



Engineering Optimization >

Volume 42, 2010 - [Issue 2](#)

524 | 25 | 0
Views | CrossRef citations to date | Altmetric

Original Articles

Interactive multi-objective particle swarm optimization with heatmap-visualization-based user interface

Jan Hettenhausen , Andrew Lewis & Sanaz Mostaghim

Pages 119-139 | Received 21 Oct 2008, Published online: 29 Oct 2009

Cite this article <https://doi.org/10.1080/03052150903042632>

Sample our
Engineering & Technology
Journals



>> **Sign in here** to start your access
to the latest two volumes for 14 days

Full Article

Figures & data

References

Citations

Metrics

Reprints & Permissions

Read this article

Share

Abstract

This article introduces an interactive Multi-Objective Particle Swarm Optimization (MOPSO) method that allows a human decision maker to guide the optimization process based on domain-specific knowledge and problem-specific preferences. This article also presents a novel graphical user interface based on heatmap visualization which, combined with the algorithm, greatly reduces the workload on the user, thereby decreasing unwanted side effects caused by human fatigue.

The method was evaluated on a set of standard test problems and the results were compared to those of a non-interactive MOPSO method. To simulate domain-specific preferences and knowledge, the decision maker was instructed to focus the search on a specific region of the Pareto-front. The results demonstrate that the proposed method

was able to obtain better solutions than the non-interactive MOPSO method in terms of convergence towards the true Pareto-front and the number and spread of focused solutions.

Keywords:

- interactive multi-objective particle swarm optimization
- heatmap visualization
- multi-objective optimization
- interactive optimization

Acknowledgements

The authors would like to thank Andy Pryke for his encouragement and assistance with the heatmap visualization method.

Related Research Data

[A fast and elitist multiobjective genetic algorithm: NSGA-II](#)
Source: IEEE Transactions on Evolutionary Computation

[Multiple Objective Decision Making — Methods and Applications](#)
Source: Unknown Repository

[MOPSO: a proposal for multiple objective particle swarm optimization](#)
Source: Unknown Repository

[Multi-Objective Particle Swarm Optimizers: A Survey of the State-of-the-Art](#)
Source: International Journal of Computational Intelligence Research

[A modified particle swarm optimizer](#)
Source: Unknown Repository

[Interactive Particle Swarm: A Pareto-Adaptive Metaheuristic to Multiobjective Optimization](#)
Source: IEEE Transactions on Systems Man and Cybernetics - Part A Systems and Humans

[Visualization and Data Mining of Pareto Solutions Using Self-Organizing Map](#)

Information for

[Authors](#)[R&D professionals](#)[Editors](#)[Librarians](#)[Societies](#)

Opportunities

[Reprints and e-prints](#)[Advertising solutions](#)[Accelerated publication](#)[Corporate access solutions](#)

Open access

[Overview](#)[Open journals](#)[Open Select](#)[Dove Medical Press](#)[F1000Research](#)

Help and information

[Help and contact](#)[Newsroom](#)[All journals](#)[Books](#)

Keep up to date

Register to receive personalised research and resources by email

[Sign me up](#)