Nature-Inspired Optimization Algorithms

(A tutorial at IDEAL 2018)

Tutor: Xin-She Yang, Middlesex University London, UK

Many problems in optimization and computational intelligence are very challenging to solve, and some of these problems can be NP-hard, which means that there are often no efficient algorithms to tackle such hard problems. In many cases, nature-inspired metaheuristic algorithms can be a good alternative and such algorithms include genetic algorithms (GA), particle swarm optimization (PSO), firefly algorithm (FA) and many others. Over the last two decades, nature-inspired algorithms have become increasingly popular in solving large-scale, nonlinear, global optimization with many real-world applications. They also become an important of part of optimization and computational intelligence. This tutorial will provide a critical analysis of recent algorithms using mathematical theories such as Markov chains, dynamic systems, random walks and self-organization systems. This will provide some insight into these algorithms and their proper use in applications.

Topics and Format:

This tutorial intends to introduce the fundamentals and latest advances of the state-of-the-art nature-inspired algorithms with the focus on analysis on new algorithms. Topics include

- Essence of evolutionary algorithms and their key components
- Introduction to some recent nature-inspired algorithms
- Review of some recent theoretical results concerning evolutionary algorithms

Tutor:

Dr. Xin-She Yang
School of Science and Technology, Middlesex University, London NW4 4BT, United Kingdom

http://scholar.google.co.uk/citations?user=fA6aTlAAAAAJ
Email: x.yang@mdx.ac.uk

Xin-She Yang is Reader at School of Science and Technology, Middlesex University (UK) and an Adjunct Professor at Reykjavik University (Iceland). He is also an elected Bye-Fellow at Downing College, Cambridge University. He worked at Cambridge University and then National Physical Laboratory as a Senior Research Scientist after obtaining his DPhil in Applied Mathematics at Oxford University. With more 250 publications and more than 20 books, his research has been cited more than 30,000 times (according to Google Scholar) with an h-index of 66. He is also on the list of Highly Cited Researchers in 2016 and 2017 according to Thomson Reuters' Web of Science. He is the Chair of IEEE CIS Task Force on Business Intelligence and Knowledge Management. Yang has given many invited keynote talks at international conferences such as ICCS2015 (Iceland), SIBGRAPI2015 (Brazil), IEEE OIPE2016 (Italy), HS2017 (Spain), and ICIST2018 (London). He has also given tutorials at international conferences such as ECTA2015 (Portugal), MOD2017 (Italy) and EANN2018 (UK) on algorithms and nature-inspired computation.