THE HONG KONG POLYTECHNIC UNIVERSITY
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Department of Computing
電子計算學系

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DATA SCIENCE & AI LAB

Distinguished Seminar Series on Data Science & Artificial Intelligence

Knee-Driven Optimization and Decision-Making in Evolutionary Multiobjective Optimization

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10:00 - 11:00 (HKT, UTC+8)
Online via Zoom
Please register at https://polyu.hk/jmiZu or scan the QR code

All are welcome!

Abstract

Evolutionary computation is a branch of studying biologically motivated computational paradigms which exert novel ideas and inspiration from natural evolution and adaptation. Its applications based upon population-based meta-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 metaphors, 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 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. During the last years, evolutionary algorithms have been adapted to address these challenges of curse of dimensionality. In addition, a minimum Manhattan distance approach to multiple criteria decision making in many-objective optimization problems was proposed with effective measure. This procedure is equivalent to the knee selection in operation research. Given such a directive, knee-based evolutionary algorithms have been well-exploited to address multimodal optimization, dynamic optimization, constraint optimization, robust optimization. In addition, it is also extended into the applications in medical screening, early varied-length ECG classification, portfolio management, model recovery in climate fluid dynamics and most recently the design of convolutional neural networks autonomously. In this talk, I will attempt to detail the knee-driven evolutionary algorithm designs and their selected real-world applications pertaining to the interest of audience.

About the Speaker

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 (Parts A and B) 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, IEEE Transactions on Cybernetics, IEEE Transactions on Emerging Topics on Computational Intelligence, and most recently IEEE Transactions on Artificial Intelligence. Gary served as Vice President for the Technical Activities, IEEE Computational Intelligence Society in 2004-2005 and was the founding editor-in-chief of the IEEE Computational Intelligence Magazine, 2006-2009. He was elected to serve as the President of the IEEE Computational Intelligence Society in 2010-2011 and is elected as a Distinguished Lecturer for the term 2012-2014, 2016-2018, and 2021-2023. 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. He is a Fellow of IEEE and IET.