KEYNOTE SPEECH I

Monday, July 17, 14:30-15:30

Chair: Yuh-Shyan Hwang (National Taipei University of Technology, Taiwan)

Data-Driven Optimization and Desion-Making in Evolutionary Multiobjective Optimization

Gary G. Yen

Regents Professor,
Oklahoma State University, USA
IEEE, IET and IAPR Fellow

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, including the evolutionary neural architecture search.

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, IET and IAPR.

KEYNOTE SPEECH II

Monday, July 17, 17:30-18:30

Chair: Jing-Ming Guo (National Taiwan University of Science and Technology, Taiwan)

Fundamental Model of Online User Dynamics Based on a Local and Causal Framework

Masaki Aida

Professor,
Tokyo Metropolitan University, Japan

Abstract

The penetration of social networking services (SNS) gives us not only beneficial for our life but causes some social problems. These include reputational damage caused by disaster, serious cyberbullying, increasing international terrorist activities, and acceleration of social division. To attack these problems, we need to understand the characteristics of online user dynamics. Nowadays, since we can easily have various data, there is a lot of research based on a data-scientific or experimental approach. However, like science and technology, I believe the analysis of online user dynamics must be developed through a complementary relationship between theory and experimentation. My talk is about constructing pure theory for describing online user dynamics. My theory is based on two fundamental assumptions (locality and causality) that anyone can accept as the first principle, and logically derives the behavior of online user dynamics. The results obtained from the theory include:

* Unifying node centrality (degree centrality and betweenness centrality) in a common framework and extending them to apply general situations.

* Clarification of the mechanism of the phenomenon that the intensity of user dynamics diverges (a kind of net-flaming) caused by the network structure.

* Prediction and validation of the phenomenon that a low-frequency mode become dominant when the activity of user dynamics is strengthened.

Biography

Masaki Aida received his B.S. degree in Physics and M.S. degree in Atomic Physics from St. Paul's University, Tokyo, Japan, in 1987 and 1989, respectively, and his Ph.D. in Telecommunications Engineering from the University of Tokyo, Japan, in 1999.

In April 1989, he joined NTT Laboratories. From April 2005 to March 2007, he was an Associate Professor at the Faculty of Systems Design, Tokyo Metropolitan University. He has been a Professor of the Graduate School of Systems Design, Tokyo Metropolitan University since April 2007. His current interests include analysis of social network dynamics and distributed control of computer communication networks. He received the Best Tutorial Paper Award and the Best Paper Award of IEICE Communications Society in 2013 and 2016, respectively, and IEICE 100-Year Memorial Paper Award in 2017. He is a fellow of IEICE, a senior member of IEEE, and a member of ACM and ORSJ.

KEYNOTE SPEECH III

Tuesday, July 18, 10:50-11:50

Chair: Wan-Jung Chang (Southern Taiwan University of Science and Technology, Taiwan)

Analysis of XR Digital Technology, the Fusion of Virtual and Real, Changing the Way Human Interact with the Real World

Wen-Lung Liang

Founder / Chairman,
Jorjin Technologies, Taiwan

Abstract

1. "People-Oriented" XR Digital Technology Innovation to lead the development of future industrial trends What is XR Digital Technology?

2. AI, AR/VR, Spatial Computing are changing the way people interact with Real world

3. Convergence of XR Digital technology and fields domain knowledge of experts To enhance the digital sustainable competitivene of enterprises.

Biography

Value Proposition of Jorjin Technologies:

Specialized in miniaturization of electronic circuits Wireless connectivity, AP(SiPs, SOMs…), AR light Engine, 3D sensing, 60/77Ghz mmWave Radar to provide advanced sart AR/VR digital vehicles and humanized HCI, the system platform of XR smart space, assisting enterprises to create digital competitiveness.
Established: March, 1997
Chairman/Founder: Tom Liang
Capital: US$ 15Millions / Listed on Taipei OTC(4980)

Experience of Wen-Lung Liang:
ALCATEL-TAISEL 1985- 1990 ME & Sr. Engineer
AMBIT 1990- 1991 ME Manager
Texchu 1991- 1997 Sales Direct
AMPAK 2000- 2007 Founder
JORJIN 1997- Until Now Founder / Chairman
Taiwan XR Smart Industry Association / (TXSIA) Chairman

KEYNOTE SPEECH IV

Wednesday, July 19, 10:50-11:50

Chair: Yen-Lin Chen (National Taipei University of Technology, Taiwan)

From Yolov4 to Yolov7
Hong-Yuan Mark Liao

Distinguished Research Fellow,
Academia Sinica,Taiwan
IEEE Fellow

Abstract

During 2018/1 – 2021/12, my research team conducted a research project with ELAN Electronics, a listed company in Hsinchu Science Park, on ``Smart City Traffic Flow Solutions'' case. To solve ELAN's expectation that the research team can calculate traffic parameters in real time at the edge (i.e., crossroads), so as to achieve the purpose of dynamically controlling traffic signs, my research team developed the world-famous real-time object detector – YOLOv4. From 2020 till now, various industries around the world, including medical systems, astronomy, biology, smart transportation, smart manufacturing and other fields, have adopted YOLOv4 to perform object detection in their respective fields. As of February 2023, the cumulative number of citations of YOLOv4 has exceeded 8,300 times. To continue maintaining the world's leading position and win glory for Taiwan, my research team released an advanced version of the object detection system – YOLOv7, in July 2022. In this talk, I will detail the development process of YOLOv4 and YOLOv7.

Biography

Mark Liao received his Ph.D. from Northwestern University, Evanston, Illinois, in 1990. He joined the Institute of Information Science, Academia Sinica, Taiwan in 1991. He received the Young Investigators' Award from Academia Sinica in 1998; the Distinguished Research Award from the National Science Council in 2003, 2010 and 2013; the Academia Sinica Investigator Award in 2010; the TECO Award from the TECO Foundation in 2016, and the 64th Academic Award from the Ministry of Education in 2020. His professional activities include: Editorial Board Member, IEEE Signal Processing Magazine (2010-13); Associate Editor, IEEE Transactions on Image Processing (2009-13), IEEE Transactions on Information Forensics and Security (2009-12), IEEE Transactions on Multimedia (1998-2001), ACM Computing Surveys (2018-2021). He is now a Senior Associate Editor of ACM Computing Surveys (2021-present). He has been a Fellow of the IEEE since 2013.