Collaborative Neurodynamic Optimization Approaches to Distributed, Global and Multiple-objective Optimization

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Summary

The past three decades witnessed the birth and growth of neurodynamic optimization which has emerged and matured as a powerful approach to real-time optimization due to its inherent nature of parallel and distributed information processing and the hardware realizability. Despite the success, almost all existing neurodynamic approaches work well only for convex and generalized-convex optimization problems with unimodal objective functions. Effective neurodynamic approach to constrained global optimization with multimodal objective functions is rarely available. In this talk, starting with the idea and motivation of neurodynamic optimization, I will review the historic review and present the state of the art of neurodynamic optimization with many individual models for convex and generalized convex optimization. In addition, I will present a multiple-time-scale neurodynamic approach to selected constrained optimization. Finally, I will introduce population-based collaborative neurodynamic approaches to constrained distributed and global optimization. By deploying a population of individual neurodynamic models with diversified initial states at a lower level coordinated by using some global search and information exchange rules (such as PSO) at a upper level, it will be shown that global and multi-objective optimization problems can be solved effectively and efficiently.

Biosketch

Jun Wang is the Chair Professor Computational Intelligence in the Department of Computer Science and School of Date Science at City University of Hong Kong. Previously, he held various academic positions at Dalian University of Technology, Case Western Reserve University, University of North Dakota, and the Chinese University of Hong Kong. He also held various short-term visiting positions at USAF Armstrong Laboratory, RIKEN Brain Science Institute, Dalian University of Technology, Huazhong University of Science and Technology, and Shanghai Jiao Tong University (Changjiang Chair Professor). He received a B.S. degree in electrical engineering and an M.S. degree in systems engineering from Dalian University of Technology and his Ph.D. degree in systems engineering from Case Western Reserve University. His current research interests include neural networks and their applications. He published about 200 journal papers, 15 book chapters, 11 edited books, and numerous conference papers in these areas. He is the Editor-in-Chief of the *IEEE Transactions on Cybernetics*. He also served as an Associate Editor of the *IEEE Transactions on Neural Networks* (1999-2009), *IEEE*

Transactions on Cybernetics and its predecessor (2003-2013), and *IEEE Transactions on Systems, Man, and Cybernetics – Part C* (2002–2005), as a member of the editorial board of *Neural Networks* (2012-2014), editorial advisory board of *International Journal of Neural Systems* (2006-2013. He was an organizer of several international conferences such as the General Chair of the 13th International Conference on Neural Information Processing (2006) and the 2008 IEEE World Congress on Computational Intelligence, and a Program Chair of the IEEE International Conference on Systems, Man, and Cybernetics (2012). He has been an IEEE Computational Intelligence Society Distinguished Lecturer (2010-2012, 2014-2016). In addition, he served as President of Asia Pacific Neural Network Assembly (APNNA) in 2006 and many organizations such as IEEE Fellow Committee; IEEE Computational Intelligence Society Awards Committee; IEEE Systems, Man, and Cybernetics Society Board of Governors, He is an IEEE Fellow, IAPR Fellow, CAAI Fellow, and a recipient of an *IEEE Transactions on Neural Networks* Outstanding Paper Award and APNNA Outstanding Achievement Award in 2011, Neural Networks Pioneer Award from IEEE Computational Intelligence Society (2014), among others.