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Xin-She Yang
Editor

Cuckoo Search and Firefly Algorithm

Theory and Applications

 Springer

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Preface

Many modelling and optimization problems require sophisticated algorithms to solve. Contemporary optimization algorithms are often nature-inspired, based on swarm intelligence. In the last two decades, there have been significant developments in the area of metaheuristic optimization and computational intelligence. Optimization and computational intelligence have become ever-increasingly more important. One of the core activities of the computational intelligence is that “intelligent” evolutionary algorithms play a vital role. Accompanying the progress of computational intelligence is the emergence of metaheuristic algorithms. Among such algorithms, swarm-intelligence-based algorithms form a large part of contemporary algorithms, and these algorithms are becoming widely used in classifications, optimization, image processing, business intelligence as well as in machine learning and computational intelligence.

Most new nature-inspired optimization algorithms are swarm-intelligence-based, with multiple interacting agents. They are flexible, efficient and easy to implement. For example, firefly algorithm (FA) was developed in late 2007 and early 2008 by Xin-She Yang, based on the flashing behaviour of tropical fireflies, and FA has been proved to be very efficient in solving multimodal, nonlinear, global optimization problems. It is also very efficient in dealing with classification problems and image processing. As another example, cuckoo search (CS) was developed by Xin-She Yang and Suash Deb in 2009, based on the brooding parasitism of some cuckoo species, in combination with Lévy flights, and CS is very efficient as demonstrated in many studies by many researchers with diverse applications. In fact, at the time of the writing in July 2013, there have been more than 440 research papers on cuckoo search and 600 pagers on firefly algorithm in the literature, which shows that these algorithms are indeed an active, hot research area.

This book strives to provide a timely summary of the latest developments concerning cuckoo search and firefly algorithm with many contributions from leading experts in the field. Topics include cuckoo search, firefly algorithm, classifications, scheduling, feature selection, travelling salesman problem, neural network training, semantic web service, multi-objective manufacturing process optimization, parameter-tuning, queuing, randomization, reliability problem, GPU optimization, shape optimization and others. This unique book can thus serve as an ideal reference for both graduates and researchers in computer science, evolutionary computing, machine learning, computational intelligence and optimization,

as well as engineers in business intelligence, knowledge management and information technology.

I would like to thank our Editors, Drs. Thomas Ditzinger and Holger Schaepe, and staff at Springer for their help and professionalism. Last but not least, I thank my family for the help and support.

London, July 2013

Xin-She Yang

Contents

Cuckoo Search and Firefly Algorithm: Overview and Analysis	1
Xin-She Yang	
On the Randomized Firefly Algorithm	27
Iztok Fister, Xin-She Yang, Janez Brest and Iztok Fister Jr.	
Cuckoo Search: A Brief Literature Review	49
Iztok Fister Jr., Xin-She Yang, Dušan Fister and Iztok Fister	
Improved and Discrete Cuckoo Search for Solving the Travelling Salesman Problem.	63
Aziz Ouabarab, Belaïd Ahiod and Xin-She Yang	
Comparative Analysis of the Cuckoo Search Algorithm	85
Pinar Civicioglu and Erkan Besdok	
Cuckoo Search and Firefly Algorithm Applied to Multilevel Image Thresholding.	115
Ivona Brajevic and Milan Tuba	
A Binary Cuckoo Search and Its Application for Feature Selection. . .	141
L. A. M. Pereira, D. Rodrigues, T. N. S. Almeida, C. C. O. Ramos, A. N. Souza, X.-S. Yang and J. P. Papa	
How to Generate the Input Current for Exciting a Spiking Neural Model Using the Cuckoo Search Algorithm.	155
Roberto A. Vazquez, Guillermo Sandoval and Jose Ambrosio	
Multi-Objective Optimization of a Real-World Manufacturing Process Using Cuckoo Search	179
Anna Syberfeldt	
Solving Reliability Optimization Problems by Cuckoo Search.	195
Ehsan Valian	

Hybridization of Cuckoo Search and Firefly Algorithms for Selecting the Optimal Solution in Semantic Web Service Composition 217
Ioan Salomie, Viorica Rozina Chifu and Cristina Bianca Pop

Geometric Firefly Algorithms on Graphical Processing Units 245
A. V. Husselmann and K. A. Hawick

A Discrete Firefly Algorithm for Scheduling Jobs on Computational Grid 271
Adil Yousif, Sulaiman Mohd Nor, Abdul Hanan Abdullah and Mohammed Bakri Bashir

A Parallelised Firefly Algorithm for Structural Size and Shape Optimisation with Multimodal Constraints. 291
Herbert Martins Gomes and Adelano Esposito

Intelligent Firefly Algorithm for Global Optimization. 315
Seif-Eddeen K. Fateen and Adrián Bonilla-Petriciolet

Optimization of Queueing Structures by Firefly Algorithm. 331
Joanna Kwiecień and Bogusław Filipowicz

Firefly Algorithm: A Brief Review of the Expanding Literature 347
Iztok Fister, Xin-She Yang, Dušan Fister and Iztok Fister Jr.

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