Preface

ITA 2017

4th Annual International Conference on Information Technology and Application (ITA 2017) was held in guangzhou, China, from 26-28 May 2017. ITA 2017 is to offer scholars, professionals, academics and graduate students to present, share, and discuss their studies from various perspectives in the aspects of Information Technology and Applications. These proceedings tend to collect the up-to-date, comprehensive and worldwide state-of-art knowledge on information technology and application. All accepted papers were subjected to strict peer-reviewing by expert referees. The papers have been selected for this proceedings based on originality, significance, and clarity for the purpose of the conference. The selected papers and additional late-breaking contributions to be presented will make an exciting technical program on conference. The conference program is extremely rich, featuring high impact presentation. We hope this conference will not only provide the participants a broad overview of the latest research results on information technology, but also provide the participants a significant platform to build academic connections.

The Technical Program Committee worked very hard to have all papers reviewed before the review deadline. The final technical program consists of 97 papers. There is four keynote speech and nine invited sessions. The keynote speakers are internationally recognized as a leading expert in the research field of information technology who has demonstrated outstanding proficiency and has achieved distinction in his profession. The proceedings were published as a volume in by EDP science.

We would like to express our sincere gratitude to all the members of Technical Program Committee and organizers for their enthusiasm, time, and expertise. Our deep thanks also go to many volunteers and staffs for the long hours and hard work they have generously given to ITA 2017. Finally, we would like to thank all the authors, speakers, and participants of this conference for their contributions to ITA 2017, and also looks forward to welcoming you to ITA 2018.

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Prof., Andres Iglesias, SPAIN & Toho University, Japan
Program Chair & Keynote Prof. Yang-Hua Xiao

Department of computer science, Fudan University, China

Yanghua Xiao got his PhD degree in software theory from Fudan University, Shanghai, China, in 2009. He now is an associate professor of computer science at Fudan University. He is one of young 973 scientists. His research interest includes big data management and mining, graph database, knowledge graph. He was a visiting professor of Human Genome Sequencing Center at Baylor College Medicine, and visiting researcher of Microsoft Research Asia. He won the Best PhD Thesis Nomination of CCF (Chinese Computer Federation) in year 2010, CCF2014 Natural Science Award (second level), ACM (CCF) Shanghai distinguished young scientists nomination award. Recently, he has published 50+ papers in international leading journal and top conferences, including Pattern Recognition, Physical Review E, Plos One, Information System, Computers & Mathematics with Applications, BCM Systems Biology, Physica A; SIGMOD, VLDB, ICDE, IJCAI, AAAI, EDBT, ICSE, OOPSLA, WWW, ICDM, CIKM, SDM, ECML/PKDD, ICWS, ICSM, DASFAA, COMPSAC, SSDBM, etc.
Program Chair Prof. Ying-Hua Zhou,

Chongqing University of Posts and Telecommunications, China

His Research included Computer Algorithms, Artificial Intelligence, Data Mining & Big Data Analysis, Computational Intelligence. He working as Associate professor in Posts and Telecommunications, China, he has published many articles, and participated in many international conferences.
Jianwei Liu, received the BSc, MSc and PhD degrees from Nanjing University of Science and Technology, Beijing University of Chemical Technology, Donghua University, China, in 1997, 2000 and 2006, respectively. He joined Department of Automation, College of Geophysics and Information Engineering, China University of Petroleum, Beijing in 2006. His main research interests cover analysis of the algorithm and the design, intelligent information processing; machine learning; analysis, prediction, controlling of complicated nonlinear system. In these areas he has published over 140 papers in international journals or conference proceedings.
Editor Hong-Can Yan

Professor of North China University of Technology, Ph.D., master tutor, Hebei province science and technology experts, she is the second Hebei province higher school teaching instruction committee candidate, Chinese information society member (E221501404M), Computer Science journal review expert

The main research directions is Web semantic retrieval and knowledge discovery, data mining and intelligent computing, in recent years engaged in particle computing model in the field of artificial intelligence applications, published more than 40 academic papers, including core papers and three major papers nearly 20, Published monograph 2; main research National Natural Fund 1, the provincial Natural Fund 3, of which two were awarded the third prize of scientific and technological progress in Hebei Province and Tangshan City Science and Technology Progress Award.
Co-Chair Dr Qiang Yang

Dr. Qiang Yang obtained the BS degree (first class honors) in Electrical Engineering in 2001, and received the M.Sc. (with distinction) and Ph.D. degree both in Electronic Engineering and Computer Science from Queen Mary, University of London, London, U.K., in 2003 and 2007, respectively. He has worked as a Postdoctoral Research Associate at the Department of Electrical and Electronic Engineering, Imperial College London, U.K., from 2007 to 2010 and involved in a number of high-profile U.K. EPSRC and European IST research projects. Currently he is an Associate Professor at College of Electrical Engineering, Zhejiang University, China, and has published more than 100 technical papers, co-authored 2 books and holds 5 national patents. His research interests over the years include communication networks, smart energy systems, and large-scale complex network modeling, control, optimization, and simulation. He is the member of various international academic bodies including IEEE, IET and IEICE as well as the Senior Member of China Computer Federation (CCF).
Co-Chiar Prof. Farn Wang,

National Taiwan University, Taiwan

Department of Electrical Engineering Graduate Institute of Electronic Engineering, National Taiwan University, got Ph.D. Computer Science, in The University of Texas at Austin, 1993, working as Associate professor in National Taiwan University, 2002-2005, Published many books, Participated in many international conferences.
Co-Chair & Editor & Keynote Prof. Tao Gong

Prof. Tao Gong received the MS degree in Pattern Recognition and Intelligent Systems and PhD degree in Computer Science from the Central South University respectively in 2003 and 2007. He is an associate professor of immune computation at Dong hua University, China, and he was a visiting scholar at Department of Computer Science and CERIAS, Purdue University, USA. He is the General Editors-in-Chief of the first leading journal Immune Computation in its field, and an editorial board member of some international journals.
Co-Chair & Keynote Prof. Tsung-Han Tsai
Department of Electrical Engineering, Director of Intelligent Chip and System Center, National Central University, Chung-Li, 320, Taiwan

Tsung-Han Tsai received the B.S., M.S., and Ph.D. degrees in electrical engineering from the National Taiwan University, Taipei, Taiwan, in 1990, 1994, and 1998 respectively. From 1999 to 2000, he was an Associate Professor of electronic engineering at Fu Jen University. He joined National Central University in 2000. Since 2008 he was a full Professor in the department of electrical engineering at National Central University. Currently he is also the director of Intelligent Chip and System Center in National Central University, and also serves as the Principal Investigator of the National Program for Intelligent Electronics. Dr. Tsai has been awarded more than 40 patents and 230 refereed papers published in international journals and conferences. Dr. Tsai received the Industrial Cooperation Award in 2003 from the Ministry of Education, Taiwan. He has been an IEEE member for over 15 years, and serves as Technical Program Committee member or Session Chair of several international conferences. His research interests include VLSI signal processing, video/audio coding algorithms, DSP architecture design, wireless communication and System-On-Chip design.
Keynote Prof. Ting Yang
School of Electrical Engineering and Automation, Tianjin University, Tianjin, China

Dr. Ting Yang is currently a Chair professor of Theory and Advanced Technology of Electrical Engineering, at the School of Electrical Engineering and Automation, Tianjin University, China. He was the cooperative research staff of Imperial College London (2008), University of Sydney, Australia (2011, 2015). Prof. Yang is the winner of the “New Century Excellent Talents in University Award” from Chinese Ministry of Education. He is the leader of tens of research grant projects, including the International S&T Cooperation Program of China, the National High-Tech Research and Development Program of China (863 Program), the National Natural Science Foundation of China, and so on. Prof. Yang is the chairman of two workshops of IEEE International Conference, and the editor in Chief of one of Special Issues of the international journal of DSN. He is the author/co-author of four books, more than one hundred publications in internationally refereed journals and conferences. Prof. Yang is a senior member of the Chinese Institute of Electronic, the fellow of Circuit and System committee, the fellow of Theory and Advanced Technology of Electrical Engineering, and the member of International Society for Industry and Applied Mathematics. His research fields include Smart Grid, advanced metering infrastructure, and information and communication technologies in electric power system.
Editor & Keynote Prof. Lei Zhang

Lei Zhang received his Ph.D degree in Circuits and Systems from the College of Communication Engineering, Chongqing University, Chongqing, China, in 2013. He was selected as a Hong Kong Scholar in China in 2013, and worked as a Post-Doctoral Fellow with The Hong Kong Polytechnic University, Hong Kong, from 2013 to 2015. He is currently a Professor/Distinguished Research Fellow with Chongqing University. He has authored more than 50 scientific papers in top journals, including the IEEE Transactions on Neural Networks and Learning Systems, the IEEE Transactions on Image Processing, the IEEE Transactions on Multimedia, the IEEE Transactions on Instrumentation and Measurement, the IEEE Transactions on Systems, Man, and Cybernetics: Systems, the IEEE Sensors Journal, Information Fusion, Sensors & Actuators B, and Analytica Chimica Acta. His current research interests include machine learning, pattern recognition, computer vision, electronic olfaction and intelligent systems.
Keynote Prof. Hui Zhang

Hui Zhang received the B.S. degree and PhD. degree respectively in 2005 and 2010, both from Beijing University of Posts and Telecommunications. In 2010, he became a faculty member in the School of Information Science in Nankai University, Tianjin, China. From 2013-2014, he was a postdoctoral research fellow respectively in University of Southampton and Korea Advanced Institute of Science and Technology. He is currently an associated professor in Nankai University. His research interests are in the areas of Wireless Networks, Visible Light Communication, Social Networks, Energy Internet, etc. Currently He is the reviewer for the following journals: IEEE Transactions on Wireless Communication, IEEE Transactions on Mobile Computing, IEEE Transactions on Vehicular Technology, EURASIP Journal on Wireless Communications and Networking, IEEE Globecom, IEEE VTC, Chinese Journal of Electronics.
Keynote Prof. Hui Zhang

Dr. Ning Zhang, male, Professor, Beijing Union University, China. Ning Zhang received the MS degree in Physics science from Hefei University of Technology in 1992, and the PhD degree in Optics science from the department of Optics Engineering, University of Tianjin in 2002. From 2002-2004, as a postdoctoral research fellow, he worked in Beijing University of Posts and Telecommunications. He is currently a professor in Beijing Union University. His research interests are in the areas of Communication Science, Computer Network Technology, Information Systems, Software Engineering, Education Management, etc. Dr. Ning Zhang, is invited reviewer for the following international journals: Chinese Journal of Electronics (China, SCI), Mathematical Problems in Engineering (USA.SCI), Optics Communications (USA. SCI), etc. Areas of Interest: Communication Science, Computer Network Technology.
Keynote Prof. Wei-Ming Zeng

He received Ph.D degree in Biomedical Engineering, Southeast University, China, in 2005. From April 2006 to May 2008, he was a postdoctoral research fellow at F. M. Kirby Center for Functional Brain Imaging, Johns Hopkins University. Now he is working in Shanghai Maritime University as a full professor, director of the Lab of Digital Imaging and Intelligent Computation, and vice dean of College of Information Engineering. He is a professor of Special Appointment at Shanghai Institutions of Higher Learning (Eastern Scholar). He is senior member of IEEE and senior member of CCF. His research interests focus on brain functional connectivity detection, Medical Image Processing, Artificial Intelligence and Pattern Recognition. In recent years, he undertook about 20 projects including 2 National Natural Science Foundation projects, one key Funded project of Shanghai Science and Technology Commission of Shanghai Municipality, and other provincial projects.
Keynote Prof. Wen-Tsai Sung

Department of Electrical Engineering, National Chin-Yi University of Technology, Taiwan

Wen-Tsai Sung is working with the Department of Electrical Engineering, National Chin-Yi University of Technology as a professor and Vice-Dean of Academic Affairs. He received a PhD and MS degree from the Department of Electrical Engineering, National Central University, Taiwan in 2007 and 2000. He has won the 2009 JMBE Best Annual Excellent Paper Award and the dragon thesis award that sponsor is Acer Foundation. His research interests include Wireless Sensors Network, Data Fusion, System Biology, System on Chip, Computer-Aided Design for Learning, Bioinformatics, and Biomedical Engineering. He has published a number of international journal and conferences article related to these areas. Currently, he is the chief of Wireless Sensors Networks Laboratory. At present, he serves as the Editor-in-Chief in three international journals: International Journal of Communications (IJC), Communications in Information Science and Management Engineering (CISME) and Journal of Vibration Analysis, Measurement, and Control (JVAMC), he also serves as the other international journals in Associate-Editor and Guest Editor (IET Systems Biology).
Keynote Prof. Xun-Wei Zhou

Institute of Information Technology, College of Information, Beijing Union University, Beijing, China.

Professor Zhou received B.E. from Department of Automation, Beijing University of Technology in 1982. He was lecturer in Department of Computer Science, Beijing University of Technology from 1987 to 1992, associate professor in College of Information, Beijing Union University from 1992 to 2005, professor in Institute of Information Technology, College of Information, Beijing Union University from 2005 to 2012, professor emeritus in Institute of Information Technology, College of Information, Beijing Union University since 2012. He construct mutually-inversistic logic and apply it to the fields of computer science, artificial intelligence, and automation, such as automatic theorem proving, logic programming, planning and scheduling, expert systems, semantic network, program verification, natural language understanding, hardware verification, machine learning, data mining, uncertainty reasoning, program refinement, many-valued computer, modern control theory, etc. He published about 80 papers, authored 4 monographs on them. He is a senior member of China Computer Federation, a member of Technical Committer of Artificial Intelligence Theory of Chinese Association for Artificial Intelligence, a director of Beijing Logical Association.
Keynote I
Prof. Weiming Zeng
brain functional connectivity detection, Medical Image Processing, Artificial Intelligence and Pattern Recognition.
Shanghai Maritime University

Speaker’s Bio
He received Ph.D degree in Biomedical Engineering, Southeast University, China, in 2005. From April 2006 to May 2008, he was a postdoctoral research fellow at F. M. Kirby Center for Functional Brain Imaging, Johns Hopkins University. Now he is working in Shanghai Maritime University as a full professor, director of the Lab of Digital Imaging and Intelligent Computation, and vice dean of College of Information Engineering. He is a professor of Special Appointment at Shanghai Institutions of Higher Learning (Eastern Scholar). He is senior member of IEEE and senior member of CCF. His research interests focus on brain functional connectivity detection, Medical Image Processing, Artificial Intelligence and Pattern Recognition. In recent years, he undertook about 20 projects including 2 National Natural Science Foundation projects, one key Funded project of Shanghai Science and Technology Commission of Shanghai Municipality, and other provincial projects.
Keynote2

Prof. Ning Zhang
Beijing Union University, China

Speaker’s Bio

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Keynote 3
Prof. Ting Yang
Key Laboratory of Smart Grid of Ministry of Education
School of Electrical Engineering and Automation
Tianjin University

Speaker’s Bio
Dr. Ting Yang is currently a Chair professor of Theory and Advanced Technology of Electrical Engineering, at the School of Electrical Engineering and Automation, Tianjin University, China. He was the cooperative research staff of Imperial College London (2008), University of Sydney, Australia (2011, 2015). Prof. Yang is the winner of the “New Century Excellent Talents in University Award” from Chinese Ministry of Education. He is the leader of tens of research grant projects, including the International S&T Cooperation Program of China, the National High-Tech Research and Development Program of China (863 Program), the National Natural Science Foundation of China, and so on. Prof. Yang is the chairman of two workshops of IEEE International Conference (the 6th IEEE International Conference on Cloud Computing Technology and Science–IEEE CloudCom, the 18th IEEE International Conference on Parallel and Distributed Systems–IEEE ICPADS), and the editor in Chief of the Special Issues “Ubiquitous Data-Centric Sensor Networks” of the international journal of DSN.
Keynote 4

Prof. Lei Zhang
College of Communication Engineering, Chongqing University,
Chongqing, China

Speaker’s Bio
Lei Zhang received his Ph.D degree in Circuits and Systems from the College of Communication Engineering, Chongqing University, Chongqing, China, in 2013. He was selected as a Hong Kong Scholar in China in 2013, and worked as a Post-Doctoral Fellow with The Hong Kong Polytechnic University, Hong Kong, from 2013 to 2015. He is currently a Professor/Distinguished Research Fellow with Chongqing University. He has authored more than 50 scientific papers in top journals, including the IEEE Transactions on Neural Networks and Learning Systems, the IEEE Transactions on Image Processing, the IEEE Transactions on Multimedia, the IEEE Transactions on Instrumentation and Measurement, the IEEE Transactions on Systems, Man, and Cybernetics: Systems, the IEEE Sensors Journal, Information Fusion, Sensors & Actuators B, and Analytica Chimica Acta. His current research interests include machine learning, pattern recognition, computer vision, electronic olfaction and intelligent systems.
Keynote 5

Prof. Hui Zhang
Wireless Networks, Visible Light Communication, Social Networks, Energy Internet
Nankai University, China

Speaker’s Bio
Hui Zhang received the B.S. degree and PhD. degree respectively in 2005 and 2010, both from Beijing University of Posts and Telecommunications. In 2010, he became a faculty member in the School of Information Science in Nankai University, Tianjin, China. From 2013-2014, he was a postdoctoral research fellow respectively in University of Southampton and Korea Advanced Institute of Science and Technology. He is currently an associated professor in Nankai University. His research interests are in the areas of Wireless Networks, Visible Light Communication, Social Networks, Energy Internet, etc. Currently He is the reviewer for the following journals: IEEE Transactions on Wireless Communication, IEEE Transactions on Mobile Computing, IEEE Transactions on Vehicular Technology, EURASIP Journal on Wireless Communications and Networking, IEEE Globecom, IEEE VTC, Chinese Journal of Electronics.
Keynote 6

Prof. Tsung-Han Tsai
Department of Electrical Engineering, Director of Intelligent Chip and System Center, National Central University, Chung-Li, 320, Taiwan

Speaker’s Bio
Tsung-Han Tsai received the B.S., M.S., and Ph.D. degrees in electrical engineering from the National Taiwan University, Taipei, Taiwan, in 1990, 1994, and 1998 respectively. From 1999 to 2000, he was an Associate Professor of electronic engineering at Fu Jen University. He joined National Central University in 2000. Since 2008 he was a full Professor in the department of electrical engineering at National Central University. Currently he is also the director of Intelligent Chip and System Center in National Central University, and also serves as the Principal Investigator of the National Program for Intelligent Electronics. Dr. Tsai has been awarded more than 40 patents and 230 refereed papers published in international journals and conferences. Dr. Tsai received the Industrial Cooperation Award in 2003 from the Ministry of Education, Taiwan. He has been an IEEE member for over 15 years, and serves as Technical Program Committee member or Session Chair of several international conferences. His research interests include VLSI signal processing, video/audio coding algorithms, DSP architecture design, wireless communication and System-On-Chip design.
Keynote 7

Prof. Wen-Tsai Sung
Department of Electrical Engineering, National Chin-Yi University of Technology, Taiwan

Speaker’s Bio
Wen-Tsai Sung is working with the Department of Electrical Engineering, National Chin-Yi University of Technology as a professor and Vice-Dean of Academic Affairs. He received a PhD and MS degree from the Department of Electrical Engineering, National Central University, Taiwan in 2007 and 2000. He has won the 2009 JMBE Best Annual Excellent Paper Award and the dragon thesis award that sponsor is Acer Foundation. His research interests include Wireless Sensors Network, Data Fusion, System Biology, System on Chip, Computer-Aided Design for Learning, Bioinformatics, and Biomedical Engineering. He has published a number of international journal and conferences article related to these areas. Currently, he is the chief of Wireless Sensors Networks Laboratory. At present, he serves as the Editor-in-Chief in three international journals: International Journal of Communications (IJC), Communications in Information Science and Management Engineering (CISME) and Journal of Vibration Analysis, Measurement, and Control (JVAMC), he also serves as the other international journals in Associate-Editor and Guest Editor (IET Systems Biology).
Keynote 8

Prof. Yanghua Xiao
Department of computer science, Fudan University, China

Speaker’s Bio
Yanghua Xiao got his PHD degree in software theory from Fudan University, Shanghai, China, in 2009. He now is an associate professor of computer science at Fudan University. He is one of young 973 scientists. His research interest includes big data management and mining, graph database, knowledge graph. He was a visiting professor of Human Genome Sequencing Center at Baylor College Medicine, and visiting researcher of Microsoft Research Asia. He won the Best PhD Thesis Nomination of CCF (Chinese Computer Federation) in year 2010, CCF2014 Natural Science Award (second level), ACM (CCF) Shanghai distinguished young scientists nomination award. Recently, he has published 50+ papers in international leading journal and top conferences, including Pattern Recognition, Physical Review E, Plos One, Information System, Computers & Mathematics with Applications, BCM Systems Biology, Physica A; SIGMOD, VLDB, ICDE, IJCAI, AAAI, EDBT, ICSE, OOPSLA, WWW, ICDM, CIKM, SDM, ECML/PKDD, ICWS, ICSM, DASFAA, COMPSAC, SSDBM, etc.
Keynote 9

Prof. Xun-Wei Zhou
Institute of Information Technology, College of Information, Beijing Union University, Beijing, China.

Speaker’s Bio
Professor Zhou received B.E. from Department of Automation, Beijing University of Technology in 1982. He was lecturer in Department of Computer Science, Beijing University of Technology from 1987 to 1992, associate professor in College of Information, Beijing Union University from 1992 to 2005, professor in Institute of Information Technology, College of Information, Beijing Union University from 2005 to 2012, professor emeritus in Institute of Information Technology, College of Information, Beijing Union University since 2012. He construct mutually-inversistic logic and apply it to the fields of computer science, artificial intelligence, and automation, such as automatic theorem proving, logic programming, planning and scheduling, expert systems, semantic network, program verification, natural language understanding, hardware verification, machine learning, data mining, uncertainty reasoning, program refinement, many-valued computer, modern control theory, etc. He published about 80 papers, authored 4 monographs on them. He is a senior member of China Computer Federation, a member of Technical Committer of Artificial Intelligence Theory of Chinese Association for Artificial Intelligence, a director of Beijing Logical Association.
Keynote 10

Prof. Tao Gong
Department of Immune Computation, Donghua University, China

Speaker’s Bio
Prof. Tao Gong received the MS degree in Pattern Recognition and Intelligent Systems and PhD degree in Computer Science from the Central South University respectively in 2003 and 2007. He is an associate professor of immune computation at Donghua University, China, and he was a visiting scholar at Department of Computer Science and CERIAS, Purdue University, USA. He is the General Editors-in-Chief of the first leading journal Immune Computation in its field, and an editorial board member of some international journals. He was a Technical Committee Chair of ISEEIP 2012, and a Publicity Chair of ISA 2012 and ICSI3 2015. He was Invited Speaker for some conferences such as SecTech 2012, ICAMR 2014, ITA 2016 and CSA 2016. He was also a program committee member of some international conferences such as IEEE ICNC 2011, IEEE BMEI 2011, WMSE 2011, ICARIS 2012, AITS 2012, CCA 2012, ASP 2012, IST 2012, ISA 2012 and SIS2013 etc.