

Collaborative Neurodynamic Optimization Approaches to Combinatorial 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 constrained 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 optimization problems with continuous variables. Effective neurodynamic approach to combinatorial optimization with discrete variables is rarely available. In this talk, based on a reformulation of combinatorial optimization problems as constrained global optimization problems, collaborative neurodynamic optimization approaches to combinatorial optimization will be presented. By using multiple neurodynamic models to search local optima in parallel and a meta-heuristic method (such as PSO) to update neuronal initial states iteratively, it will be shown that combinatorial optimization problems can be solved effectively and efficiently. The efficacy of the proposed approaches will be substantiated with experimental results for sparse nonnegative matrix factorization and portfolio selection.

Biosketch

Jun Wang is the Chair Professor Computational Intelligence in the Department of Computer Science and School of Data Science at City University of Hong Kong. Prior to this position, 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 from Dalian University of Technology and his Ph.D. degree from Case Western Reserve University. His current research interests include neural networks and their applications. He published over 230 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* (2014-2019). He 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 many international conferences such as the General Chair of the 13th/25th International Conference on Neural Information Processing (2006/2018), the 2008 IEEE World Congress on Computational Intelligence, and a Program Chair of the IEEE International Conference on Systems, Man, and Cybernetics (2012). He is an IEEE Fellow, IAPR Fellow, CAAI Fellow. He was a Distinguished Lecturer of the IEEE Computational Intelligence Society (2010-2012, 2014-2016) and the IEEE Systems, Man and Cybernetics Society (2017-2018). 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 a recipient of the APNNA Outstanding Achievement Award in 2011, IEEE CIS Neural Networks Pioneer Award in 2014, CAAI Wu Wenjun AI Achievement Award in 2016, and IEEE SMCS Norbert Wiener Award and Outstanding Contribution Award in 2019, among other distinctions.