PPSN XIII

Session 2 Overview

Juergen Branke

The Baldwin Effect Hinders Self-Adaptation

Jim Smith

- Two ways to improve final stage:
  - Memetic algorithms
  - self-adaptation
- Interaction between Self-Adaptation and Baldwinian or Lamarckian learning
- Lamarckian learning helps Self-Adaptation, Baldwinian learning slows it down

Memetic algorithms, self-adaptation

A taxonomy of heterogeneity and dynamics in particle swarm optimisation

Harry Goldingay, **Peter Lewis**

- **Heterogeneity:** Particles with different behaviour
- **Dynamics:** Particle behaviour changes over time
- Dynamics often more useful than heterogeneity

PSO, Self-adaptation

An Immune-Inspired Algorithm for the Set Cover Problem

Ayush Joshi, Jonathan Rowe, Christine Zarges

- Set cover with 2 objectives:
  - min number of subsets
  - min number uncovered elements
- Parallel AIS based on germinal centre reaction in the immune system
- Comparison with GSEMO

AIS, Parallelization, Set Cover

Factoradic Representation for Permutation Optimisation

Olivier Regnier-Coudert, John McCall

- **GA and 2 EDAs**
- **4 problems (**TSP, Permutation Flowshop Scheduling, Quadratic Assignment, Linear Ordering)
- Factoradic representation works well in particular for UMDA

EDA, permutation problems, representation

Inferring and Exploiting Problem Structure with Schema Grammar

Chris Cox and Richard Watson

- A model-building algorithm that is able to infer problem structure from fit individuals using generative grammar induction
- Correlation between the compressibility of a population and the degree of inherent problem structure
- Schemata inferred from the grammar can be exploited by an EA
- NK landscapes

EDA, Grammars, landscape analysis

Population Exploration on Genotype Networks in Genetic Programming

Ting Hu, Wolfgang Banzhaf,
Jason Moore

- Linear GP
- neutral networks to characterize the distribution of neutrality among genotypes and phenotypes
- Correlation of the network properties with robustness and evolvability

Genetic Programming, neutral networks, landscape analysis

A Provably Asymptotically Fast Version of the Generalized Jensen Algorithm for Non-Dominated Sorting

Maxim Buzdalov, Anatoly Shalyto

- New non-dominated sorting algorithm with better worst-case complexity

EMO, algorithm complexity

Local Optimal Sets and Bounded Archiving on Multi-objective NK-Landscapes with Correlated Objectives

Manuel López-Ibáñez, Arnaud Liefooghe, **Sébastien Verel**

- Multi-objective NK-landscapes
- Pareto Local Search
- Analyse size of PLO-sets:
  - increasing the number of objectives -> exponential increment
  - decreasing the correlation between objectives -> exponential increment
  - variable correlation -> minor effect
- time to reach PLOs when bounded archiving methods are used

EMO, NK-landscapes, fitness landscape analysis, runtime analysis

Evolution-In-Materio: Solving Machine Learning Classification Problems Using Materials

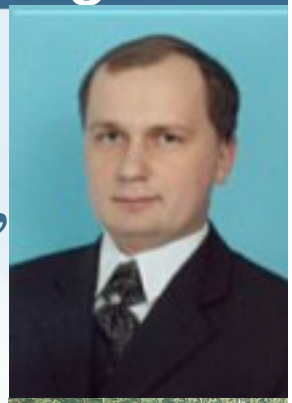
Maktuba Mohid, **Julian Miller**,
Simon Harding, Gunnar Tufte,
Odd Rune Lykkebø, Kieran Massey,
Mike Petty

- EIM: solution is implemented and tested on reconfigurable hardware
- A mixture of single-walled carbon nanotubes and a polymer
- Exploit the properties of physical matter to solve classification problems

In-materio-evolution, in-the-loop evolution

Application of Evolutionary Methods to Semiconductor Double-Chirped Mirrors Design

Rafal Biedrzycki, Jaroslaw Arabas,
Agata Jasik, Michal Szymanski2, Pawel Wnuk,
Piotr Wasylczyk, Anna Wójcik-Jedlinska



- Design a mirror to be used in a laser
- Comparison of **CMA-ES**, DE, Nelder-Mead, BFGS
- Design is actually used

Real-world application, algorithm comparison

A Memetic Algorithm For Multi Layer Hierarchical Ring Network Design

Christian Schauer, Günther Raidl

- large and reliable telecommunication networks
- decomposition into
  - partitioning nodes into rings done by memetic algorithm
  - computation of ring for each partition done by heuristic decoder

Representation, memetic algorithm, real-world application

A Generalized Markov-Chain Modelling Approach to (1, λ)-ES Linear Optimization

Alexandre Chotard, Martin Holena

- (1, λ)-ES with constant step size
- linear problem with linear constraint
- extension of previous work to non-Gaussian mutation

Theory

Runtime Analysis of Evolutionary Algorithms on Randomly Constructed High-Density Satisfiable 3-CNF Formulas

Andrew Sutton, Frank Neumann

- Proves that for almost all satisfiable 3-CNF formulas, a simple 1+1 EA will find a satisfying assignment in $O(n^2 \log n)$ steps with high probability

Theory

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Enjoy the session!