

Meeting Report:

International Symposium on Computational Intelligence and Cybernetics

<https://lab.bciml.cn/en/cic/>

The International Symposium on Computational Intelligence and Cybernetics was held online via Zoom on December 19, 2020. The event was mainly supported by Huazhong University of Science and Technology (HUST), China. It was also supported by IEEE SMC Society Wuhan Chapter, IEEE Computational Intelligence Society Wuhan Chapter, and IEEE Control Systems Society Wuhan Chapter. The honorary chairs were Professor Youlun Xiong (Members, Chinese Academy of Sciences) and Professor Zhigang Zeng (Dean, School of Artificial Intelligence and Automation, HUST). The executive chairs were Professor Hai-Tao Zhang (Deputy Dean, School of Artificial Intelligence and Automation, HUST) and Professor Dongrui Wu (Deputy Director, Ministry of Education Key Laboratory on Image Information Processing and Intelligent Control, HUST). Over 150 audience worldwide attended this free symposium.



The image shows a Zoom meeting window with a title slide. The slide features the following text and logos:

- Zoom 会议 (Zoom Meeting)
- Participant list: Dongrui Wu, Yang Wenchao, 李杰, Tianyang Hua, Yinyan Zhang@...
- Event Title: **International Symposium on Computational Intelligence and Cybernetics**
- Chinese Title: **计算智能与智能控制 国际研讨会**
- Organizer: **School of Artificial Intelligence and Automation, Huazhong University of Science and Technology**
- Date: **2020.12.19**
- Logos at the bottom: HUST, School of Artificial Intelligence and Automation, HUST, IEEE Computational Intelligence Society, IEEE SMC (Systems, Man, & Cybernetics Society), and IEEE Control Systems Society.

Opening Speech			9:00-9:15
Witold Pedrycz	University of Alberta, Canada	Interpretability in System Modeling: A Study in Granular Rule-Based Computing	09:15-09:45
Gary Yen	Oklahoma State University, US	Knee-Driven Optimization And Decision-Making in Evolutionary Multi-Objective Optimization	09:45-10:15
Piero Bonissone	PPB Analytics LLC, US	PHM Analytics for Industrial AI	10:15-10:45
Qing-long Han	Swinburne University of Technology, Australia	Multi-Agent Systems Based Distributed Control, Optimization and Energy Management in Smart Grids	10:45-11:15
Dongrui Wu	Huazhong University of Science and Technology, China	Fuzzy Set and Signal Processing/Machine Learning for Brain-Computer Interface (BCI)	11:15-11:45
Lunch Break			
Fei-Yue Wang	Chinese Academy of Sciences, China	The Origin and Goal of CPSS: From AlphaGo to Third Axial Age	14:00-14:30
Marios Polycarpou	University of Cyprus, Cyprus	Intelligent Critical Infrastructure Systems	14:30-15:00
Enrique Herrera-Viedma	University of Granada, Spain	Evaluation of Science: Analysis Tools for Evaluating Science	15:00-15:30
Hani Hagrass	University of Essex, UK	Towards Human-Friendly Explainable Artificial Intelligence	15:30-16:00
Hai-Tao Zhang	Huazhong University of Science and Technology, China	From Swarm Intelligence to Autonomous Unmanned Surface Vessel Formation Coordination	16:00-16:30
Closing Speech			16:30-16:40

Ten distinguished speakers from the IEEE SMC society and the Computational Intelligence Society were invited to give 30-minute talks.

Prof. Witold Pedrycz from the University of Alberta in Canada gave a talk on “Interpretability in System Modeling: A Study in Granular Rule-Based Computing.” He offered a systematic discussion on augmenting the interpretability of multivariable functional granular (fuzzy, in particular) rule-based models. The interpretability mechanisms are focused on the elevation of interpretability of the conditions and conclusions of the rules. A hierarchy of interpretation mechanisms is systematically established. He also discussed how this increased interpretability associates with the reduced accuracy of the rules and how sound trade-offs between these features are formed.

Prof. Gary Yen from the Oklahoma State University in the US gave a talk on “Knee-Driven Optimization and Decision-Making in Evolutionary Multi-objective Optimization.” It proposed a knee-based multi-objective evolutionary algorithm to address the curse of dimensionality, and a minimum Manhattan distance approach

to multiple criteria decision making in many-objective optimization problems. Focal research on evolutionary neural architecture search was also detailed.

Dr. Piero Bonissone, former Chief Scientist of GE Global Research, now CEO of PPB Analytics in the US, gave a talk on “PHM Analytics for Industrial AI.” He first reviewed the application of data-driven analytic models to assets Prognostics and Health Maintenance (PHM) such as aircraft engines, medical imaging devices, and locomotives, and then described the evolution of analytic models with the advent of cloud computing, and proposed the use of customized model ensembles on demand, inspired by Lazy Learning. Finally, he explored research trends, challenges and opportunities for Machine Learning techniques in this emerging context of big data and cloud computing.

Prof. Qing-Long Han from Swinburne University of Technology in Australia gave a talk on “Multi-Agent Systems Based Distributed Control, Optimization and Energy Management in Smart Grids.” He proposed a multi-agent system based strategy to address control and optimization issues in smart grids, showcasing its strong ability in improving efficiency, reliability and scalability. Finally, some challenging issues are discussed for future investigation.

Prof. Fei-Yue Wang from the Chinese Academy of Sciences gave a talk on “The Origin and Goal of CPSS: From AlphaGo to Third Axial Age.” He proposed that the future IT will be the parallel integration and execution of Information Technology, Industrial Technology and Intelligent Technology.

Prof. Marios Polycarpou from the University of Cyprus gave a talk on “Intelligent Critical Infrastructure Systems.” It provided an overview of current advances in intelligent critical infrastructure systems and some key tools and design methodologies based on information and communication technologies for making critical infrastructures more efficient, more sustainable and more secure.

Prof. Enrique Herrera Viedma from the University of Granada in Spain gave a talk on “Evaluation of Science: Analysis Tools for Evaluating Science.” He presented two bibliometric tools developed in his research laboratory SECABA: H-

Classics to develop performance analysis by based on Highly Cited Papers and SciMAT to develop science mapping guided by performance bibliometric indicators.

Prof. Hani Hagrass from the University of Essex in UK gave a talk on “Towards Human-Friendly Explainable Artificial Intelligence.” He introduced the concepts of XAI by moving towards “explainable AI” (XAI) to achieve a significantly positive impact on communities and industries all over the world, and presented novel techniques enabling to deliver human friendly XAI systems which could be easily understood, analysed and augmented by humans.

Finally, Prof. Hai-Tao Zhang from HUST gave a talk on “From Swarm Intelligence to Autonomous Unmanned Surface Vessel Formation Coordination,” and Prof. Dongrui Wu from HUST gave a talk on “Fuzzy Set and Signal Processing/Machine Learning for Brain-Computer Interface (BCI).”

These talks covered a wide variety of topics in computational intelligence and cybernetics, facilitated discussions, and motivated new ideas. We thank all speakers for their time, and would like to organize more such events in the future.

Dongrui Wu, Professor

School of Artificial Intelligence and Automation

Huazhong University of Science and Technology

Wuhan, China

drwu@hust.edu.cn

<https://sites.google.com/site/drwuhust>