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IEEE Distinguished Lecture

STATE-OF-THE-ART MANY-OBJECTIVE EVOLUTIONARY ALGORITHMS FOR OPTIMIZATION

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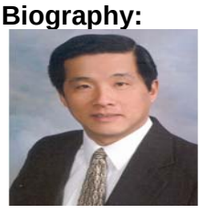
Date: Monday, October 17, 2016

Time: 11:00 a.m.

Place: University of Waterloo, EIT 3142 ** Refreshments will be provided*

Abstract:
Evolutionary computation is the study of biologically motivated computational paradigms which exert novel ideas and inspiration from natural evolution and adaptation. The applications of population-based heuristics in solving multiobjective optimization problems have been receiving a growing attention. To search for a family of Pareto optimal solutions based on nature-inspiring problem solving paradigms, Evolutionary Multiobjective Optimization Algorithms have been successfully exploited to solve optimization problems in which the fitness measures and even constraints are uncertain and changed over time. When we encounter optimization problems with many objectives, nearly all designs perform poorly because of loss of selection pressure in fitness evaluation solely based upon Pareto optimality principle. This talk will survey recently published literature along this line of research- evolutionary algorithm for many-objective optimization and its real-world applications. In particular, focus will be placed on the design of selection strategy, including mating selection and environmental selection. We will show the design of a coordinated selection strategy to improve the performance of evolutionary algorithms in many-objective optimization. This selection strategy considers three crucial factors: 1) the new mating selection criterion considers both the quality of each selected parent and the effectiveness of the combination of selected parents; 2) the new environmental selection criterion directly focuses on the performance of the whole population rather than single individual alone, and 3) both selection strategies are complement to each other and the coordination between them in the evolutionary process can achieve a better performance than each of them used individually. Based on performance metrics ensemble, we will provide a comprehensive measure among all competitors and more importantly reveal insights pertaining to specific problem characteristics that the underlying evolutionary algorithm could perform best.

Biography:



Gary G. Yen received the Ph.D. degree in electrical and computer engineering from the University of Notre Dame in 1992. He is currently a Regents Professor in the School of Electrical and Computer Engineering, Oklahoma State University. His research interest includes intelligent control, computational intelligence, evolutionary multiobjective optimization, conditional health monitoring, signal processing and their industrial/defense applications. Gary was an associate editor of the IEEE Transactions on Neural Networks and IEEE Control Systems Magazine during 1994-1999, and of the IEEE Transactions on Control Systems Technology, IEEE Transactions on Systems, Man and Cybernetics and IFAC Journal on Automatica and Mechatronics during 2000-2010. He is currently serving as an associate editor for the IEEE Transactions on Evolutionary Computation and IEEE Transactions on Cybernetics. Gary served as Vice President for the Technical Activities, IEEE Computational Intelligence Society in 2004-2005 and is the founding editor-in-chief of the IEEE Computational Intelligence Magazine, 2006-2009. He was the President of the IEEE Computational Intelligence Society in 2010-2011 and is elected as a Distinguished Lecturer for the term 2012-2014. He received Regents Distinguished Research Award from OSU in 2009, 2011 Andrew P Sage Best Transactions Paper award from IEEE Systems, Man and Cybernetics Society, 2013 Meritorious Service award from IEEE Computational Intelligence Society and 2014 Lockheed Martin Aeronautics Excellence Teaching award. Currently he serves as the chair of IEEE/CIS Fellow Committee and General Co-Chair of 2016 IEEE World Congress on Computational Intelligence to be held in Vancouver, Canada. He is a Fellow of IEEE and IET.

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