A Special Session on

Handling Uncertainties in Big Data by Fuzzy Systems

organized by Jie Lu, Cheng-Ting Lin, Farookh Khadeer Hussain, Vahid Behbood, Guangquan Zhang

Description

The volume, variety, velocity, veracity and value of data and data communication are increasing exponentially. The “Five Vs” are the key features of big data, and also the causes of inherent uncertainties in the representation, processing, and analysis of big data. Big data, by its nature, contains bias, noise and abnormality, which may not be a correct characterisation of the actual system that it is meant to represent. Big data also contains a significant amount of unstructured, uncertain and imprecise data. For example, social media data is inherently uncertain.

Fuzzy sets, logic and systems enable us to efficiently and flexibly handle uncertainties in big data, thus enabling it to better satisfy the needs of real world big data applications and improve the quality of organizational data-based decisions. Successful developments in this area have appeared in many different aspects, such as fuzzy data analysis technique and fuzzy data inference methods. In particular, the linguistic representation and processing power of fuzzy logic is a unique tool for bridging symbolic intelligence and numerical intelligence gracefully. Hence, fuzzy logic can help to extend transfer learning in big data from the numerical data level to the knowledge rule level. It is therefore instructive and vital to gather current trends and provide a high quality forum for the theoretical research results and practical development of fuzzy logic and systems in handling uncertainties in big data.

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**Objective and topics**

This special session aims to offer a systematic overview of this new field and provides innovative approaches to handle various uncertainty issues in big data presentation, processing and analysing by applying fuzzy sets, fuzzy logic, fuzzy systems and other computational intelligent techniques.

We invite interested authors to submit their original and unpublished work to this special session. The main topics of this special session include, but are not limited to, the following:

- Fuzzy rule-based knowledge representation in big data processing
- Information uncertainty handling in big data processing
- Unstructured big data visualization
- Uncertain information and knowledge modeling in big data sets
- Tools and techniques for big data analytics in uncertain environments
- Context-aware big data processing
- Fuzzy systems for big data analytics
- Uncertain data presentation in big data systems
- Uncertain issues in data-driven decision support systems
- Uncertain issues in recommender systems in big data environments
- Uncertain issues in cloud computing
- Uncertain issues in social network and web services

**Short biography of the organizer(s) and contact information:**

Dr. Jie Lu is currently the Associate Dean (Research) in the Faculty of Engineering & IT, and the Director of the Decision Systems and e-Service Intelligence (DeSI) Research Laboratory in the Centre for Quantum Computation & Intelligent Systems at the University of Technology, Sydney (UTS). Prior to this, she served as the Head of the School of Software at UTS. Her main research interests lie in the area of decision support systems, fuzzy
information processing, recommender systems and e-Service intelligence. She has published five research books and 350 papers in refereed journals and conference proceedings. She has won six Australian Research Council (ARC) discovery grants, and 10 other research grants. She received the first UTS Research Excellence Medal for Teaching and Research Integration in 2010. She is the Editor-In-Chief for Knowledge-Based Systems (Elsevier), Editor-In-Chief of International Journal on Computational Intelligence Systems (Atlantis), Associate Editor for IEEE Transactions on Fuzzy Systems, Editor for a book series on Intelligent Information Systems (World Scientific), and has served as a guest editor of seven special issues for international journals, as well as having delivered numerous keynote speeches at international conferences.

Dr Chin-Teng Lin is the Provost, Chair Professor of Electrical and Computer Engineering, and Director of Brain Research Center, National Chiao Tung University. Dr. Lin was elevated to be an IEEE Fellow and IFSA Fellow for his contributions to biologically inspired information systems in 2005 and 2013, respectively. He served on the Board of Governors at IEEE Circuits and Systems (CAS) Society in 2005-2008, IEEE Systems, Man, Cybernetics (SMC) Society in 2003-2005, IEEE Computational Intelligence Society in 2008-2010, Chair of IEEE Taipei Section in 2009-2010. Dr. Lin was the Distinguished Lecturer of IEEE CAS Society from 2003 to 2005. He served as the Deputy Editor-in-Chief of IEEE Transactions on Circuits and Systems-II in 2006-2008 and serve as the Editor-in-Chief of IEEE Transactions on Fuzzy Systems in 2011-2016. Dr. Lin was the General Chair of FUZZ-IEEE2011, Program Chair of IEEE International Conference on Systems, Man, and Cybernetics in 2005. Dr. Lin is the coauthor of Neural Fuzzy Systems (Prentice-Hall), and the author of Neural Fuzzy Control Systems with Structure and Parameter Learning (World Scientific). He has published over 170 journal papers in the areas of neural networks, fuzzy systems, multimedia hardware/software, and cognitive neuro-engineering, including approximately 85 IEEE journal papers. Dr. Lin is a member of Tau Beta Pi, Eta Kappa Nu, and Phi Kappa Phi honorary societies. He has been the member of Board of Government (BoG) of Asia Pacific Neural Network Assembly (APNNA) since 2000; and the Council member of International Fuzzy System Association (IFSA) since 2000. Dr. Lin was the President of APNNA for 2004-2005. He has won the Outstanding Research Award granted by National Science Council (NSC), Taiwan, since 1997 to present, the Outstanding Electrical Engineering Professor Award granted by the Chinese Institute of Electrical Engineering (CIEEE) in 1997, the Outstanding Engineering Professor Award granted by the Chinese Institute of Engineering in 2000, and the 2002 Taiwan Outstanding Information-Technology Expert Award. Dr. Lin was also elected to be one of the 38th Ten Outstanding Rising
Stars in Taiwan (2000). The main axis in Dr. Lin’s research career is to pursue for the biological-inspired intelligent systems, including algorithm development and system design. The research interests cover the basic circuitry level, to signal and information level, and to the system level, either from the biological or engineering point of views. The short-term target system is brain machine interface and the long-term goal is on brain-like intelligent system.

Dr. Farookh Hussain is a Senior Lecturer at the School of Software in the Faculty of Engineering and Information Technology. Additionally he is a member of the Decision Systems and e-Service Intelligence Research Laboratory in the Centre for Quantum Computation & Intelligent Systems at the University of Technology, Sydney (UTS). He received his PhD from Curtin University of Technology, Australia, in 2007. His main research interests lie in the area of engineering intelligent Cloud Services, trust and reputation management and modeling for web-based services. He is particularly interested in the making use of Soft Computing techniques such as Fuzzy Logic and Neural Network for engineering intelligent Cloud Services. He has published four research books and over 100 papers in refereed journals and conference proceedings, including IEEE Intelligent Systems, IEEE Transactions on Industrial Electronics, IEEE Transactions on Industrial Informatics, and The Computer Journal. He has delivered two keynote speeches at international conferences.

Dr. Vahid Behbood is Lecturer at the School of Software in the Faculty of Engineering and Information Technology. Additionally he is a member of the Decision Systems and e-Service Intelligence Research Laboratory in the Centre for Quantum Computation & Intelligent Systems at the University of Technology, Sydney (UTS). He received the Ph.D. degree in software engineering from the University of Technology Sydney, Sydney, Australia. His research interests include machine learning, fuzzy sets and systems, warning systems, and big data analytics. He has published over 20 papers in journals and conferences.

Dr. Guangquan Zhang is an associate professor at the Centre for Quantum Computation and Intelligent Systems (QCIS), Faculty of Engineering and Information Technology at the University of Technology, Sydney (UTS), Australia. He has a PhD in Applied Mathematics from Curtin University of Technology, Australia. He was with the Department of Mathematics, Hebei University, China, from 1979 to 1997, as a Lecturer, Associate Professor and Professor. His main research interests lie in the area of prediction modelling, multi-objective, bilevel and group decision making, decision support system tools, fuzzy measure, fuzzy optimization and uncertain information processing. He has published four monographs, four reference books and
over 350 papers in refereed journals and conference proceedings including *IEEE Transactions on Fuzzy Systems, IEEE Transactions on Industrial Informatics and Artificial Intelligence*. He has won five Australian Research Council (ARC) discovery grants and many other research grants.

**Contact Information**

Dr Jie Lu  
Professor  
Head, School of Software  
Director of Decision Systems & e-Service Intelligence  
Centre for Quantum Computation & Intelligent Systems  
Faculty of Engineering and Information Technology,  
University of Technology, Sydney  
P.O. Box 123, Broadway, NSW 2007, Australia

Phone: +61-2-95141838  
Fax: +61-2-95144535  
Email: jielu@it.uts.edu.au  
http://www-staff.it.uts.edu.au/~jielu/  
http://decide.it.uts.edu.au/

**Important Dates**

- Paper submission  
  **February 8, 2015**  
- Notification of acceptance for papers  
  **March 23, 2015**  
- Camera-ready paper submission  
  **April 21, 2015**  
- Early registration deadline  
  **April 23, 2015**  
- Conference  
  **August 2-5, 2015**

**Submission of the papers**

Please submit your papers for this special session to both the organizers and conference online submission system (http://fuzzieee2015.org/) by indicating the title of the special session.