions using the Avida system. From my own perspective as a biologist, I see many exciting opportunities at the interface of biology and computer science.

Richard Lenski is a biologist at Michigan State University. He received his undergraduate degree from Oberlin College, and his Ph.D. from the University of North Carolina. After a postdoc at the University of Massachusetts, he joined the faculty at the University of California, Irvine, then moved to MSU in 1991. For most of his career, he has studied bacteria in order to observe evolutionary dynamics on an experimentally tractable timescale. In one experiment, he has followed 12 replicate populations of bacteria while they have evolved for more than 30,000 generations in a laboratory environment. A few years ago, he also began collaborative research with Chris Adami (Caltech) and Charles Ofria (now at MSU) on ‘digital organisms’ in the Avida system. Lenski’s interest lies in exploring the evolutionary process in both the computational and biological realms.

Tuesday July 15, 10:00 – 11:40

★GA BEST PAPER NOMINEES 1 SAUGANASH BALLROOM EAST CHAIR: R. HECKENDORN

- ★ *Scalability of Selectorecombinative Genetic Algorithms for Problems with Tight Linkage*
Kumara Sastry, David E. Goldberg
- ★ *Are Multiple Runs of Genetic Algorithms Better Than One?*
Erick Cantú-Paz, David E. Goldberg
- ★ *Selection in the Presence of Noise*
Juergen Branke, Christian Schmidt
- ★ *Adaptive Elitist-population Based Genetic Algorithm for Multimodal Function Optimization*
Kwong-Sak Leung, Yong Liang

RWA INDUSTRIAL 1 SAUGANASH BALLROOM WEST CHAIR: RAJKUMAR ROY

- Genetic Algorithm for Supply Planning Optimization Under Uncertain Demand*
Masaru Tezuka, Masahiro Hiji
- Optimisation of Reaction Mechanisms for Aviation Fuels Using a Multi-objective Genetic Algorithm*
Lionel Elliott, Derek Ingham, Adrian Kyne, Nicolae Mera, Mohamed Pourkashanian, Christopher Wilson
- Parameter Optimization by a Genetic Algorithm for Pitch Tracking System*
Yoon-Seok Choi, Byung-Ro Moon
- Minimization of Sonic Boom on Supersonic Aircraft Using an Evolutionary Algorithm*
Charles Karr, Rodney Bowersox, Vishnu Singh

★LCS BEST PAPER NOMINEES WESTERN STAGE HOUSE CHAIR: LASHON BOOKER

- ★ *Towards Building Block Propagation in XCS: A Negative Result and Its Implications*
Kurian Tharakunnel, Martin Butz, David E. Goldberg
- ★ *Designing Efficient Exploration with MACS: Modules and Function Approximation*
Pierre Gérard, Olivier Sigaud
- ★ *Tournament Selection: Stable Fitness Pressure in XCS*
Martin Butz, Kumara Sastry, David E. Goldberg
- Estimating Classifier Generalization and Action's Effect: A Minimalist Approach*
Pier Luca Lanzi

★ER BEST PAPER NOMINEES MERCHANT'S HOTEL CHAIR: MITCHELL POTTER

- ★ *Co-Evolving Task-Dependent Visual Morphologies in Predator-Prey Experiments*
Gunnar Buason, Tom Ziemke
- ★ *Integration of Genetic Programming and Reinforcement Learning for Real Robots*
Shotaro Kamio, Hideyuki Mitsuhashi, Hitoshi Iba
- Multi-Objectivity as a Tool for Constructing Hierarchical Complexity*
Jason Teo, Minh Ha Hguyen, Hussein Abbass,
- Learning Biped Locomotion from First Principles on a Simulated Humanoid Robot Using Linear Genetic Programming*
Krister Wolff, Peter Nordin

GA APPLICATIONS 3 STEAMBOAT HOTEL CHAIR: A. WRIGHT

- Cellular Programming and Symmetric Key Cryptography Systems*
Franciszek Seredynski, Pascal Bouvry, Albert Zomaya
- Population Sizing for the Redundant Trivial Voting Mapping*
Franz Rothlauf
- Learning a Procedure That Can Solve Hard Bin-packing Problems: A New GA-Based Approach to Hyper-Heur*
Peter Ross, Javier G. Marín-Blázquez, Sonia Schulenburg, Emma Hart
- Investigation of the Fitness Landscapes and Multi-Parent Crossover for Graph Bipartitioning*
Yong-Hyuk Kim, Byung-Ro Moon

SBSE SHAKESPEARE HOTEL CHAIR: JOACHIM WEGENER

- Can Genetic Programming Improve Software Effort Estimation Based on General Datasets?*
Martin Lefley, Martin Shepperd
- Evolutionary Testing of Flag Conditions*
André Baresel, Harmen Sthamer
- Structural and Functional Sequence Testing of Dynamic and State-Based Software with EA*
André Baresel, Hartmut Pohlheim, Sadegh Sadeghipour
- Predicate Expression Cost Functions to Guide Evolutionary Search for Test Data*
Leonardo Bottaci

Tuesday July 15, 13:15 – 14:30

★GA BEST PAPER NOMINEES 2 SAUGANASH BALLROOM EAST CHAIR: M. SCHOENAUER

★*Effective Use of Directional Information in Multi-Objective Evolutionary Computation*

Martin Brown, Robert Smith

Efficient Linkage Discovery by Limited Probing

Robert Heckendorn, Alden Wright

Dispersion-based Population Initialization

Ronald Morrison

RWA INDUSTRIAL 2 SAUGANASH BALLROOM WEST CHAIR: S. MATSUI

Control of a Flexible Manipulator Using a Sliding Mode Controller With Genetic

Algorithm Tuned Manipulator Dimension

Ngai Kwok, S Kwong

An Efficient Hybrid Genetic Algorithm for a Fixed Channel Assignment Problem with Limited Bandwidth

Shouichi Matsui, Isamu Watanabe, Ken-ichi Tokoro

Optimal Elevator Group Control by Evolution Strategies

Thomas Beielstein, Claus-Peter Ewald, Sandor Markon

ECI: NEW APPROACHES

TO DATA MINING

WESTERN STAGE HOUSE

CHAIR: ALWYN BARRY

Learning Generalizations, Control Rules, and Classification Strategies from Data with Learning Classifier Systems

Alwyn Barry

Commentary on Classifier System Approaches to Data Mining

Invited Speakers

LBP 2 MERCHANT'S HOTEL CHAIR: BART RYLANDER

Global Optimization Using a Knowledge-Based Classifier Model

H.Liu, T. Igusa, B.W. Schafer

A Grammatical Evolution Multi-Classifer through Crowding

A.R. McIntyre, M.I. Heywood

A Simple Evolution Strategy to Solve Constrained Optimization Problems

Efren Mezura-Montes, Carlos A. Coello Coello

Lessons Learned from LCSs: An Incremental Non-Generational Coevolutionary Algorithm

Ramon Alfonso Palacios-Durazo, Manuel Valenzuela-Rendon

Optimization of Neural Networks using Genetic Programming Improves Detection and Modeling of

Gene-Gene Interactions in Studies of Human Diseases

Marylyn D. Ritchie, Bill C.White, Joel S. Parker, Lance W. Hahn, Jason H. Moore

A New Perspective in Simulating Quantum Circuits

Mihai Udrescu, Lucian Prodan, Mircea Vladutiu

Tour Jete, Pirouette: Dance Choreographing by Swarm

Tina Yu, Paul Johnson

GA OPERATORS 1 STEAMBOAT HOTEL CHAIR: F. ROTHLAUF

Wise Breeding GA via Machine Learning Techniques for Function Optimization

Xavier Llorá, David E. Goldberg

Using an Immune System Model to Explore Mate Selection in Genetic Algorithms

Chien-Feng Huang

An Analysis of a Reordering Operator with Tournament Selection on a GA-Hard Problem

Ying-ping Chen, David E. Goldberg

★SBSE BEST PAPER NOMINEES SHAKESPEARE HOTEL CHAIR: SPIROS MANCORIDIS

★*Extracting Test Sequences from a Markov Software Usage Model by ACO*

Karl Doerner, Walter Gutjahr

★*Modeling the Search Landscape of Metaheuristic Software Clustering Algorithms*

Brian Mitchell, Spiros Mancoridis

The State Problem for Evolutionary Testing

Phil McMinn, Mike Holcombe

Tuesday July 15, 15:00 – 16:15

GA OPERATORS 2

SAUGANASH BALLROOM EAST

CHAIR: J. BRANKE

Problem-Independent Schema Synthesis for Genetic Algorithms

Yong-Hyuk Kim, Yung-Keun Kwon, Byung-Ro Moon

Finding Building Blocks Through Eigenstructure Adaptation

Danica Wyatt, Hod Lipson

A Survey on Chromosomal Structures and Operators for Exploiting Topological Linkages of Genes

Dong-Il Seo, Byung-Ro Moon

RWA BIOINFORMATICS 1

SAUGANASH BALLROOM WEST

CHAIR: JASON MOORE

Artificial Immune System for Classification of Gene Expression Data

Shin Ando, Hitoshi Iba

Complex Function Sets Improve Symbolic Discriminant Analysis of Microarray Data

David Reif, Bill White, Nancy Olsen, Thomas Aune, Jason Moore

Finding the Optimal Gene Order in Displaying Microarray Data

Seung-Kyu Lee, Yong-Hyuk Kim, Byung-Ro Moon

ECI INNOVATIVE APPLICATIONS

WESTERN STAGE HOUSE

CHAIR: KEN DEJONG

Using Evolutionary Computation to Stress Test Complex Systems

Ken DeJong

Shape Optimization of Vehicle Structures

Erik Goodman

Scheduling for the Air Force Satellite Control Network

Darrell Whitley

LBP 3

MERCHANT'S HOTEL

CHAIR: BART RYLANDER

Building-Block Identification by Simultaneity Matrix

Chatchawit Aporntewan, Prabhas Chongstitvatana

Regulating Population Size with Self-Organized Criticality 2

Britt Crawford, Annie S. Wu

An Efficient Design Methodology for the Nondominated Sorted Genetic Algorithm-II

Venkat Devireddy, Patrick Reed

Facts and Fallacies in Using Genetic Algorithms for Learning Clauses in First-Order Logic:

What Binary Refinement Can Do and Binary Representations Can Not

Flaviu Adrian Marginean

Evolutionary Incremental Concept Development for Case-Based Reasoning

Brian Mastenbrook, Eric Berkowitz

GeneRepair- A Repair Operator for Genetic Algorithms

George G. Mitchell, Diarmuid O'Donoghue, David Barnes, Mark McCarville

Soft Adaptive Multiple Expression Mechanisms for Structured and Multiploid Chromosome Representations

Olfa Nasraoui, Carlos Rojas, Cesar Cardona, Dipankar Dasgupta

Comparison Between Deterministic and Probabilistic Algorithms of Bounded Kolmogorov Complexity

Mikhail A. Semenov

★AAAA BEST PAPER NOMINEES

STEAMBOAT HOTEL

★ *Emergence of Collective Behavior in Evolving Populations of Flying Agents*

Lee Spector, Jon Klein, Christopher Perry, Mark Feinstein

★ *A Non-dominated Sorting Particle Swarm Optimizer for Multiobjective Optimization*

Xiaodong Li

Demonstrating the Evolution of Complex Genetic Representations: An Evolution of Artificial Plants

Marc Toussaint

★ES/EP BEST PAPER NOMINEES

SHAKESPEARE HOTEL

CHAIR: MARC SCHOENAUER

★ *Ruin and Recreate Principle Based Approach for the Quadratic Assignment Problem*

Alfonso Misecvicius

★ *The Steady State Behavior of (m/m₁, l)-ES on Ellipsoidal Fitness Models Disturbed by Noise*

Hands-Georg Beyer, Dirk Arnold

★ *Evolutionary Computing as a Tool for Grammar Development*

Guy De Pauw

Tuesday July 15, 16:45 – 18:00

GA APPLICATIONS 4 SAUGANASH BALLROOM EAST CHAIR: H. ABBASS

Hierarchical BOA Solves Ising Spin Glasses and MAXSAT

Martin Pelikan, David E. Goldberg

ERA: An Algorithm for Reducing the Epistasis of SAT Problems

Eduardo Rodriguez-Tello, Jose Torres-Jimenez

New Usage of SOM for Genetic Algorithms

Jung-Hwan Kim, Byung-Ro Moon

RWA BIOINFORMATICS 2 SAUGANASH BALLROOM WEST CHAIR: JAMES FOSTER

Optimizing the Order of Taxon Addition in Phylogenetic Tree Construction Using Genetic Algorithm

Yong-Hyuk Kim, Seung-Kyu Lee, Byung-Ro Moon

Evolving Consensus Sequence for Multiple Sequence Alignment with a Genetic Algorithm

Conrad Shyu, James A. Foster

An Evolutionary Approach for Molecular Docking

Jinn-Moon Yang

GA OPERATORS 3 WESTERN STAGE HOUSE CHAIR: YAOCHU JIN

Ant-Based Crossover for Permutation Problems

Jürgen Branke, Christiane Barz, Ivesa Behrens

Normalization in Genetic Algorithms

Sung-Soon Choi, Byung-Ro Moon

New Usage of Sammon's Mapping for Genetic Visualization

Yong-Hyuk Kim, Byung-Ro Moon

LBP 4 MERCHANT'S HOTEL CHAIR: BART RYLANDER

Formula Prediction using Genetic Algorithms

Namir Aldawoodi, Rafael Perez

A Modified NSGA-II to Solve Noisy Multiobjective Problems

Meghna Babbar, Ashvin Lakshmikantha, David E. Goldberg

A Genetic Algorithm for Multiobjective Multiconstrained Schedule Design

David D. Barth, Michelle D. Moore

Discovering Propositionalized Rules Via GasRule (Genetic Algorithms for Structural Rule Extraction)

Nailah Binti, Michel Liquiere, Stefano A. Cerri

Finding Maximum Cliques with Ants

Thang N.Bui, Joseph R. Rizzo Jr.

Multiple Heuristic Search in Genetic Algorithm for Traveling Salesman Problem

Peng Gang, Shigeru Nakahara

Evolving Efficient Security Systems Under Budget Constraints Using Genetic Algorithms

Michael L. Gargano, Paul Benjamin, William Edelson, Paul Meisinger, Maheswara Kasinadhuni, Joseph DeCicco

The Modular Genetic Algorithm: Motivation and First Results on Repetitive Modularity

Ozlem O. Garibay, Ivan I. Garibay, Annie S. Wu

AAAA RUNTIME DETAILS STEAMBOAT HOTEL

The Influence of Run-Time Limits on Choosing Ant System Parameters

Krzysztof Socha

Revisiting Elitism in Ant Colony Optimization

Tony White, Simon Kaegi, Terri Oda

A New Approach to Improve Particle Swarm Optimization

Liping Zhang, Huanjun Yu, Shangxu Hu

ES/EP THEORY & PRACTICE SHAKESPEARE HOTEL CHAIR: HANS-GEORG BEYER

Model-Assisted Steady-State Evolution Strategies

Holger Ulmer, Felix Streicher, Andreas Zell

Dimension-independent Convergence Rate for Non-isotropic (1,lambda)-ES

Anne Auger, Claude LeBris, Marc Schoenauer

Theoretical Analysis of Simple Evolution Strategies in Quickly Changing Environment

Jürgen Branke, Wei Wang

Schedule at a Glance Wednesday July 16

	Sauganash Ballroom East	Sauganash Ballroom West	Western Stage House	Merchant's Hotel	Steamboat Hotel	Shakespeare Hotel
8:00-9:30	ISGEC Business Meeting					
9:30-10:00	Coffee Break					
10:00-11:40	GA Representation 1	★RWA Best Paper Nominees	LCS Practice	GA Distributed Tech.	AIS Practice	★DMQ Best Paper Nominees
11:40-13:15	Lunch (on your own)					
13:15-14:30	GA Representations 2	RWA Design 1	ECI Logistics	LBP 5	★ AIS Best Paper Nominees	ESR
14:30-15:00	Coffee Break					
15:00-16:15	GA Techniques 1	RWA Design & Security	ECI Lessons	LBP 6	AAAA Interactions	ES/EP Practice
16:15-16:45	Coffee Break					
16:45-18:00	GA Techniques 2	RWA Financial & Security	GA Learning	LBP 7	AAAA Applications	Theory

REGISTRATION: 7:30 – 12:00 in Mansion House

COFFEE BREAKS: 9:30 – 10:00 and 14:30 – 15:00 and 16:15 – 16:45. Coffee stations are located in the Front Hall.

LUNCH: 11:40 - 13:15 on your own.

★“Best of GECCO” paper nominations. Remember to vote on the best papers and submit your ballot at the registration desk.

Wednesday July 16, 10:00 – 11:40

GA REPRESENTATION I **SAUGANASH BALLROOM EAST** **CHAIR: A. HOMAIFAR**

- Chromosome Reuse in Genetic Algorithms*
Adnan Acan, Yüce Tekol
- A Case For Codons in Evolutionary Algorithms*
Josh Gilbert, Maggie Eppstein
- Natural Coding: A More Efficient Representation for Evolutionary Learning*
Raúl Giraldez, Jesús Aguilar-Ruiz, José Riquelme
- The Virtual Gene Genetic Algorithm*
Manuel Valenzuela-Rendón

★RWA BEST PAPER NOMINEES **SAUGANASH BALLROOM WEST** **CHAIR: FAUSTINO GOMEZ**

- ★ *Active Guidance for a Finless Rocket Using Neuroevolution*
Faustino Gomez, Risto Miikkulainen
- ★ *Mining Comprehensive Clustering Rules with an Evolutionary Algorithm*
Ioannis Sarafis, Phil Trinder, Ali Zalzal
- ★ *Quantum-inspired Evolutionary Algorithm-based Face Verification*
Jun-Su Jang, Kuk-Hyun Han, Jong-Hwan Kim
- ★ *System-Level Synthesis of MEMS via Genetic Programming and Bond Graphs*
Zhun Fan, Kisung Seo, Jianjun Hu, Ronald C. Rosenberg, Erik Goodman

LCS PRACTICE **WESTERN STAGE HOUSE** **CHAIR: ROBERT E. SMITH**

- Evolving Multiple Discretizations with Adaptive Intervals for a Pittsburgh Rule-Based Learning Class*
Jaume Bacardit, Josep Maria Garrell
- Bounding the Population Size in XCS to Ensure Reproductive Opportunities*
Martin Butz, David E. Goldberg
- Improving Performance in Size-Constrained Extended Classifier Systems*
Devon Dawson
- Limits in Long Path Learning with XCS*
Alwyn Barry

GA DISTRIBUTED TECH. **MERCHANT'S HOTEL** **CHAIR: H. BARBOSA**

- Asynchronous Genetic Algorithms for Heterogeneous Networks Using Coarse-Grained Dataflow*
John Baugh Jr., Sujay Kumar
- Exploring a Two-Population Genetic Algorithm*
Steven Kimbrough, Ming Lu, David Wood, Dongjun Wu
- A Parallel Genetic Algorithm Based on Linkage Identification*
Masaharu Munetomo, Naoya Murao, Kiyoshi Akama
- Distributed Probabilistic-Model Building Genetic Algorithm Discussion on Search Capability and Characteristics*
Tomoyuki Hiroyasu, Mitsunori Miki, Masaki Sano, Hisashi Shimosaka, Shigeyoshi Tsutsui, Jack Dongarra

AIS PRACTICE **STEAMBOAT HOTEL** **CHAIR: J. TIMMIS**

- The Effect of Binary Matching Rules in Negative Selection*
Fabio González, Dipankar Dasgupta, Jonatan Gómez,
- Multiobjective Optimization using the Clonal Selection Principle*
Nareli Cruz Cortés, Carlos Coello Coello
- MILA – Multilevel Immune Learning Algorithm*
Dipankar Dasgupta, Senhua Yu, Nivedita Sumi Majumdar,
- A Scalable Artificial Immune System Model for Dynamic Unsupervised Learning*
Olfa Nasraoui, Fabio González, Cesar Cardona, Carlos Rojas, Dipankar Dasgupta

★DMQ BEST PAPER NOMINEES **SHAKESPEARE HOTEL**

- ★ *Efficiency and Reliability of DNA-based Memories*
Max Garzon, Andrew Neel, Hui Chen
- Hybrid Networks of Evolutionary Processors*
Carlos Martin-Vide, Victor Mitrana, Mario Pérez-Jiménez, Fernando Sancho-Caparrini
- DNA-like Genomes for Evolution in Silico*
Michael West, Max Garzon, Derrel Blain
- Evolving Hogg's Quantum Algorithm using Linear-tree GP*
André Leier, Wolfgang Banzhaf

Wednesday July 16, 13:15 – 14:30

GA REPRESENTATIONS 2 **SAUGANASH BALLROOM EAST** **CHAIR: D. THERENS**

- Adaptation of Length in a Nonstationary Environment*
Han Yu, Annie Wu, Kuo-Chi Lin, Guy Schiavone
- Voronoi Diagrams based Function Identification*
Carlos Kavka, Marc Schoenauer
- Comparing Evolutionary Computation Techniques Via their Representation*
Boris Mitavskiy

RWA DESIGN 1 **SAUGANASH BALLROOM WEST** **CHAIR: SIU SHING TONG**

- Genetic Algorithms: A Fundamental Component of an Optimization Toolkit for Engineering Design*
Siu Shing Tong, David Powell
- Automatic Design Synthesis and Optimization of Component-based Systems by Evolutionary Algorithms*
Plamen Angelov, Yi Zhang, Jonthan Wright, Victor Hanby, Richard Buswell
- Multicriteria Network Design using Evolutionary Algorithms*
Rajeev Kumar, Nilanjan Banerjee

ECI LOGISTICS **WESTERN STAGE HOUSE** **CHAIR: DAVID MONTANA**

- Vishnu: a Scheduling System for Large-scale Logistics Projects*
David Montana
- ARROW: Combining Evolutionary Algorithms and Other Techniques for Specific Logistics Applications*
David Davis
- Comparing Tabu Search and Genetic Algorithms for Scheduling*
Darrell Whitley

LBP 5 **MERCHANT'S HOTEL** **CHAIR: BART RYLANDER**

- GA and Random Trees: An Alternative for Solving Stochastic Network Problems*
Miguel A. Gomez-Sanchez, Carmen X. Flores-Mendoza, Linda A. Riley
- Using Genetic Algorithms to Analyze the Path of an Object in Earth Orbit*
Ryuji Goto, Yuji Sato
- Fixed Budget Allocation Strategies for Noisy Fitness Landscapes*
Adrian Grajdeanu, Kenneth De Jong
- Applying Genetic Algorithms to Richardson's Arms Race Equations to Determine the Stability of Nuclear Deterrence*
Tim Hackworth
- Integrated Optical Devices Design by Genetic Algorithms*
Andreas Hakansson, L. Sanchis, D. Lopez-Zenon, J. Bravo-Abad, Jose Sanchez-Dehesa
- The Evolution of 3D Procedural Textures*
Adam Hewgill, Brian J. Ross
- A Perturbation-Coded Genetic Algorithm for the Minimum Rectilinear Steiner Arborescence Problem*
Bryant A. Julstrom
- On the Design of an Evolutionary Preprocessor*
S. Kazadi, D. Choi, A. Chang, T. Kang, H. Li, D. Kim, S. Ho, J. Wu

★AIS BEST PAPER NOMINEES **STEAMBOAT HOTEL** **CHAIR: F. L. NINO**

- ★Immune Inspired Somatic Contiguous Hypermutation for Function*
Johnny Kelsey, Jonathan Timmis
- Developing an Immunity to Spam*
Terri Oda, Tony White
- A Hybrid Immune Algorithm with Information Gain for the Graph Coloring Problem*
Vincenzo Cutello, Giuseppe Nicosia, Mario Pavone

ESR **SHAKESPEARE HOTEL**

- A Hybrid Genetic Algorithm Based on Complete Graph Representation for the Sequential Ordering Problem*
Dong-Il Seo, Byung-Ro Moon,
- An Evolutionary Approach to Capacitated Resource Distribution by a Multiple-agent Team*
Mudassar Hussain, Bahram Kimiaghalam, Abdollah Homaifar, Albert Esterline, Bijan Sayyarodsari
- An Optimization Solution for Packet Scheduling: A Pipeline-based Genetic Algorithm Accelerator*
Shiann-Tsong Sheu, Yue-Ru Chuang, Yu-Hung Chen, Eugene Lai
- A Hybrid Genetic Algorithm for the Capacitated Vehicle Routing Problem*
Jean Berger, Mohamed Barkaoui

Wednesday July 16, 16:45 – 18:00

GA TECHNIQUES 2 **SAUGANASH BALLROOM EAST** **CHAIR: E. GOODMAN**

- Dimensionality Reduction via Genetic Value Clustering*
Alexander Topchy, William Punch
- An Adaptive Penalty Scheme for Steady-State Genetic Algorithms*
Helio Barbosa, Afonso Lemonge
- Selection Intensity in Asynchronous Cellular Evolutionary Algorithms*
Mario Giacobini, Enrique Alba, Marco Tomassini

RWA FINANCIAL & SECURITY **SAUGANASH BALLROOM WEST** **CHAIR: SUSAN STEPNEY**

- Daily Stock Prediction Using Neuro-Genetic Hybrids*
Yung-Keun Kwon, Byung-Ro Moon
- Connection Network and Optimization of Interest Metric for One-to-One Marketing*
Sung-Soon Choi, Byung-Ro Moon
- Secret Agents Leave Big Footprints*
John Clark, Jeremy L. Jacob, Susan Stepney

GA LEARNING **WESTERN STAGE HOUSE** **CHAIR: M. MIKI**

- Building a GA from Design Principles for Learning Bayesian Networks*
Steven van Dijk, Dirk Thierens, Linda van der Gaag
- A Method for Handling Numerical Attributes in GA-based Inductive Concept Learners*
Federico Divina, Maarten Keijzer, Elena Marchiori
- Facts and Fallacies in Using Genetic Algorithms for Learning Clauses in First-Order Logic*
Flaviu Marginean

LBP 7 **MERCHANT'S HOTEL** **CHAIR: BART RYLANDER**

- An Adaptive Domination Map Approach for Multi-Allelic Diploid Genetic Algorithms*
A. Sima Uyar, A. Emre Harmanci
- Constructing Microbial Consortia with Optimal Biomass Production Using a GA*
Frederik P.J. Vandecasteele, Thomas F. Hess, Ronald L. Crawford
- Meta-heuristics for the Job Shop Scheduling Problem*
Mario Ventresca, Beatrice M. Ombuki
- Social Programming on MARS: A Benchmark Study*
Mark S. Voss
- Evolutionary Sentence Building for Chatterbots*
Dana Vrajitoru
- Integrated Active and Passive Mechatronic System Design Using Bond Graphs and Genetic Programming*
Jiachuan Wang, Janis Terpenney
- Simulating GA Search in a Dynamic Grid Environment*
Han Yu, Ning Jiang, Annie S. Wu

AAAA APPLICATIONS **STEAMBOAT HOTEL**

- Swarms in Dynamic Environments*
T. M. Blackwell
- AntClust: Ant Clustering and Web Usage Mining*
Nicolas Labroche, Nicolas Monmarché, Gilles Venturini
- The Effect of Natural Selection on Phylogeny Reconstruction Algorithms*
Dehua Hang, Charles Ofria, Thomas M. Schmidt, Eric Torng

THEORY **SHAKESPEARE HOTEL**

- Analysis of the (1+1) EA for a Dynamically Bitwise Changing OneMax*
Stefan Droste
- Optimization and Information Processing: Modeling and NFL-Results*
Dirk Wiesmann
- Convergence of Program Fitness Landscapes*
William Langdon

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