Conference Overview

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Workshops

Saturday, September 13

	Room 1	Room 2	Room 3	Room 4	Room 5
8:00	Registration				
9:00	**Workshop 1** Session 1	**Workshop 2** Session 1	**Workshop 3** Session 1	**Workshop 4** Session 1	
10:30	Coffee Break				
11:00	**Workshop 1** Session 2	**Workshop 2** Session 2	**Workshop 3** Session 2	**Workshop 4** Session 2	
12:30	Lunch				
14:00	**Workshop 1** Session 3	**Workshop 2** Session 3	**Workshop 3** Session 3	**Workshop 5** Session 1	**Workshop 6** Session 1
15:30	Coffee Break				
16:00	**Workshop 1** Session 4	**Workshop 2** Session 4	**Workshop 7** Session 1	**Workshop 5** Session 2	**Workshop 6** Session 2

Workshop 1: Student Workshop on Bioinspired Optimization Methods and their Applications (BIOMA 2014)
Workshop 2: Semantic Methods in Genetic Programming (SMGP)
Workshop 3: Workshop on Nature-Inspired Techniques for Robotics
Workshop 4: Scaling Behaviours of Landscapes, Parameters and Algorithms
Workshop 5: Advances in Multimodal Optimization
Workshop 6: In Search of Synergies between Reinforcement Learning and Evolutionary Computation
Workshop 7: Natural Computing for Protein Structure Prediction

Room 1: September 13, from 9:00 to 17:30

Workshop 1
Student Workshop on Bioinspired Optimization Methods and their Applications (BIOMA 2014)

Organizers: Jurij Šilc and Aleš Zamuda

Natural phenomena, like the evolution of species, emergent behavior of biological societies, and functioning of the vertebrate immune system, have inspired computer scientists to design advanced problem-solving techniques, known as evolutionary algorithms, ant colony optimization, and artificial immune systems. These and many other bioinspired algorithms that continue to emerge, overcome many limitations of traditional algorithms and have been widely accepted in science, engineering and business. Parallel solving intricate optimization problems in these domains is of particular interest to both designers and practitioners of bioinspired algorithms.

The aim of this workshop is to provide an international forum for doctoral students to discuss a range of topics that are current in research. The workshop provides an excellent opportunity to share provocative ideas, interesting preliminary work, or innovative research directions related to the use of bioinspired optimization techniques and their respective applications. The purpose of the workshop is as well to support the development of networks for young researchers in this area, both with senior researchers and with other graduate students.

Revised and extended versions of selected papers from the workshop will be invited for submission to the Informatica – An International Journal of Computing and Informatics.

9:00–10:30 Session 1 Chair: Aleš Zamuda

9:00 Analysis of Two Algorithms for Multi-Objective Min-Max Optimization
Simone Alicino and Massimiliano Vasile

9:30 Comparison Between Single and Multi Objective Genetic Algorithm Approach for Optimal Stock Portfolio Selection
Nejc Cvörnjek, Miran Brezočnik, Timotej Jagrič, and Gregor Papa

10:00 Simulation-Based GA Optimization for Production Planning
Juan Esteban Diaz Leiva and Julia Handl

11:00–12:30 Session 2 Chair: Peter Korošec

11:00 Multi-Population Adaptive Inflationary Differential Evolution
Marilena Di Carlo, Massimiliano Vasile, and Edmondo Minisci

11:30 Automated Slogan Production Using a Genetic Algorithm
Polona Tomašič, Gregor Papa, and Martin Žnidaršič

12:00 A Comparison of Search Spaces and Evolutionary Operators in Facial Composite Construction
Joseph James Mist, Stuart James Gibson, and Christopher John Solomon

14:00–15:30 Session 3 Chair: Gregor Papa

14:00 Local Search Based Optimization of a Spatial Light Distribution Model
David Kaljun and Janez Žerovnik

14:30 Parallel CUDA Implementation of the Desirability-Based Scalarization Approach for Multi-Objective Optimization Problems
Eren Akca, Ökkes Tolga Altınöz, Sadi Uçkun Emel, Asım Egemen Yilmaz, Murat Efe, and Tayfur Yaylagul

15:00 Differential Evolution for Self-Adaptive Triangular Brushstrokes
Uroš Mlakar, Janez Brest, and Aleš Zamuda

16:00–17:30 Session 4 Chair: Jurij Šilc

16:00 Extended Finite-State Machine Inference with Parallel Ant Colony Based Algorithms
Daniil Chivilikhin, Vladimir Ulyantsev, and Anatoly Shalyto

16:30 Empirical Convergence Analysis of Genetic Algorithm for Solving Unit Commitment Problem
Domen Butala, Dejan Velušček, and Gregor Papa

17:00 General discussion
Peter Korošec, Gregor Papa, Jurij Šilc, and Aleš Zamuda

Room 2: September 13, from 9:00 to 17:30

Workshop 2
Semantic Methods in Genetic Programming (SMGP)

Organizers: Colin Johnson, Krzysztof Krawiec, Alberto Moraglio, and Michael O'Neill

Genetic programming (GP)—the application of evolutionary computing techniques to the creation of computer programs—has been a key topic in computational intelligence in the last couple of decades. In the last few years a rising topic in GP has been the use of semantic methods. The aim of this is to provide a way of exploring the input-output behaviour

of programs, which is ultimately what matters for problem solving. This contrasts with much previous work in GP, where operators transform the program code and the effect on program behaviour is indirect. This new approach has produced substantially better results on a number of problems, both benchmark problems and real-world applications in areas such as pharmacy; and, has been grounded in a body of theory, which also informs algorithm design. All aspects of research related to Semantic Methods in Genetic Programming will be considered, including both theoretical and empirical work.

There will be a special issue of the journal Genetic Programming and Evolvable Machines on the subject of Semantic Methods in Genetic Programming, and selected authors from the workshop will be encouraged to submit extended versions of their papers for the special issue.

9:00–10:30 Session 1 Chair: Alberto Moraglio

9:00 Introduction

9:05 Semantically-meaningful Numeric Constants for Genetic Programming
Jerry Swan, John Drake, and Krzysztof Krawiec

9:30 Information Theory, Fitness, and Sampling Semantics
Colin G. Johnson and John R. Woodward

9:55 Asymptotic Genetic Improvement Programming via Type Functors and Catamorphisms
Zoltan A. Kocsis and Jerry Swan

11:00–12:30 Session 2 Chair: Colin Johnson

11:00 Introduction to Geometric Semantic Genetic Programming
Alberto Moraglio

11:15 Semantic Operators for Evolutionary Art
Joao Correia and Penousal Machado

11:40 A Framework for Measuring the Generalization Ability of Geometric Semantic Genetic Programming (GSGP) for Black-Box Boolean Functions Learning
Andrea Mambrini, Yang Yu, and Xin Yao

12:05 Guarantees of Progress for Geometric Semantic Genetic Programming
Tomasz P. Pawlak and Krzysztof Krawiec

14:00–15:30 Session 3 Chair: Michael O'Neill

14:00 Analysis of Semantic Building Blocks via Groebner Bases
Jerry Swan, Geoffrey K. Neumann, and Krzysztof Krawiec

14:25 An Efficient Implementation of GSGP using Higher-Order Functions and Memoization
Alberto Moraglio

14:50 The Influence of Population Size on Geometric Semantic GP
Mauro Castelli, Luca Manzoni, Sara Silva, and Leonardo Vanneschi

16:00–17:30 Session 4 Chair: Krzysztof Krawiec

16:00 A Study of Semantic Geometric Crossover Operators in Regression Problems
Julio Albinati, Gisele L. Pappa, Fernando E. B. Otero, and Luiz Otávio V. B. Oliveira

16:25 Self-tuning Geometric Semantic GP
Mauro Castelli, Luca Manzoni, Sara Silva, and Leonardo Vanneschi

16:50 Geometric Semantic Grammatical Evolution
Alberto Moraglio, James McDermott, and Michael O'Neill

17:15 Closing Discussion

Room 3: September 13, from 9:00 to 15:30

Workshop 3
Workshop on Nature-Inspired Techniques for Robotics

Organizers: Claudio Rossi, Nicolas Bredeche, and Kasper Stoy

In recent years, there have been a growing number of nature-inspired approaches to robotics, from designing control architecture to robot morphologies, from considering single robot to adaptive collective systems, from bio-inspired decision models to bio-inspired learning algorithms.

The purpose of the workshop on Nature-inspired techniques for robotics is to analyze the state-of-art/state-of-knowledge in this field. The workshop is intended as a melting pot for engineers, researchers and experts working on different disciplines, fostering interdisciplinary debate between fields such as neuro-evolution, evolutionary design, artificial life, evolutionary robotics, development and learning in robotics, adaptive collective robotic systems, etc.

9:00–10:30 Session 1: Invited presentations part 1 Chair: Nicolas Bredeche

9:00 Welcome Remarks
Claudio Rossi and Nicholas Bredeche

Asynchronous Situated Coevolution: from experimentation to formalization
Abraham Prieto

On the use of algorithms inspired from natural selection
Stéphane Doncieux

Damage recovery is a reality gap problem
Jean-Baptiste Mouret

For the Good of the Cause: Hypothesis-Catching for Swarm Robots
Heiko Hamann

11:00–12:30 Session 2: Research spotlight (contributed presentations) Chair: Claudio Rossi

11:00 A Nature-Inspired Control Technique for Adaptive Hexapedal Walking on Challenging Surfaces
Xiaofeng Xiong, Florentin Wörgötter, and Poramate Manoonpong

Effects of Packing and Dynamics in a Self-Assembling System
Dhananjay Ipparthi, Massimo Mastrangeli, Navneet Bhalla, and Marco Dorigo

Diversity-based Coevolution of Behaviourally Heterogeneous Multirobot Systems
Jorge Gomes, Pedro Mariano, and Anders Lyhne Christensen

Additional Stability for Single-Unit Pattern Generators
Gregory Morse, Lisa B. Soros, and Kenneth O. Stanley

Evaluation Strategies for Distributed Embodied Evolution
Pedro Trueba, Abraham Prieto, and Francisco Bellas

Evolutionary algorithms to automatically obtain central pattern generators for biped and hexapod robotic structures
José Santos Reyes

Environment-driven embodied evolutionary robotics
Nicholas Bredeche

14:00–15:30 Session 3: Invited presentations part 2 Chair: Claudio Rossi

14:00 Making MONEE: combining environment- and task-driven evolution with swarm robots
Evert Haasdijk

Bio-inspired, Automated Design of Machine Bodies and Adaptive Brains
Sebastian Risi

Concluding remarks and discussion

Room 4: September 13, from 9:00 to 12:30

Workshop 4
Scaling Behaviours of Landscapes, Parameters and Algorithms

Organizers: Ender Özcan and Andrew J. Parkes

All too often heuristics and meta-heuristics for combinatorial optimisation problems require significant parameter tuning to work most effectively. Often this tuning is performed without any a priori knowledge as to how good values of parameters might depend on features of the problem. This lack of knowledge can lead to lot of computational effort and also has the danger of being limited to only problem instances that are similar to those that have been seen before. The aim of the workshop is to support the development of methods to give deeper insight into problem classes, and how to obtain and exploit structural information. The target participants will be those that:

1. work on the theory of search algorithms, but are seeking ways for the theory to have a practical impact;
2. work on direct applications, but are frustrated with the trial-and-error approaches that often are often used, and would like to bring 'theoretically-inspired methods' into their work;
3. work on flexible frameworks supporting interchangeability and reusability of components and a closer integration between parameter selection and the algorithm.

9:00–10:30 Session 1 Chair: Andrew J. Parkes

9:00 Welcome and Introductions

9:05 Extension of NILS to the Multi-Objective Optimization. Case study: The Multi-Objective Permutation Flowshop Scheduling Problem
Marie-Eléonore Marmion and Aymeric Blot

9:30 On the Big-Valley Hypothesis for the Permutation Flowshop Scheduling Problem with Total Flow Time Criterion
and
An Analysis of the Smoothness and Neutrality of the Permutation Flowshop Scheduling Problem with Total Flow Time Criterion
Valentino Santucci, Marco Baioletti, and Alfredo Milani

10:05 Automatic Design of Evolutionary Algorithms for Multi-Objective Optimization
Leonardo C. T. Bezerra, Manuel López-Ibáñez, and Thomas Stützle

11:00–12:30 Session 2 Chair: Andrew J. Parkes

11:00 There's method in my serendipity: Using Random Parameters in Distributed Evolutionary Algorithms
Juan J. Merelo Guervós, Mario García-Valdez, Leonardo Trujillo, and Francisco Fernández de Vega

11:25 Experiences of a MapReduce-based Discrete Implementation of a PSO algorithm
Simone A. Ludwig

11:50 CHAMP: Creating Heuristics via Many Parameters
Shahriar Asta, Ender Özcan, and Andrew Parkes

12:15 General Discussion

Room 4: September 13, from 14:00 to 17:30

Workshop 5
Advances in Multimodal Optimization

Organizers: Mike Preuss, Michael G. Epitropakis, and Xiaodong Li

The workshop attempts to bring together researchers from evolutionary computation and related areas who are interested in Multimodal Optimization. This is a currently forming field, and we aim for a highly interactive and productive meeting that makes a step forward towards defining it. The Workshop will provide a unique opportunity to review the advances in the current state-of-the-art in the field of Niching methods. Further discussion will deal with several experimental/theoretical scenarios, performance measures, real-world and benchmark problem sets and outline the possible future developments in this area. Positional statements, suggestions, and comments are very welcome!

14:00–15:30 Session 1 Chair: Mike Preuss

14:00 Introduction to Advances in Multimodal Optimization
Organizers

14:10 Discussion: most important research questions in MMO, attempt to define MMO

14:30 Evolutionary Level Set Approximation Applied in Biological Systems Identification
Michael Emmerich and Alexander Nezhinsky

14:50 Discussion: collect applications and use cases (design optimization, soft constraints, etc.) for MMO

15:10 Maximizing Diversity for Multimodal Optimization
Fabricio Olivetti de Franca

16:00–17:30 Session 2 Chair: Michael G. Epitropakis

16:00 Discussion: benchmark problems for MMO

16:20 Realistic Performance Assessment for Multimodal Optimization
Simon Wessing and Mike Preuss

16:40 Discussion: performance measuring in MMO

17:00 Workshop Wrap-up
Organizers

Room 5: September 13, from 14:00 to 17:30

Workshop 6
In Search of Synergies between Reinforcement Learning and Evolutionary Computation

Organizers: Madalina M. Drugan and Bernard Manderick

A recent trend in machine learning is the transfer of knowledge from one area to another. In this workshop, we focus on potential synergies between reinforcement learning and evolutionary computation: reinforcement learning (RL) addresses sequential decision problems in an initially unknown stochastic environment, requiring lots of computational resources while the main strength of evolutionary computation (EC) is its general applicability and computational efficiency. Although at first they seem very different, these two learning techniques address basically the same problem: the maximization of the agent's reward in a potentially unknown environment that is not always completely observable. Possibly, these machine learning methods can benefit from an exchange of ideas resulting in a better theoretical understanding and/or empirical efficiency. There are already few examples that

exploit the potential synergy between EC and RL. One example is multi-objective reinforcement learning. This is a variant of reinforcement learning that uses multiple rewards instead of a single one. Techniques from multi-objective EC are used for multi-objective RL in order to improve the exploration-exploitation tradeoff. An example in the other direction is the problem of selecting the best genetic operator that is similar to the problem of an RL-agent has to choose between alternatives while maximizing its cumulative expected reward.

The main goal of this workshop is to solicit research and to start the discussion on potential synergies between RL and EC. We want to bring together researchers from machine learning, optimization, and artificial intelligence interested in searching difficult environments that are moreover possibly dynamic, uncertain and partially observable. We also encourage submissions describing applications of EC and RL for games, neural networks, and other real-world applications. Ideally, this workshop will help researchers with a background in either RL or EC to find synergies between their work as well as new challenges and ideas.

14:00–15:30 Session 1: Reinforcement Learning into Evolutionary Computation Chair: Bernard Manderick

14:00 'Guided' Restarts Hill-Climbing
David Catteeuw, Madalina M. Drugan, and Bernard Manderick

14:20 A Method for Auxiliary Objectives Selection using Reinforcement Learning: An Overview
Arina Buzdalova and Maxim Buzdalov

14:40 Schemata Monte Carlo Network Optimization
Pedro Isasi, Madalina M. Drugan, and Bernard Manderick

15:00 Discussion panel
Bernard Manderick

16:00–17:30 Session 2: Evolutionary Computation in Reinforcement Learning Chair: Madalina Drugan

16:00 Annealing-Pareto Multi-Objective Multi-Armed Bandit Algorithm
Saba Q. Yahyaa, Madalina M. Drugan, and Bernard Manderick

16:20 A Q-learning Based Evolutionary Algorithm for Sequential Decision Making Problems
Haobo Fu, Peter R. Lewis, and Xin Yao

16:40 Schemata bandits
Madalina M. Drugan, Pedro Isasi, and Bernard Manderick

17:00 Discussion panel
Madalina Drugan

Room 3: September 13, from 16:00 to 18:00

Workshop 7
Natural Computing for Protein Structure Prediction

Organizers: José Santos Reyes, Gregorio Toscano, and Julia Handl

Independent of its starting conformation, a protein in its natural environment folds into a unique three dimensional structure, the native structure. Understanding the native structure of a protein is crucial, as the structure can provide insight into the functional roles of a protein and the specific mechanisms of its biological function. As the output of experimentally determined protein structures lags behind the output of protein sequences, the computational prediction of protein structure remains a 'holy grail' of computational biology.

The aim of this workshop is to provide a forum for the exchange and communication of ideas, proposals and results related to the use of nature-inspired techniques in problems related to computational protein structure prediction. In tackling this important problem, nature-inspired techniques are currently being used in a variety of ways, but presentations related to this work are often distributed across a range of sessions / conferences / journals dependent on the particular sub-problem considered / algorithm used. It is hoped that this workshop will act as a meeting point for those authors and attendants of the PPSN conference who have a current or developing interest in this area.

16:00–18:00 Session 1 Chair: José Santos Reyes

16:00 Cellular automata for modeling protein folding in lattice models
José Santos, Pablo Villot, and Martin Diéguez

16:30 Evolutionary Multi Objective Optimisation with Diversity as Objective for the Protein Structure Similarity Problem
Sune S. Nielsen, Wiktor Jurkowski, Grégoire Danoy, Juan Luis Jiménez Laredo, Reinhard Schneider, El-Ghazali Talbi, and Pascal Bouvry

17:00 Low-resolution conformational exploration for Rosetta Ab initio by bi-level optimisation of structural features
Shaun M. Kandathil, Simon C. Lovell, and Julia Handl

17:30 Memetic, Multi-Objective, Off-Lattice, and Multiscale Evolutionary Algorithms for De novo and Guided Protein Structure Modelling
Amarda Shehu and Kenneth A. De Jong

Tutorials

Sunday, September 14

	Room 4	Room 3	Room 1/2
8:00	Registration		
10:30	**Tutorial 1** Theory of Evolutionary Computation *A. Auger, B. Doerr*	**Tutorial 2** Low or No Cost Distributed Evolutionary Computation *J. J. Merelo*	**Tutorial 3** Cartesian Genetic Programming *J. F. Miller*
12:30	Lunch		
14:00	**Tutorial 4** Multimodal Optimization *M. Preuss*	**Tutorial 5** Theory of Parallel Evolutionary Algorithms *D. Sudholt*	**Tutorial 6** Automatic Design of Algorithms via Hyper-heuristic Genetic Programming *J. R. Woodward, J. Swan, M. Epitropakis*
16:00	Coffee Break		
16:30	**Tutorial 7** Evolutionary Bilevel Optimization *A. Sinha, P. Malo, K. Deb*	**Tutorial 8** Parallel Experiences in Solving Complex Problems *E. Alba*	**Tutorial 9** Algorithm and Experiment Design with HeuristicLab - An Open Source Optimization Environment for Research and Education *S. Wagner, G. Kronberger*

Room 4: September 14, from 10:30 to 12:30

Tutorial 1
Theory of Evolutionary Computation

Anne Auger, INRIA, France
Benjamin Doerr, Ecole Polytechnique de Paris, France

Theory has always accompanied the development of evolutionary methods. It aims at detecting and explaining at a deep level the working principles, guiding the design of new algorithms and rigorously proving what has been observed. In this introductory tutorial, we target those researchers that have no or little experience with theoretical work. We will (i) explain the aims of theoretical research in evolutionary computation and give easy-to-understand examples of its success, (ii) teach the audience how to read a theoretical result and gain from it, (iii) present some very elementary theoretical methods that are useful not only for writing theory papers, but also help you in planning your experimental work and foreseeing its success.

Room 3: September 14, from 10:30 to 12:30

Tutorial 2
Low or No Cost Distributed Evolutionary Computation

JJ Merelo, University of Granada, Spain

Having a grid or cluster or money to pay for cloud is great, but the need to do science and the performance it should have is not always in sync with what is provided by your friendly funding agency. However, nowadays there are many resources attached to the Internet which you can tap when free or when they are offered to you voluntarily. In this tutorial we will talk about which resources can be used for performing mid to big scale distributed evolutionary computation experiments, what kind of languages and storage tools are available to do it and how you should adapt your algorithm to leverage those resources. It will include an introduction of how to use cloud computing resources and adapt them to the need of evolutionary algorithms and an invitation to open science and how all of us will profit from it.

Room 1/2: September 14, from 10:30 to 12:30

Tutorial 3
Cartesian Genetic Programming

Julian F. Miller, University of York, UK

Cartesian Genetic Programming (CGP) is a well-known, popular and efficient form of Genetic Programming. Cartesian Genetic Programming is a highly cited technique that was

developed by Julian Miller in 1999 and 2000 from some earlier joint work of Julian Miller with Peter Thomson in 1997. In its classic form, it uses a very simple integer based genetic representation of a program in the form of a directed graph. Graphs are very useful program representations and can be applied to many domains (e.g., electronic circuits, neural networks). In a number of studies, CGP has been shown to be comparatively efficient to other GP techniques. It is also very simple to program. Since then, the classical form of CGP has been developed made more efficient in various ways. Notably by including automatically defined functions (modular CGP) and self-modification operators (self-modifying CGP). SMCGP was developed by Julian Miller, Simon Harding and Wolfgang Banzhaf. It uses functions that cause the evolved programs to change themselves as a function of time. Using this technique it is possible to find general solutions to classes of problems and mathematical algorithms (e.g., arbitrary parity, n-bit binary addition, sequences that provably compute pi and e to arbitrary precision, and so on). This tutorial is will cover the basic technique, advanced developments and applications to a variety of problem domains. The first edited book on CGP was published by Springer in September 2011. CGP has its own dedicated website.

Room 4: September 14, from 14:00 to 16:00

Tutorial 4
Multimodal Optimization

Mike Preuss, University of Münster, Germany

Multimodal optimization is currently getting established as a research direction that collects approaches from various domains of evolutionary computation that strive for delivering multiple very good solutions at once. We start with discussing why this is actually useful and therefore provide some real-world examples. From that on, we set up several scenarios and list currently employed and potentially available performance measures. This part also calls for user interaction: currently, it is very open what the actual targets of multimodal optimization shall be and how the algorithms shall be compared experimentally. As there has been little work on theory (not runtime complexity; rather the limits of different mechanisms) in the area, we present a high-level modelling approach that provides some insight in how niching can actually improve optimization methods if it fulfils certain conditions. While the algorithmic ideas for multimodal optimization (as niching) originally stem from biology and have been introduced into evolutionary algorithms from the 70s on, we only now see the consolidation of the field. The vast number of available approaches is getting sorted into collections and taxonomies start to emerge. We present our version of a taxonomy, also taking older but surpisingly modern global optimization approaches into account. We highlight some single mechanisms as clustering, multiobjectivization and archives that can be used as additions to existing algorithms or building blocks of new ones. We also discuss recent relevant competitions and their results, point to available software and outline the possible future developments in this area.

Room 3: September 14, from 14:00 to 16:00

Tutorial 5
Theory of Parallel Evolutionary Algorithms

Dirk Sudholt, University of Sheffield, UK

Evolutionary algorithms (EAs) have given rise to many parallel variants, fuelled by the rapidly increasing number of CPU cores and the ready availability of computation power through GPUs and cloud computing. A very popular approach is to parallelize evolution in island models, or coarse-grained EAs, by evolving different populations on different processors. These populations run independently most of the time, but they periodically communicate genetic information to coordinate search. Many applications have shown that island models can speed up computation time significantly, and that parallel populations can further increase solution diversity. However, there is little understanding of when and why island models perform well, and what impact fundamental parameters have on performance. This tutorial will give an overview of recent theoretical results on the runtime of parallel evolutionary algorithms. These results give insight into the fundamental working principles of parallel EAs, assess the impact of parameters and design choices on performance, and contribute to the design of more effective parallel EAs.

Room 1/2: September 14, from 14:00 to 16:00

Tutorial 6
Automatic Design of Algorithms via Hyper-heuristic Genetic Programming

John R. Woodward, University of Stirling, UK
Jerry Swan, University of Stirling, UK
Michael Epitropakis, University of Stirling, UK

How can we automatically design algorithms for a given problem domain? The aim of this tutorial is to demonstrate how we can use genetic programming to improve human-written programs. The resulting algorithms are therefore part man-made part machine-made. While there are often many algorithms suitable for a specific task (e.g., the Lin-Kernighan for the travelling salesman problem) there is often an over-arching structure which defines their functionality. There are commonalities between these algorithms (that define their purpose) and the differences (which give different performance). The invariant parts of a family of algorithms can be extracted by examining existing algorithms, and variations of the algorithm can be generated using genetic programming resulting in novel behaviour but with a predefined purpose. Therefore we have a method of mass-producing tailor-made algorithms for specific purposes. This is perhaps best illustrated by the following example; typically a travelling salesman algorithm is developed by hand and when executed returns a solution to a specific instance of the problem (i.e., an ordered list of cities). What we are advocating is a method that automatically generates travelling salesman algorithms in this example. An additional yet centrally important advantage of this approach is that the

resulting algorithm is 'unique' and bespoke to the specific set of problem instances used to train the algorithm. Continuing the travelling salesman example, two logistics companies will have two different probability distributions of customers and therefore require two different algorithms if they are to achieve better performance compared to using a standard off-the-shelf travelling salesman problem algorithm. This method has been applied to a rapidly increasing number of domains including; data mining/machine learning, combinatorial problems including bin packing (on and off line), traveling salesman problems, Boolean satiability, job shop scheduling, exam timetabling, image recognition, black-box function optimization, layout of wind farms, and components of metaheuristics themselves. A step-by-step guide will be given, taking the novice through the distinct stages of the process of automatic design and a number of examples will be given to illustrate and reinforce the method in practice.

Room 4: September 14, from 16:30 to 18:30

Tutorial 7
Evolutionary Bilevel Optimization

Ankur Sinha, Aalto University School of Business, Helsinki, Finland
Pekka Malo, Aalto University School of Business, Helsinki, Finland
Kalyanmoy Deb, Michigan State University, East Lansing, MI, USA

Many practical optimization problems should better be posed as bilevel optimization problems in which there are two levels of optimization tasks. A solution at the upper level is feasible if the corresponding lower level variable vector is optimal for the lower level optimization problem. Consider, for example, an inverted pendulum problem for which the motion of the platform relates to the upper level optimization problem of performing the balancing task in a time-optimal manner. For a given motion of the platform, whether the pendulum can be balanced at all becomes a lower level optimization problem of maximizing stability margin. Such nested optimization problems are commonly found in transportation, engineering design, game playing and business models. They are also known as Stackelberg games in the operations research community. These problems are too complex to be solved using classical optimization methods simply due to the 'nestedness' of one optimization task into another. Evolutionary Algorithms (EAs) provide some amenable ways to solve such problems due to their flexibility and ability to handle constrained search spaces efficiently. Clearly, EAs have an edge in solving such difficult yet practically important problems. In the recent past, there has been a surge in research activities towards solving bilevel optimization problems. In this tutorial, we will introduce principles of bilevel optimization for single and multiple objectives, and discuss the difficulties in solving such problems in general. With a brief survey of the existing literature, we will present a few viable evolutionary algorithms for both single and multi-objective EAs for bilevel optimization. Our recent studies on bilevel test problems and some application studies will be discussed. Finally, a number of immediate and future research ideas on bilevel optimization will also be highlighted.

Room 3: September 14, from 16:30 to 18:30

Tutorial 8 Parallel Experiences in Solving Complex Problems

Enrique Alba, University of Malaga, Spain

This talk introduces the basic concepts of two fields of research: parallelism and metaheuristics. We will revise the main concepts, tools, metrics, open issues, and application domains related to parallel models of search, optimization, and learning techniques. The very special kind of algorithms searching in a decentralized manner and later parallelized will be shown to solve complex problems at unseen levels of efficiency and efficacy. Facts, methodology, and general open issues will be presented in this talk.

Room 1/2: September 14, from 16:30 to 18:30

Tutorial 9
Algorithm and Experiment Design with HeuristicLab – An Open Source Optimization Environment for Research and Education

Stefan Wagner, University of Applied Sciences Upper Austria, Austria
Gabriel Kronberger, University of Applied Sciences Upper Austria, Austria

HeuristicLab is an open source system for heuristic optimization that features many metaheuristic optimization algorithms (e.g., genetic algorithms, genetic programming, evolution strategies, taboo search, simulated annealing) as well as many optimization problems (e.g., traveling salesman, regression, classification, vehicle routing, knapsack, job shop scheduling, simulation-based optimization). It is based on C# and the Microsoft .NET Framework and is used as development platform for several research and industry projects as well as for teaching metaheuristics in university courses. This tutorial demonstrates how to apply HeuristicLab in research and education for creating, executing and analyzing metaheuristic optimization algorithms. It includes many interactive live demonstrations in which it will be shown how to parameterize and execute evolutionary algorithms to solve combinatorial optimization problems as well as data analysis problems. The participants will see how to assemble different algorithms and parameter settings to large scale optimization experiments with HeuristicLab's graphical user interface and how to execute such experiments on multi-core or cluster systems. Furthermore, the experiment results will be compared using HeuristicLab's interactive charts for visual and statistical analysis. To complete the tutorial, it will be sketched briefly how HeuristicLab can be extended with further optimization problems and how custom optimization algorithms can be modeled using the graphical algorithm designer.

Keynotes

Monday – Wednesday, September 15–17

	Monday September 15	Tuesday September 16	Wednesday September 17
8:00	Registration		
8:30		Registration	Registration
9:00	**Conference Opening & Keynote 1**	**Announcements & Keynote 2**	**Announcements & Keynote 3**
10:30	Coffee Break	Coffee Break	Coffee Break
11:00	**Posters 1**	**Posters 4**	**Posters 7**
12:30	Lunch	Lunch	**Conference Closing**
			Lunch
14:00	**Posters 2**	**Posters 5**	
15:30	Coffee Break	Coffee Break	
16:00	**Posters 3**	**Posters 6**	
18:30	Welcome Reception	City Tour & Conference Dinner	

Room 4: September 15, from 9:15 to 10:30 Chair: Bogdan Filipič

Keynote 1
Some Computational Aspects of Robot Kinematic Redundancy

Jadran Lenarčič, Jožef Stefan Institute, Slovenia

Computations in robotics cover a rich spectrum of problems at the junction of mechanics, computer science, engineering and mathematics. In this talk the emphasis will be given to robot kinematics, its analysis, design and optimization with respect to different tasks. This will include a brief discussion on the direct and inverse kinematics problems of serial and parallel mechanisms, kinematic singularities, workspace determination, manipulability, as well as kinematic flexibility. Examples will present peculiarities in robot and human motion performing different tasks, such as the manipulation of heavy objects or the vertical jump, with the focus on kinematic redundancy. Redundant robots possess too many degrees of freedom; their number exceeds the number required by the task. Therefore, redundancy gives to the robot an immense source of freedom and enables it to solve different tasks in an infinite number of ways. The robot can simultaneously solve additional secondary tasks of lower priority. We will discuss various aspects in robot programming and design in comparison with humans.

Room 4: September 16, from 9:15 to 10:30 Chair: Günter Rudolph

Keynote 2
Solving Optimization Problems in Industry: An Arms Race

Thomas Bäck, Leiden University, The Netherlands

Many industries use simulation tools for virtual product design, and there is a growing trend towards using simulation in combination with optimization algorithms. The requirements for optimization under such circumstances are often very strong, involving many design variables and constraints and a strict limitation of the number of function evaluations to a surprisingly small number (often around one thousand or less). Tuning optimization algorithms for such challenges has led to very good results obtained by variants of evolution strategies. Evolutionary algorithms are nowadays standard solvers for such applications. In the presentation, sample cases from industry are presented, their challenges are discussed in more detail. Results of an experimental comparison of contemporary evolution strategies on the BBOB test function set for a small number of function evaluations are presented and discussed, and further enhancements of contemporary evolution strategies are outlined. Our practical examples are motivated by industrial applications. A typical challenge is to find innovative solutions to a design optimization task. Based on a suitable definition of innovative solutions, an application of this concept to an airfoil design optimization task is discussed in the presentation. Discussing these applications and the variants of evolution strategies applied, the capabilities of these algorithms for optimization cases with a small number of function evaluations are illustrated.

Room 4: September 17, from 9:15 to 10:30 Chair: Marc Schoenauer

Keynote 3
In Vivo Veritas: Towards the Evolution of Things

A. E. (Gusz) Eiben, VU University Amsterdam, The Netherlands

Evolutionary Computing (EC) is the research field concerned with artificial evolutionary processes in digital spaces, inside computers. In about three decades the EC community learned the 'art of taming evolution' and developed several evolutionary algorithm variants to solve optimization, design, and machine learning problems. In all these applications, the reproductive entities are digital. This holds even in evolutionary robotics where the evolved code is ported to a robot body and in evolutionary design where the evolved design is constructed physically after the evolutionary process terminates. In this talk I present a vision about the next big breakthrough: the creation of artificial evolutionary processes in physical spaces. In other words, I envision the "Evolution of Things", rather than just the evolution of digital objects, leading to a new field of Embodied Artificial Evolution. After presenting this vision I elaborate on some of the technical challenges and relate the main algorithmic/technical requirements to the current know-how in EC. Finally, I will speculate about possible applications, their societal impacts, and argue that these developments will radically change our lives.

Poster Sessions

Monday – Wednesday, September 15–17

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Monday, September 15

11:00–12:30 Room 3: Poster Session 1

11:00–11:20 Poster Introduction, *Chair: Enrique Alba*

S1.1 Online Black-Box Algorithm Portfolios for Continuous Optimization
Proc. p. 40 *Petr Baudiš and Petr Pošík*

S1.2 Self-Adaptive Genotype-Phenotype Maps: Neural Networks as a Meta-Representation
Proc. p. 110 *Luís F. Simões, Dario Izzo, Evert Haasdijk, and A. E. Eiben*

S1.3 Derivation of a Micro-Macro Link for Collective Decision-Making Systems: Uncover Network Features Based on Drift Measurements
Proc. p. 181 *Heiko Hamann, Gabriele Valentini, Yara Khaluf, and Marco Dorigo*

S1.4 Natural Gradient Approach for Linearly Constrained Continuous Optimization
Proc. p. 252 *Youhei Akimoto and Shinichi Shirakawa*

S1.5 A Study on Multimemetic Estimation of Distribution Algorithms
Proc. p. 322 *Rafael Nogueras and Carlos Cotta*

S1.6 Compressing Regular Expression Sets for Deep Packet Inspection
Proc. p. 394 *Alberto Bartoli, Simone Cumar, Andrea De Lorenzo, and Eric Medvet*

S1.7 On the Locality of Standard Search Operators in Grammatical Evolution
Proc. p. 465 *Ann Thorhauer and Franz Rothlauf*

S1.8 Clustering-Based Selection for Evolutionary Many-Objective Optimization
Proc. p. 538 *Roman Denysiuk, Lino Costa, and Isabel Espírito Santo*

S1.9 Discovery of Implicit Objectives by Compression of Interaction Matrix in Test-Based Problems
Proc. p. 611 *Paweł Liskowski and Krzysztof Krawiec*

S1.10 Using a Family of Curves to Approximate the Pareto Front of a Multi-Objective Optimization Problem
Proc. p. 682 *Saúl Zapotecas Martínez, Víctor A. Sosa Hernández, Hernán Aguirre, Kiyoshi Tanaka, and Carlos A. Coello Coello*

S1.11 Combining Evolutionary Computation and Algebraic Constructions to Find Cryptography-Relevant Boolean Functions
Proc. p. 822 *Stjepan Picek, Elena Marchiori, Lejla Batina, and Domagoj Jakobovic*

S1.12 Coupling Evolution and Information Theory for Autonomous Robotic Exploration
Proc. p. 852 *Guohua Zhang and Michèle Sebag*

S1.13 Unbiased Black-Box Complexity of Parallel Search
Proc. p. 892 *Golnaz Badkobeh, Per Kristian Lehre, and Dirk Sudholt*

14:00–15:30 Room 1/2: Poster Session 2

14:00–14:20 Poster Introduction, *Chair: Jürgen Branke*

S2.1 The Baldwin Effect Hinders Self-Adaptation
Proc. p. 120 *Jim Smith*

S2.2 A Taxonomy of Heterogeneity and Dynamics in Particle Swarm Optimisation
Proc. p. 171 *Harry Goldingay and Peter R. Lewis*

S2.3 An Immune-Inspired Algorithm for the Set Cover Problem
Proc. p. 243 *Ayush Joshi, Jonathan E. Rowe, and Christine Zarges*

S2.4 Factoradic Representation for Permutation Optimisation
Proc. p. 332 *Olivier Regnier-Coudert and John McCall*

S2.5 Inferring and Exploiting Problem Structure with Schema Grammar
Proc. p. 404 *Chris R. Cox and Richard A. Watson*

S2.6 Population Exploration on Genotype Networks in Genetic Programming
Proc. p. 424 *Ting Hu, Wolfgang Banzhaf, and Jason H. Moore*

S2.7 A Provably Asymptotically Fast Version of the Generalized Jensen Algorithm for Non-dominated Sorting
Proc. p. 528 *Maxim Buzdalov and Anatoly Shalyto*

S2.8 Local Optimal Sets and Bounded Archiving on Multi-objective NK-Landscapes with Correlated Objectives
Proc. p. 621 *Manuel López-Ibáñez, Arnaud Liefooghe, and Sébastien Verel*

S2.9 Evolution-In-Materio: Solving Machine Learning Classification Problems Using Materials
Proc. p. 721 *Maktuba Mohid, Julian Francis Miller, Simon L. Harding, Gunnar Tufte, Odd Rune Lykkebø, Mark K. Massey, and Mike C. Petty*

S2.10 Application of Evolutionary Methods to Semiconductor Double-Chirped Mirrors Design
Proc. p. 761 *Rafał Biedrzycki, Jarosław Arabas, Agata Jasik, Michał Szymański, Paweł Wnuk, Piotr Wasylczyk, and Anna Wójcik-Jedlińska*

S2.11 A Memetic Algorithm for Multi Layer Hierarchical Ring Network Design
Proc. p. 832 *Christian Schauer and Günther Raidl*

S2.12 A Generalized Markov-Chain Modelling Approach to $(1, \lambda)$-ES Linear Optimization
Proc. p. 902 *Alexandre Chotard and Martin Holeňa*

S2.13 Runtime Analysis of Evolutionary Algorithms on Randomly Constructed High-Density Satisfiable 3-CNF Formulas
Proc. p. 942 *Andrew M. Sutton and Frank Neumann*

16:00–17:30 Room 3: Poster Session 3

16:00–16:20 Poster Introduction, *Chair: Jim Smith*

S3.1 How to Assess Step-Size Adaptation Mechanisms in Randomised Search
Proc. p. 60 *Nikolaus Hansen, Asma Atamna, and Anne Auger*

S3.2 On Low Complexity Acceleration Techniques for Randomized Optimization
Proc. p. 130 *Sebastian Urban Stich*

S3.3 Reevaluating Exponential Crossover in Differential Evolution
Proc. p. 201 *Ryoji Tanabe and Alex Fukunaga*

S3.4 Combining Model-Based EAs for Mixed-Integer Problems
Proc. p. 342 *Krzysztof L. Sadowski, Dirk Thierens, and Peter A. N. Bosman*

S3.5 Bent Function Synthesis by Means of Cartesian Genetic Programming
Proc. p. 414 *Radek Hrbacek and Vaclav Dvorak*

S3.6 Generic Postprocessing via Subset Selection for Hypervolume and Epsilon-Indicator
Proc. p. 518 *Karl Bringmann, Tobias Friedrich, and Patrick Klitzke*

S3.7 Multi-objective Quadratic Assignment Problem Instances Generator with a Known Optimum Solution
Proc. p. 559 *Mădălina M. Drugan*

S3.8 Optimized Approximation Sets for Low-Dimensional Benchmark Pareto Fronts
Proc. p. 569 *Tobias Glasmachers*

S3.9 Racing Multi-objective Selection Probabilities
Proc. p. 631 *Gaétan Marceau-Caron and Marc Schoenauer*

S3.10 Randomized Parameter Settings for Heterogeneous Workers in a Pool-Based
Proc. p. 702 Evolutionary Algorithm
Mario García-Valdez, Leonardo Trujillo, Juan Julián Merelo-Guérvos, and Francisco Fernández-de-Vega

S3.11 Evolving Neural Network Weights for Time-Series Prediction of General Avi-
Proc. p. 771 ation Flight Data
Travis Desell, Sophine Clachar, James Higgins, and Brandon Wild

S3.12 Scheduling the English Football League with a Multi-objective Evolutionary
Proc. p. 842 Algorithm
Lyndon While and Graham Kendall

S3.13 On the Use of Evolution Strategies for Optimization on Spherical Manifolds
Proc. p. 882 *Dirk V. Arnold*

Tuesday, September 16

11:00–12:30 Room 3: Poster Session 4

11:00–11:20 Poster Introduction, *Chair: Evert Haasdijk*

S4.1 Maximum Likelihood-Based Online Adaptation of Hyper-Parameters in
Proc. p. 70 CMA-ES
Ilya Loshchilov, Marc Schoenauer, Michèle Sebag, and Nikolaus Hansen

S4.2 Stopping Criteria for Multimodal Optimization
Proc. p. 141 *Simon Wessing, Mike Preuss, and Heike Trautmann*

S4.3 An Extended Michigan-Style Learning Classifier System for Flexible Super-
Proc. p. 211 vised Learning, Classification, and Data Mining
Ryan J. Urbanowicz, Gediminas Bertasius, and Jason H. Moore

S4.4 On the Life-Long Learning Capabilities of a NELLI*: A Hyper-Heuristic
Proc. p. 282 Optimisation System
Emma Hart and Kevin Sim

S4.5 A New EDA by a Gradient-Driven Density
Proc. p. 352 *Ignacio Segovia Domínguez, Arturo Hernández Aguirre, and S. Ivvan Valdez*

S4.6 Recurrent Cartesian Genetic Programming
Proc. p. 476 *Andrew James Turner and Julian Francis Miller*

S4.7 Proc. p. 498 A Multiobjective Evolutionary Optimization Framework for Protein Purification Process Design
Richard Allmendinger and Suzanne S. Farid

S4.8 Proc. p. 641 Shake Them All!: Rethinking Selection and Replacement in MOEA/D
Gauvain Marquet, Bilel Derbel, Arnaud Liefooghe, and El-Ghazali Talbi

S4.9 Proc. p. 711 PaDe: A Parallel Algorithm Based on the MOEA/D Framework and the Island Model
Andrea Mambrini and Dario Izzo

S4.10 Proc. p. 751 A Geometrical Approach to the Incompatible Substructure Problem in Parallel Self-Assembly
Navneet Bhalla, Dhananjay Ipparthi, Eric Klemp, and Marco Dorigo

S4.11 Proc. p. 782 Random Partial Neighborhood Search for University Course Timetabling Problem
Yuichi Nagata and Isao Ono

S4.12 Proc. p. 912 Level-Based Analysis of Genetic Algorithms and Other Search Processes
Dogan Corus, Duc-Cuong Dang, Anton V. Eremeev, and Per Kristian Lehre

S4.13 Proc. p. 922 Maximizing Submodular Functions under Matroid Constraints by Multi-objective Evolutionary Algorithms
Tobias Friedrich and Frank Neumann

14:00–15:30 Room 1/2: Poster Session 5

14:00–14:20 Poster Introduction, *Chair: Carlos Cotta*

S5.1 Proc. p. 80 Run-Time Parameter Selection and Tuning for Energy Optimization Algorithms
Ingo Mauser, Marita Dorscheid, and Hartmut Schmeck

S5.2 Proc. p. 151 VLR: A Memory-Based Optimization Heuristic
Hansang Yun, Myoung Hoon Ha, and Robert Ian McKay

S5.3 Proc. p. 222 A Cooperative Evolutionary Approach to Learn Communities in Multilayer Networks
Alessia Amelio and Clara Pizzuti

S5.4 Proc. p. 272 Viability Principles for Constrained Optimization Using a (1+1)-CMA-ES
Andrea Maesani and Dario Floreano

S5.5 Proc. p. 292 Adaptation in Nonlinear Learning Models for Nonstationary Tasks
Wolfgang Konen and Patrick Koch

S5.6 Proc. p. 362 From Expected Improvement to Investment Portfolio Improvement: Spreading the Risk in Kriging-Based Optimization
Rasmus K. Ursem

S5.7 Proc. p. 434 Improving Genetic Programming with Behavioral Consistency Measure
Krzysztof Krawiec and Armando Solar-Lezama

S5.8 Proc. p. 508 Automatic Design of Evolutionary Algorithms for Multi-Objective Combinatorial Optimization
Leonardo C. T. Bezerra, Manuel López-Ibáñez, and Thomas Stützle

S5.9 Proc. p. 579 Start Small, Grow Big? Saving Multi-objective Function Evaluations
Tobias Glasmachers, Boris Naujoks, and Günter Rudolph

S5.10 Proc. p. 652 MH-MOEA: A New Multi-Objective Evolutionary Algorithm Based on the Maximin Fitness Function and the Hypervolume Indicator
Adriana Menchaca-Mendez and Carlos A. Coello Coello

S5.11 Proc. p. 792 Balancing Bicycle Sharing Systems: An Analysis of Path Relinking and Recombination within a GRASP Hybrid
Petrina Papazek, Christian Kloimüllner, Bin Hu, and Günther Raidl

S5.12 Proc. p. 812 Evolving DPA-Resistant Boolean Functions
Stjepan Picek, Lejla Batina, and Domagoj Jakobovic

S5.13 Proc. p. 932 On the Runtime Analysis of Fitness Sharing Mechanisms
Pietro S. Oliveto, Dirk Sudholt, and Christine Zarges

16:00–17:30 Room 3: Poster Session 6

16:00–16:20 Poster Introduction, *Chair: Rasmus K. Ursem*

S6.1 Proc. p. 90 Towards a Method for Automatic Algorithm Configuration: A Design Evaluation Using Tuners
Elizabeth Montero and María Cristina Riff

S6.2 Proc. p. 161 A Differential Evolution Algorithm for the Permutation Flowshop Scheduling Problem with Total Flow Time Criterion
Valentino Santucci, Marco Baioletti, and Alfredo Milani

S6.3 Proc. p. 233 Novelty Search in Competitive Coevolution
Jorge Gomes, Pedro Mariano, and Anders Lyhne Christensen

S6.4 Proc. p. 302 On the Effectiveness of Sampling for Evolutionary Optimization in Noisy Environments
Chao Qian, Yang Yu, Yaochu Jin, and Zhi-Hua Zhou

S6.5 Distance Measures for Permutations in Combinatorial Efficient Global Optimization
Proc. p. 373
Martin Zaefferer, Jörg Stork, and Thomas Bartz-Beielstein

S6.6 On Effective and Inexpensive Local Search Techniques in Genetic Programming Regression
Proc. p. 444
Fergal Lane, R. Muhammad Atif Azad, and Conor Ryan

S6.7 Combining Semantically-Effective and Geometric Crossover Operators for Genetic Programming
Proc. p. 454
Tomasz P. Pawlak

S6.8 An Analysis on Selection for High-Resolution Approximations in Many-Objective Optimization
Proc. p. 487
Hernán Aguirre, Arnaud Liefooghe, Sébastien Verel, and Kiyoshi Tanaka

S6.9 Queued Pareto Local Search for Multi-Objective Optimization
Proc. p. 589
Maarten Inja, Chiel Kooijman, Maarten de Waard, Diederik M. Roijers, and Shimon Whiteson

S6.10 Empirical Performance of the Approximation of the Least Hypervolume Contributor
Proc. p. 662
Krzysztof Nowak, Marcus Märtens, and Dario Izzo

S6.11 An Analysis of Migration Strategies in Island-Based Multimemetic Algorithms
Proc. p. 731
Rafael Nogueras, and Carlos Cotta

S6.12 Multiobjective Selection of Input Sensors for SVR Applied to Road Traffic Prediction
Proc. p. 802
Jiri Petrlik, Otto Fucik, and Lukas Sekanina

S6.13 Quasi-Stability of Real Coded Finite Populations
Proc. p. 872
Jarosław Arabas and Rafał Biedrzycki

Wednesday, September 17

11:00–12:30 Room 3: Poster Session 7

11:00–11:20 Poster Introduction, *Chair: Dirk Thierens*

S7.1 Shuffle and Mate: A Dynamic Model for Spatially Structured Evolutionary Algorithms
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Carlos M. Fernandes, Juan L. J. Laredo, Juan Julian Marelo, Carlos Cotta, Rafael Nogueras, and Agostinho C. Rosa

S7.2 Parameter Prediction Based on Features of Evolved Instances for Ant Colony Optimization and the Traveling Salesperson Problem
Proc. p. 100 *Samadhi Nallaperuma, Markus Wagner, and Frank Neumann*

S7.3 Messy Coding in the XCS Classifier System for Sequence Labeling
Proc. p. 191 *Masaya Nakata, Tim Kovacs, and Keiki Takadama*

S7.4 Evolutionary Constrained Optimization for a Jupiter Capture
Proc. p. 262 *Jérémie Labroquère, Aurélie Héritier, Annalisa Riccardi, and Dario Izzo*

S7.5 Evolving Mixtures of n-gram Models for Sequencing and Schedule Optimization
Proc. p. 312 *Chung-Yao Chuang and Stephen F. Smith*

S7.6 Boosting Search for Recursive Functions Using Partial Call-Trees
Proc. p. 384 *Brad Alexander and Brad Zacher*

S7.7 On the Impact of Multiobjective Scalarizing Functions
Proc. p. 548 *Bilel Derbel, Dimo Brockhoff, Arnaud Liefooghe, and Sébastien Verel*

S7.8 Distance-Based Analysis of Crossover Operators for Many-Objective Knapsack Problems
Proc. p. 600 *Hisao Ishibuchi, Yuki Tanigaki, Hiroyuki Masuda, and Yusuke Nojima*

S7.9 A Portfolio Optimization Approach to Selection in Multiobjective Evolutionary Algorithms
Proc. p. 672 *Iryna Yevseyeva, Andreia P. Guerreiro, Michael T. M. Emmerich, and Carlos M. Fonseca*

S7.10 Travelling Salesman Problem Solved 'in materio' by Evolved Carbon Nanotube Device
Proc. p. 692 *Kester Dean Clegg, Julian Francis Miller, Kieran Massey, and Mike Petty*

S7.11 Tuning Evolutionary Multiobjective Optimization for Closed-Loop Estimation of Chromatographic Operating Conditions
Proc. p. 741 *Richard Allmendinger, Spyridon Gerontas, Nigel J. Titchener-Hooker, and Suzanne S. Farid*

S7.12 Local Optima and Weight Distribution in the Number Partitioning Problem
Proc. p. 862 *Khulood Alyahya and Jonathan E. Rowe*