Table of Contents

Evolutionary Algorithms Theory

Random Dynamics Optimum Tracking with Evolution Strategies 3
Dirk V. Arnold, Hans-Georg Beyer

On the Behavior of Evolutionary Global-Local Hybrids with Dynamic Fitness Functions 13
Roger Eriksson, Björn Olsson

Measuring the Searched Space to Guide Efficiency: The Principle and Evidence on Constraint Satisfaction 23
Jano I. van Hemert, Thomas Bäck

On the Analysis of Dynamic Restart Strategies for Evolutionary Algorithms 33
Thomas Jansen

Running Time Analysis of Multi-objective Evolutionary Algorithms on a Simple Discrete Optimization Problem 44
Marco Laumanns, Lothar Thiele, Eckart Zitzler, Emo Welzl, Kalyanmoy Deb

Fitness Landscapes Based on Sorting and Shortest Paths Problems 54
Jens Scharnow, Karsten Tinnefeld, Ingo Wegener

Performance Measures for Dynamic Environments 64
Karsten Weicker

Representation/Codification Issues

Direct Representation and Variation Operators for the Fixed Charge Transportation Problem 77
Christoph Eckert, Jens Gottlieb

On the Utility of Redundant Encodings in Mutation-Based Evolutionary Search 88
Joshua D. Knowles, Richard A. Watson

Binary Representations of Integers and the Performance of Selectorecombinative Genetic Algorithms 99
Franz Rothlauf

Variation Operators: Analysis, New Techniques

Parallel Varying Mutation in Deterministic and Self-adaptive GAs 111
Hernán E. Aguirre, Kiyoshi Tanaka

Self-organizing Maps for Pareto Optimization of Airfoils 122
Dirk Büche, Gianfranco Guidati, Peter Stoll, Petros Koumoutsakos

On Fitness Distributions and Expected Fitness Gain of Mutation Rates in Parallel Evolutionary Algorithms 132
David W. Corne, Martin J. Oates, Douglas B. Kell

Opposites Attract: Complementary Phenotype Selection for Crossover in Genetic Programming 142
B. Dolin, M.G. Arenas, J.J. Merelo

Theoretical Analysis of the Confidence Interval Based Crossover for Real-Coded Genetic Algorithms 153
C. Hervás-Martínez, D. Ortiz-Boyer, N. García-Pedrajas

Deterministic Multi-step Crossover Fusion: A Handy Crossover Composition for GAs 162
Kokolo Ikeda, Shigenobu Kobayashi

Operator Learning for a Problem Class in a Distributed Peer-to-Peer Environment 172
M. Jelasity, M. Preuß, A.E. Eiben

Crossover Operator Effect in Function Optimization with Constraints 184
D. Ortiz-Boyer, C. Hervás-Martínez, N. García-Pedrajas

Reducing Random Fluctuations in Mutative Self-adaptation 194
Thomas Philip Runarsson

On Weight-Biased Mutation for Graph Problems 204
Günther R. Raidl, Gabriele Kodydek,, Bryant A. Julstrom

Self-adaptive Operator Scheduling Using the Religion-Based EA 214
René Thomsen, Thiemo Krink

Probabilistic Model-Building Genetic Algorithms in Permutation Representation Domain Using Edge Histogram 224
Shigeyoshi Tsutsui

From Syntactical to Semantical Mutation Operators for Structure Optimization 234
Dirk Wiesmann

Evolutionary Techniques: Coevolution

Parameter Control within a Co-operative Co-evolutionary Genetic Algorithm 247
Antony Iorio, Xiaodong Li

The Effects of Representational Bias on Collaboration Methods in Cooperative Coevolution 257
R. Paul Wiegand, William C. Liles, Kenneth A. De Jong

Multiobjective Optimization

Parallel and Hybrid Models for Multi-objective Optimization: Application to the Vehicle Routing Problem 271
Nicolas Jozefowiez, Frédéric Semet, El-Ghazali Talbi

Multiobjective Design Optimization of Merging Configuration for an Exhaust Manifold of a Car Engine 281
Masahiro Kanazaki, Masashi Morikaw, Shigeru Obayashi, Kazuhiro Nakahashi

Multi-objective Co-operative Co-evolutionary Genetic Algorithm 288
Nattavut Keerativuttitumrong, Nachol Chaiyaratana, Vara Varavithya

Bayesian Optimization Algorithms for Multi-objective Optimization 298
Marco Laumanns, Jiri Ocenasek

An Evolutionary Algorithm for Controlling Chaos: The Use of Multi–objective Fitness Functions 308
Hendrik Richter

Evolutionary Algorithms: New Techniques

On Modelling Evolutionary Algorithm Implementations through Co-operating Populations 321
Panagiotis Adamidis, Vasilios Petridis

Permutation Optimization by Iterated Estimation of Random Keys Marginal Product Factorizations 331
Peter A.N. Bosman, Dirk Thierens

Advanced Population Diversity Measures in Genetic Programming 341
Edmund Burke, Steven Gustafson, Graham Kendall, Natalio Krasnogor

Introducing Start Expression Genes to the Linkage Learning Genetic Algorithm 351
Ying-ping Chen, David E. Goldberg

Metamodel–Assisted Evolution Strategies 361
Michael Emmerich, Alexios Giotis, Mutlu Özdemir, Thomas Bäck, Kyriakos Giannakoglou

Limiting the Number of Fitness Cases in Genetic Programming Using Statistics 371
Mario Giacobini, Marco Tomassini, Leonardo Vanneschi

Resource-Based Fitness Sharing 381
Jeffrey Horn

Evolution Strategy with Neighborhood Attraction Using a Neural Gas Approach 391
Jutta Huhse, Thomas Villmann, Peter Merz, Andreas Zell

A New Asynchronous Parallel Evolutionary Algorithm for Function Optimization 401
Pu Liu, Francis Lau, Michael J. Lewis, Cho-li Wang

Fighting Bloat with Nonparametric Parsimony Pressure 411
Sean Luke, Liviu Panait

Increasing the Serial and the Parallel Performance of the CMA-Evolution Strategy with Large Populations 422
Sibylle D. Müller, Nikolaus Hansen, Petros Koumoutsakos

Adaptive Reservoir Genetic Algorithm with On-Line Decision Making 432
Cristian Munteanu, Agostinho Rosa

Genetic Algorithm Visualization Using Self-organizing Maps 442
G. Romero, J.J. Merelo, P.A. Castillo, J.G. Castellano, M.G. Arenas

Generalised Regression GA for Handling Inseparable Function Interaction: Algorithm and Applications 452
Rajkumar Roy, Ashutosh Tiwari

Diversity-Guided Evolutionary Algorithms 462
Rasmus K. Ursem

Hybrid Algorithms: Neurogenetic Algorithms, Evolutionary Techniques Applied to Neural Nets

Evolutionary Optimization of Heterogeneous Problems 475
Lluís A. Belanche Muñoz

Automatic Recurrent and Feed-Forward ANN Rule and Expression Extraction with Genetic Programming 485
Julian Dorado, Juan R. Rabuñal, Antonino Santos, Alejandro Pazos, Daniel Rivero

Learning and Evolution by Minimization of Mutual Information 495
Yong Liu, Xin Yao

Evolved RBF Networks for Time-Series Forecasting
and Function Approximation 505
V.M. Rivas, P.A. Castillo, J.J. Merelo

Hybrid Algorithms: Memetic, Other

Evolutive Identification of Fuzzy Systems for Time-Series Prediction 517
Jesús González, Ignacio Rojas, Héctor Pomares

HyGLEAM - An Approach to Generally Applicable Hybridization
of Evolutionary Algorithms 527
Wilfried Jakob

Co-evolving Memetic Algorithms: Initial Investigations 537
Jim Smith

Learning Classifier Systems

Consideration of Multiple Objectives
in Neural Learning Classifier Systems 549
Larry Bull, Matt Studley

On Using Constructivism in Neural Classifier Systems 558
Larry Bull

Initial Modifications to XCS for Use in Interactive Evolutionary Design ... 568
Larry Bull, David Wyatt, Ian Parmee

First Results from Experiments in Fuzzy Classifier System Architectures
for Mobile Robotics 578
A.G. Pipe, B. Carse

TCS Learning Classifier System Controller on a Real Robot 588
Jacob Hurst, Larry Bull, Chris Melhuish

Comparison of Different Techniques

Comparing Synchronous and Asynchronous Cellular Genetic Algorithms .. 601
Enrique Alba, Mario Giacobini, Marco Tomassini, Sergio Romero

Satellite Range Scheduling: A Comparison of Genetic, Heuristic
and Local Search 611
L. Barbulescu, A.E. Howe, J.P. Watson, L.D. Whitley

The LifeCycle Model: Combining Particle Swarm Optimisation,
Genetic Algorithms and HillClimbers 621
Thiemo Krink, Morten Løvbjerg

Metaheuristics for Group Shop Scheduling 631
Michael Sampels, Christian Blum, Monaldo Mastrolilli, Olivia Rossi-Doria

Experimental Investigation of Three Distributed Genetic Programming Models 641
Marco Tomassini, Leonardo Vanneschi, Francisco Fernández, Germán Galeano

Model-Based Search for Combinatorial Optimization: A Comparative Study 651
Mark Zlochin, Marco Dorigo

Evolutionary Algorithm Implementations

A Framework for Distributed Evolutionary Algorithms 665
M.G. Arenas, P. Collet, A.E. Eiben, M. Jelasity, J.J. Merelo, B. Paechter, M. Preuß, M. Schoenauer

Optimisation of Multilayer Perceptrons Using a Distributed Evolutionary Algorithm with SOAP 676
P.A. Castillo, M.G. Arenas, J.G. Castellano, J.J. Merelo, V.M. Rivas, G. Romero

Applications

Off-Line Evolution of Behaviour for Autonomous Agents in Real-Time Computer Games 689
Eike Falk Anderson

A Parallel Evolutionary Algorithm for Stochastic Natural Language Parsing 700
Lourdes Araujo

Evolutionary Learning of Boolean Queries by Multiobjective Genetic Programming 710
Oscar Cordón, Enrique Herrera-Viedma, María Luque

Inferring Phylogenetic Trees Using Evolutionary Algorithms 720
Carlos Cotta, Pablo Moscato

Towards a More Efficient Evolutionary Induction of Bayesian Networks ... 730
Carlos Cotta, Jorge Muruzábal

Robust Multiscale Affine 2D-Image Registration through Evolutionary Strategies 740
Héctor Fernando Gómez García, Arturo González Vega, Arturo Hernández Aguirre, José Luis Marroquín Zaleta, Carlos Coello Coello

Synthesizing Graphical Models Employing Explaining Away 749
Ralf Garionis

Constructive Geometric Constraint Solving: A New Application
of Genetic Algorithms 759
R. Joan-Arinyo, M.V. Luzón, A. Soto

Multimeme Algorithms for Protein Structure Prediction 769
N. Krasnogor, B.P. Blackburne, E.K. Burke, J.D. Hirst

A Dynamic Traffic Model for Frequency Assignment 779
Hakim Mabed, Alexandre Caminada, Jin-Kao Hao, Denis Renaud

A Parameter-Free Genetic Algorithm
for a Fixed Channel Assignment Problem with Limited Bandwidth 789
Shouichi Matsui, Isamu Watanabe, Ken-ichi Tokoro

Real-Coded Parameter-Free Genetic Algorithm
for Job-Shop Scheduling Problems 800
Shouichi Matsui, Isamu Watanabe, Ken-ichi Tokoro

Clustering Gene Expression Profiles with Memetic Algorithms 811
Peter Merz, Andreas Zell

Cellular Automata and Genetic Algorithms
for Parallel Problem Solving in Human Genetics 821
Jason H. Moore, Lance W. Hahn

Evolutionary Graph Generation System and Its Application
to Bit-Serial Arithmetic Circuit Synthesis 831
Makoto Motegi, Naofumi Homma, Takafumi Aoki, Tatsuo Higuchi

Evaluating Multi-criteria Evolutionary Algorithms
for Airfoil Optimisation 841
Boris Naujoks, Lars Willmes, Thomas Bäck, Werner Haase

Hyperheuristics: A Robust Optimisation Method Applied
to Nurse Scheduling 851
Peter Cowling, Graham Kendall, Eric Soubeiga

Evolving the Topology of Hidden Markov Models
Using Evolutionary Algorithms 861
René Thomsen

Solving a Real World Routing Problem
Using Multiple Evolutionary Agents 871
Neil Urquhart, Peter Ross, Ben Paechter, Ken Chisholm

Other Bioinspired Algorithms: Cellular Automata, Ant Colony Optimization

An Ant Colony Optimization Approach to the Probabilistic Traveling Salesman Problem 883
Leonora Bianchi, Luca Maria Gambardella, Marco Dorigo

When Model Bias Is Stronger than Selection Pressure 893
Christian Blum, Michael Sampels

Evolution of Asynchronous Cellular Automata 903
Mathieu S. Capcarrere

Improved Ant-Based Clustering and Sorting in a Document Retrieval Interface 913
Julia Handl, Bernd Meyer

An Adaptive Flocking Algorithm for Spatial Clustering 924
Gianluigi Folino, Giandomenico Spezzano

Evolution of Asynchronous Cellular Automata for the Density Task 934
Marco Tomassini, Mattias Venzi

Author Index 945