Advanced Program

ICIS2018

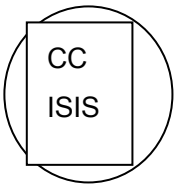
3rd International Conference

On

Intelligence Science

2-5, November, 2018

Beijing, China



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Sponsored by

Chinese Association for Artificial Intelligence (CAAI)
China Chapter under International Society for Information Studies

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Beijing Association for Artificial Intelligence (BAAI)
CIE Signal Processing Society

Keynotes Speakers

Progress toward a high-performance brain interface

Andrew Schwartz

Distinguished Professor of Neurobiology
Department of Neurobiology
University of Pittsburgh
Email: abs21@pitt.edu

Abstract: A better understanding of neural population function would be an important advance in systems neuroscience. The change in emphasis from the single neuron to the neural ensemble has made it possible to extract high-fidelity information about movements that will occur in the near future. Information processing in the brain is distributed and each neuron encodes many parameters simultaneously. Although the fidelity of information represented by individual neurons is weak, because encoding is redundant and consistent across the population, extraction methods based on multiple neurons are capable of generating a faithful representation of intended movement. A new generation of investigation is based on population-based analyses, focusing on operational characteristics of the motor system. The realization that useful information is embedded in the population has spawned the current success of brain-controlled interfaces. This basic research has allowed to us to extract detailed control information from populations of neural activity in a way that this can be used to restore natural arm and hand movement to those who are paralyzed. We began by showing how monkeys in our laboratory could use this interface to control a very realistic, prosthetic arm with a wrist and hand to grasp objects in different locations and orientations. This technology was then extended to a paralyzed patient who cannot move any part of her body below her neck. Based on our laboratory work and using a high-performance "modular prosthetic limb," she was able to control 10 degrees-of-freedom simultaneously. The control of this artificial limb was intuitive and the movements were coordinated and graceful, closely resembling natural arm and hand movement. This subject was able to perform tasks of daily living-- reaching to, grasping and manipulating objects, as well as performing spontaneous acts such as self-feeding. Current work with a second subject is progressing toward making this technology more robust and extending the control with tactile feedback to sensory cortex. New research is aimed at understanding the neural signaling taking place as the hand interacts with objects and together, this research is a promising pathway toward movement restoration for those who are paralyzed.

Bio-Sketch: Dr. Schwartz received his Ph.D. in Physiology from the University of Minnesota in 1984. He then went on to a postdoctoral fellowship at the Johns Hopkins School of Medicine where he worked with Dr. Apostolos Georgopoulos, who was developing the concept of directional tuning and population-based movement representation in the motor cortex.

In 1988, Dr. Schwartz began his independent research career at the Barrow Neurological Institute in Phoenix. That work showed how a high fidelity representation of movement intention could be extracted from the motor cortex. Schwartz teamed up with colleagues at Arizona State University to develop cortical neural prosthetics before moving to the Neurosciences Institute in San Diego in 1995 and then to the University of Pittsburgh in 2002.

After demonstrating that monkeys could use this technique to control arm prostheses in a self-feeding task, orient a prosthetic hand, and control the fingers when grasping, this approach was demonstrated in two paralyzed subjects who operated a high-performance prosthetic arm and hand. Tactile feedback sensed by the prosthetic hand is being fed back to stimulating electrodes to impart sensation as part of our ongoing work to extend this technology to manipulation and dexterous behavior.

Predicting the present: experiments and computational models of perception and internally generated representations

Cyriel M. A. Pennartz

Head of Cognitive and Systems Neuroscience group
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Abstract: The last three decades have witnessed several ideas and theories on brain-consciousness relationships, but it is still poorly understood how brain systems may fulfill the requirements and characteristics we associate with conscious experience. This lecture will first pay attention to the basic requirements for generating experiences set in different modalities, such as vision and audition, given the rather uniform nature of signal transmission from periphery to brain. We will next examine a few experimental approaches relevant for understanding basic processes underlying consciousness, such as changes in population behavior during sensory detection as studied with multiarea ensemble recordings. For visual detection, the primary sensory cortices have been a long-standing object of study, but it is unknown how neuronal populations in this area process detected and undetected stimuli differently. We investigated whether visual detection correlates more strongly with the overall response strength of a population, or with heterogeneity within the population. Zooming out from visual cortex to larger neural systems, we asked how "visual" the visual cortex actually is by studying auditory influences on this system and considering interactions between visual and auditory systems. Finally, we will consider the topic of perception in the context of predictive coding. Predictive coding models aim to mimic inference processes underlying perception in the sense that they can learn to represent the hid-den causes of the inputs our sensory organs receive. They are not only about "predicting-in-time" but also about predicting what is currently going on in the world around us – "predicting the present". I will present novel work on predictive coding in deep neural networks, and link the inferential and generative properties of these networks to conscious representations. I will argue that a productive way forward in research on consciousness and perception comes from thinking about world representations as set across different levels of computation and complexity, ranging from cells to ensembles and yet larger representational aggregates.

Bio-Sketch: Currently, Cyriel Pennartz is Full Professor of Cognitive and Systems Neuroscience and Head of Department at the Faculty of Science, University of Amsterdam.

After his studies in Neurobiology at the University of Nijmegen and University of Amsterdam (UvA), Cyriel Pennartz obtained his PhD degree in Neuroscience cum laude at the UvA (1992) with Fernando Lopes da Silva and Henk Groenewegen. His PhD research

elucidated physiological functions and plasticity of limbic-striatal circuits, and was partly conducted at the University of Tennessee at Memphis with Stephen Kitai. He continued as postdoctoral fellow in Computational Neuroscience at the Department of Physics of Computation at the California Institute of Technology, working with John Hopfield. In 1993 he became Assistant Professor at the Netherlands Institute for Brain Research, where he initiated a research line on the cellular electrophysiology of the brain´s circadian clock and conducted research on motivational and behavioral control circuits by way of recordings in freely behaving animals. For the first time in the Netherlands he developed in vivo ensemble recording techniques, using tetrode-arrays, working with Prof. Dr. Carol Barnes and Prof. Dr. Bruce McNaughton at the University of Arizona in Tucson. In 2002, Pennartz became senior group leader at the Netherlands Institute for Brain Research and was appointed Special Professor in Cognitive Neurobiology at the University of Amsterdam. In 2003 he was promoted at the same institution to Full Professor in Cognitive and Systems Neuroscience, leading a group of ~20-25 people. In this function he has been working to integrate empirical neuroscience, computational theory and theories on perception, memory and consciousness and published a monograph on this topic in 2015 with MIT Press. Cyriel Pennartz is elected leader of one of the 12 Subprojects of the EU FET Flagship Human Brain Project (Systems and Cognitive Neuroscience) and leads the Fundamental Brain & Cognition Science section of the Dutch National Science Agenda. Chief characteristics of his work are its multidisciplinarity and integrative approach to neuroscience, combined with theory- and model-driven experimentation and with technological innovation.

Brain Science and Artificial Intelligence

Xu Zhang

Institute of Brain-Intelligence Science and Technology, Zhangjiang Laboratory;
Institute of Neuroscience, Chinese Academy of Sciences;
Shanghai Branch of Chinese Academy of Sciences, China

Abstract: Cognition is the mental action or process of acquiring knowledge and under-standing through thought, experience and the senses. The processes can be analyzed from different perspectives within different contexts, notably in the fields of linguistics, anesthesia, neuroscience, psychiatry, psychology, edu-cation, philosophy, anthropology, biology, systemic, logic and computer sci-ence. So far, we still do not know how many neuron types, neural circuits and networks in our brain. It is important to construct the basis for decipher-ing brain and developing brain-inspired artificial intelligence (AI). In 2012, Chinese Academy of Sciences started the Strategic Priority Research Pro-gram, mapping brain functional connections. This research program tried to set up new research teams for interpreting and modeling the brain function-specific neural connectivity and network. In 2014, we started the Shanghai Brain-Intelligence Project, for translational research and R&D. We tried to map the somatosensory neuron types and their connectivity with single-cell Tech and the trans-synaptic tracers. We were also interested to link Neuro-science and AI development. Our team has produced the deep-learning, neu-ral network processors, and achieved the applications of AI Tech, such as the speech recognition and translation technology, and the bionics of eyes and control system through the physiological, mathematical, physical and circuit models**.**

Bio-Sketch: Xu Zhang, a neuroscientist and an Academician of the Chinese Academy of Sciences. Born in August 1961, people from Yixing, Jiangsu. He graduated from The Fourth Military Medical University in 1985 and received his doctorate from Caroline ska School of medicine in Sweden in 1994. He is now vice president of the Shanghai branch of the Chinese Academy of Sciences.

Long term research on molecular cell biology mechanism of nervous system diseases. The gene expression profiles of the dorsal root ganglion and spinal cord of chronic pain were systematically studied. A new regulatory system of pain information, such as endogenous sodium potassium pump agonists, was found, which provided a new theoretical basis for clinical analgesia and drug development.

Intelligence Science Will Lead the Development of New Generation of Artificial Intelligence

Zhongzhi Shi

Institute of Computing Technology, Chinese Academy of Sciences

Abstract: The State Council of China issued the notice of the new generation AI de-velopment plan in last year. The notice points out that AI has become a new focus of international competition and a new engine of economic develop-ment. We must firmly grasp the great historical opportunity of the develop-ment of artificial intelligence, play the leading role of intelligence science and drive the national competitiveness to jump and leap forward. Intelligence Science is the contemporary forefront interdisciplinary subject which dedi-cates to joint research on basic theory and technology of intelligence by brain science, cognitive science, artificial intelligence and others. The presen-tation will outline the framework of intelligence science and introduce the cognitive model of brain machine integration, containing environment awareness, motivation driven automated reasoning and collaborative deci-sion making. Finally, explore the principle of cognitive machine learning in terms of mind model CAM.

Bio-Sketch: Zhongzhi Shi, Professor at the Institute of Computing Technology, Chinese Academy of Sciences. Fellow of CCF and CAAI. IEEE senior members, AAAI, ACM members. His research interests mainly contain intelligence science, artificial intelligence, multi-agent systems, machine learning. He has been responsible for 973, 863, key projects of NSFC. He has been awarded with various honors, such as National Science and Technology Progress Award (2002), Beijing Municipal Science and Technology Award (2006), the Achievement Award of Wu Wenjun artificial intelligence science and technology by CAAI (2013), the Achievement Award of Multi-Agent Systems by China Multi-Agent Systems Technical Group of AIPR, CCF (2016). He has published 16 books, including "Mind Computation", "Intelligence Science", "Advanced Artificial Intelligence", "Principles of Machine Learning". Published more than 500 academic papers. He served as chair of the machine learning and data mining group, IFIP TC12. He served as Secretary-General of China Computer Federation, vice chair of China Association of Artificial Intelligence.

Invited Speakers

Scientific Paradigm Shift for Intelligence Science Research

Yixin Zhong
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Abstract: Intelligence science is a newly inceptive and highly complex scientific field, which is the most height of information science while is rather different from the classical physic science. However, the research of intelligence science carried on so far has been basically following the scientific paradigm suitable for classical physic science. The incompatibility between the properties of intelligence science and the scientific paradigm suitable for classical physic science has caused many problems. For overcoming these problems and making good progress in intelligence science, the shift of the scientific paradigm from the one suitable for classical physic science to the one suitable for intelligence science is demanded. What is the concept of scientific paradigm then? What is the scientific paradigm suitable for intelligence science research? What kinds of progresses can be, or have been, achieved in intelligence science research through the scientific paradigm shift? These are the topics in the paper.

Bio-Sketch: Yixin Zhong is a Professor at the center for intelligence science, Beijing University of Posts and Telecommunications (BUPT), China. He has devoted himself to teaching and research in the fields of information science and artificial intelligence in BUPT. He has published 18 books and over 500 papers in above fields and set up the “Mechanism Approach to AI” and the “Advanced Theory of Intelligence”. He has served as vice president of BUPT, president of Chinese Association for Artificial Intelligence (CAAI), chairman of China Neural Network Council (CNNC), vice president of World Federation for Engineering Organizations (WFEO) and Chairman of WFEO Committee for Information and Communication. He is now a Fellow of the Academy of Engineering and Technology for Developing World and is also one of the major founders of International Society for Information Studies (IS4SI) and chairman of China chapter of IS4SI.

Visual Information Processing – From Video to Retina

Tiejun Huang

Chair of the Department of Computer Science, School of EE&CS
Peking University, China

Abstract: Visual perception is a corner stone for human and machine. However, the conventional frame by frame video employed in computer vision system is totally different with the spike train on the visual fibers from the biological retina to the brain. This talk will give a background on the challenges for the visual big data processing nowadays, then introduce our works on mapping and simulation of the neural circuits in the primate retina, and a new sensor chip based on the spiking representation, to be potentiality used for machine vision including autonomous driving, robot perception etc.

Bio-Sketch: Professor Tiejun Huang is the Chair of the Department of Computer Science, School of EE&CS, Peking University. His research areas include video coding, image recognition, and neuromorphic computing. Professor Huang received the National Science Fund for Distinguished Young Scholars of China in 2014, and was awarded the Distinguished Professor of the Chang Jiang Scholars Program by the Ministry of Education of China in 2015. Professor Huang is the secretary general of the Artificial Intelligence Industry Technology Innovation Alliance, a member of the Board of the Chinese Institute of Electronics, the Distinguished member of the China Computer Federation, the advisory board of Computing Now of the IEEE Computer Society and the Head of Delegation of China for the multimedia standardization organization MPEG (ISO/IEC JTC1 SC29/WG11).

The Human Brainnetome Atlas and its Applications in Neuroscience and Brain Diseases

Tianzi Jiang

Institute of Automation of the Chinese Academy of Sciences
Beijing, China

Abstract: Brainnetome atlas is constructed with brain connectivity profiles obtained using multimodal magnetic resonance imaging. It is in vivo, with finer-grained brain subregions, and with anatomical and functional connection profiles. In this lecture, we will summarize the advance of the human brainnetome atlas and its applications. We first give a brief introduction on the history of the brain atlas development. Then we present the basic ideas of the human brainnetome atlas and the procedure to construct this atlas. After that, some parcellation results of representative brain areas will be presented. We also give a brief presentation on how to use the human brainnetome atlas to ad-dress issues in neuroscience and clinical research. Finally, we will give a brief perspective on monkey brainnetome atlas and the related neurotechniqes.

Bio-Sketch: Tianzi Jiang is Professor and Director of Beijing Key Laboratory of Brainnetome, Director of the Brainnetome Center, the Institute of Automation of the Chinese Academy of Sciences, the core member of CAS Center for Excellence in Brain Science and Intelligence Technology, and Professor of Queensland Brain Institute, University of Queensland. He received his BSc degree from Lanzhou University in 1984 and PhD degree from Zhejiang University in 1994. He worked as a postdoctoral research fellow (1994-1996) and an Associate Professor (1996-1999), and full professor (1999-present) at CASIA. During that time, he worked as a Vice-Chancellor's postdoctoral fellow at the University of New South Wales, a visiting scientist at Max Planck Institute for Human Cognitive and Brain Sciences, a research fellow at the Queen’s University of Belfast, and a visiting professor at University of Houston. His research interests include neuroimaging, brainnetome, imaging genetics, and their clinical applications in brain disorders. He is the author or co-author of over 240 reviewed journal papers in these fields and the co-editor of six issues of the Lecture Notes in Computer Sciences. He is Associate Editor of IEEE Transactions on Cognitive and Developmental Systems, Frontiers in Neuroinformatics, and Neuroscience Bulletin and Section Editor of BMC Neuroscience.

A Brief Overview of Practical Optimization Algorithms in the Context of Relaxation

Zhouchen Lin
Fellow of IEEE
Peking University
Beijing, China

Abstract: Optimization is an indispensable part of machine learning. There have been various optimization algorithms, typically introduced independently in textbooks and scatter across vast materials, making the beginners hard to have a global picture. In this talk, by explaining how to relax some aspects of optimization procedures I will briefly introduce some practical optimization algorithms in a systematic way.

Bio-Sketch: Zhouchen LIN received the Ph.D. degree in applied mathematics from Peking University in 2000. He is currently a Professor with the Key Laboratory of Machine Perception, School of Electronics Engineering and Computer Science, Peking University. His research interests include computer vision, image processing, machine learning, pattern recognition, and numerical optimization. He is an area chair of ACCV 2009/2018, CVPR 2014/2016, ICCV 2015, and NIPS 2015/2018, and senior program committee of AAAI 2016/2017/2018 and IJCAI 2016/2018. He is an Associate Editor of the IEEE Transactions on Pattern Analysis and Machine Intelligence and the International Journal of Computer Vision.

Clifford Geometric Algebra

Jiali Feng

Information Engineering College, Shanghai Maritime University
Shanghai, 201306, China

Abstract: Turing question: “Can Machine think?” involves the basic contradiction in philosophy: “Could the material be able to have spiritual?” By it a secondary contradiction chain, that from the general matter to the life, to the advanced intelligence, can be induced. The law of unity of opposites of contradiction and the law of dialectical transformation have become the core issues that must be studied in Natural Sciences, Social Sciences, Noetic Sciences and Intelligence Sciences. The space-time position is the basic attribute of when and where things are represented. If take “two different things must not be in the same position at the same time” as the “simultaneous heterotopy” principle or basic assumption, and the exclusiveness between different objects based on “simultaneous heterotopic” can be equivalented the "overtness" of object, then whether a non-zero distance between two different objects is existing? or not, would not only is a criterion for the existence of differences between them, but also can be seen as a source of contradictions between the two. Since the range of displacement of one object, which such that the non-zero-distance between both contradictions could be maintained, can be considered as “the qualitative criterion” for its quality can be maintained, therefore, the law that “the quality of object can be remained, when the range of quantitative change does not exceed, can be expressed as a qualitative mapping from quantities to quality. The (non-essential) differences in the nature of object caused by different distances between two contradictions, can be expressed by the function of degree of conversion from quantity to quality. The movements, changes, developments of contradictory between both objects, and one changes to its opposites and so on, are regulated by the non-zero distance changes that accompany displacement varies with time, as well as changes of qualitative criterion. In mathematics, distance is defined as "the square root of the inner product of two vectors (positive definite)". The inner product is defined, in physics, as the work done by a force vector (or force function) on an object along with the direction of motion. The inner product is an invariant under the coordinate displacement translation and rotation, by which a polarization circle can be induced. When an object moves with a velocity under the action of a force, since distance is defined as the integral of velocity over time, but the integral of force and the inner product of the velocity is an outer product at the polarization vector. Using an application example, the analyzes about the mutual entanglement relation among the three definitions of distance, inner product and work function, and by it the Geometry Product = Inner product + Outer product (Clifford geometric algebra) structure are induced are presented in this paper, and the corresponding attribute coordinate for representation of it is given too. In addition, combining with pattern classification and identification, the relationship and the differences between the theories and methods in this

paper and the (Clifford and Capsule) Artificial Neural Network are discussed. It improves a referenceable way for the creation of Noetic Science, Intelligent Science, and Synthesis Wisdom.

Bio-Sketch: Jiali Feng was born in China, in 1948.12.1, he get his B.S in Mathematics in the Mathematics Department at Guangxi Normal University, in Guilin, Guangxi, China, in 1982. He was a visiting scholar in Mathematics Department at Beijing Normal University from 1988 to 1989. He get his PhD in radioprotection at China Institute of Atomic Energy in 2001. His research is focused on the attribute theory method in Noetic Science and Intelligence Science.

After graduation he was engaged as a teacher in Guilin 8th High School from 1982 to 1984. He was a lecturer, an associate professor and a professor at Guangxi Normal University from 1984 to 2000, as the deputy dean of the College of Mathematics and Computer Science from 1999 to 2000. Since 2000 he is a Professor in Department of Computer Science at Shanghai Maritime University, and served as dean of College of Information Engineering at the University from 2003 to 2005. He is a pluralistic professor of Academy of Disaster Reduction and Emergency Management, Ministry of Affairs of china & Ministry of Education of China, at Beijing Normal University from 2007.

Dr. Feng is deputy director of Machine Learning Society, Chinese Association for Artificial Intelligence during 2000-2015. Member of IEEE Shanghai Section. President of the Noetic Science of Shanghai from 2012.

Urban Computing: Building Intelligent Cities Using Big Data and AI

Yu Zheng

Vice President and Chief Data Scientist at JD Finance
Editor-in-Chief of ACM Transactions on Intelligent Systems and Technology
Director of the Urban Computing Lab at JD Group

Abstract: Urban computing is a process of acquisition, integration, and analysis of big and heterogeneous data in cities to tackle urban challenges, e.g. air pollution, energy consumption and traffic congestion. Urban computing connects sensing technologies, data management and AI models, as well as visualization methods, to create win-win-win solutions that improve urban environment, human life quality and city operation systems. This talk presents the vision of urban computing in JD group, introducing the urban big data platform and a general design for intelligent cities. A series of deployed applications, such as big data and AI-driven location selection for business, AI-based operation optimization for power plants, and urban credit systems are also presented in this talk.

Bio-Sketch: Dr. Yu Zheng is the Vice President and Chief Data Scientist at JD Finance, passionate about using big data and AI technology to tackle urban challenges. He is the president of the Urban Computing Business Unit and serves as the director of the Urban Computing Lab at JD Group. Before Joining JD Finance, he was a senior research manager at Microsoft Research. Zheng is also a Chair Professor at Shanghai Jiao Tong University, an Adjunct Professor at Hong Kong University of Science and Technology. Zheng currently serves as the Editor-in-Chief of ACM Transactions on Intelligent Systems and Technology and has served as chair on over 10 prestigious international conferences, e.g. as the program co-chair of ICDE 2014 (Industrial Track) and CIKM 2017 (Industrial Track). In 2013, he was named one of the Top Innovators under 35 by MIT Technology Review (TR35) and featured by Time Magazine for his research on urban computing. In 2014, he was named one of the Top 40 Business Elites under 40 in China by Fortune Magazine. In 2017, Zheng is honored as an ACM Distinguished Scientist.

New Approaches to Natural Language Understanding

Xiaohui Zou

Sino-American Saerle Research Center

Abstract: This talk aims to disclose the know-how of launching a new generation of excellent courses and to develop the learning environment in which human-computer collaboration can optimize the expert knowledge acquisition. The method is to form a teaching environment that can be integrated online and offline with some technical platform of cloud classrooms, cloud offices and cloud conference rooms. Taking Chinese, English, classical and summary abstracts as examples, human-computer coordination mechanism, to do the appropriate new generation of quality courses. Its characteristics are: teachers and students can use the text analyzed method to do the fine processing of the same knowledge module, and only in Chinese or English, through the selection of keywords and terminology and knowledge modules, you can use the menu to select as the way to achieve knowledge. The module's precision machining can adopt the big production method that combines on the line first, complete coverage and accurate grasp each language point and knowledge point and original point even their respective combination. This method can finish fine processing instantly for any text segment. The result is the learning environment that enables human-computer collaboration to optimize the expert knowledge acquisition. Natural language understanding is only a research field that has great significance to human beings. Digital Chinese character chess, using numbers and Chinese characters as twin chess pieces, with their meaningful combination as a language point and knowledge point, the purpose is to find the original chess soul namely original point. Assume that every sentence, every paragraph, every article has at least one original point. Whether reading comprehension, writing expression, or even automatic recognition, it is intended to clearly highlight the original points, of course, also to list language points and knowledge points. These jobs were originally mainly experts' expertise, now and in the near future, computers will also be able to handle them automatically. Its significance is that this project of this learning environment software based on the National Excel-lent Courses is already owned by Peking University and that is constructed by using the numbers-words chessboard with the feature of the introduction on the knowledge big production mode for the textual knowledge module finishing. The new approaches obtains a breakthrough from three types of information processing, namely: phenomenon of object, intention, text and its implication on the nature of mechanism, principle, law, and even chaos or Tao, all can be paraphrased in sequence and positioning logic on essential information, linkage function on formal information and generalized translation on content information, under the guidance of language, knowledge, software three kinds of GPS, such as GLPS and GKPS and GSPS.

Bio-Sketch: Xiaohui Zou, male, Chengdu, Sichuan Province, chief researcher, Working in the Project Team on the new generation Excellent Courses of Natural Science Foundation in Peking University and the Sino-American Searle Research Center, head of the group on collaborative

intelligent education research, deputy director of the Artificial Intelligence Committee of the China Branch of the International Information Research Society, and Assistant Director of the Education Information Professional Committee, The research direction is language, information and intelligence science.

Neuromorphic Computing: A Learning and Memory Centered Approach

Huajin Tang

Director of the Neuromorphic Computing Research Center
Sichuan University, China.

Abstract: Neuromorphic cognitive computing is a new theme of computing technology that aims for brain-like computing efficiency and intelligence. Neuromorphic computational models use neural spikes to represent the outputs of sensors and for communication between computing blocks, and using spike timing based learning algorithms. This talk will introduce the major concepts and developments in this interdisciplinary area from the learning and memory centered perspective, and discuss the major challenges and problems facing this field.

Bio-Sketch: Huajin Tang received the B.Eng. degree from Zhejiang University, M. Eng. degree from Shanghai Jiao Tong University, and Ph.D. degree from the National University of Singapore in 1998, 2001, and 2005, respectively. He was an R&D Engineer with STMicroelectronics, Singapore from 2004 to 2006. From 2006, he was a Postdoctoral Fellow with Queensland Brain Institute, University of Queensland, Australia. Since 2008 he was the Lab Head of Robotic Cognition at the Institute for Infocomm Research, A*STAR, Singapore. Currently he is National Youth-1000 Talent Distinguished Professor and Director of the Neuromorphic Computing Research Center, Sichuan University, China. His research interests include neuromorphic computing and hardware, neuro-robotics, etc. He received IEEE Outstanding TNNLS Paper Award 2016. He has served as Associate Editor for IEEE Trans. On Neural Networks and Learning Systems, IEEE Trans. on Cognitive and Developmental Systems, and Frontiers in Neuromorphic Engineering, and Program Chair for CIS-RAM 2015, 2017, and ISNN 2019, etc.

Theory of Cognitive Relativity

Yujian Li

College of Computer Science, Faculty of Information Technology,
Beijing University of Technology, China
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Abstract: The rise of deep learning has brought artificial intelligence (AI) to the fore-front. The ultimate goal of AI is to realize a machine with human mind and consciousness, but existing achievements mainly simulate intelligent behavior on computer platforms. These achievements all belong to weak AI rather than strong AI. How to achieve strong AI is not known yet in the field of intelligence science. Currently, this field is calling for a new paradigm, especially Theory of Cognitive Relativity. The starting point of the theory is to summarize first principles about the nature of intelligence from the systematic point of view, at least including the Principle of World's Relativity and the Principle of Symbol's Relativity. The Principle of World's Relativity states that the subjective world an intelligent agent can observe is strongly con-strained by the way it perceives the objective world. The Principle of Symbol's Relativity states that an intelligent agent can use any physical symbol system to describe what it observes in its subjective world. The two principles are derived from scientific facts and life experience. Thought experiments show that they are of great significance to understand high-level intelligence and necessary to establish a scientific theory of mind and consciousness. Other than brain-like intelligence, they indeed advocate a promising change in direction to realize different kinds of strong AI from human and animals. A revolution of intelligence lies ahead.

Bio-Sketch: Yujian Li was born in Guilin, China, on October 10 1968. He received the B.S. degree in mathematics from the Huazhong University of Science and Technology, Hubei, China, in 1990, the M.S. degree in mathematics from the Institute of Mathematics, Chinese Academy of Sciences, Beijing, China, in 1993, and the Ph.D. degree in semiconductor devices and microelectronics from the Institute of Semiconductors, Chinese Academy of Sciences, in 1999. He was with the Institute of Biophysics, Chinese Academy of Sciences, from 1993 to 1996. He was a Post-Doctoral Fellow at the Beijing University of Posts and Telecommunications, Beijing, from 1999 to 2001. He was an Associate Professor at Beijing University of Technology, Beijing, since June 2001, and has been a Professor since December 2007.

For a long time he has devoted himself to teaching and research in the fields of pattern recognition, machine learning and artificial intelligence. He has published a book "An Introduction to Deep Learning with Analysis of Cases (in Chinese)" in 2016, and many papers in leading journals such as IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Neural Networks, Neural Networks, Pattern Recognition, Knowledge-Based Systems, etc. His ambition is to set up a scientific theory of mind and consciousness. Particularly, he would like to further develop his "Theory of Cognitive Relativity", some important ideas of which was proposed 15-20 years ago.

Two-layer Mixture of Gaussian Processes for Curve Clustering and Prediction

Jinwen Ma

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School of Mathematical Sciences and LMAM
Peking University, Beijing, 100871, P. R. China
Email: jwma@math.pku.edu.cn

Abstract: The mixture of Gaussian processes is capable of learning any general stochastic process for a given set of (sample) curves for regression and prediction. However, it is ineffective for curve clustering analysis and prediction when the sample curves come from different stochastic processes as independent sources linearly mixed together. In fact, curve clustering analysis becomes very important in the modern big data era, but it is a very challenging problem. Recently, we have established a two-layer mixture model of Gaussian processes to describe such a mixture of general stochastic processes or independent sources, especially effective for curve clustering analysis and prediction. This talk describes the learning paradigm of this new two-layer mixture of Gaussian processes, introduces its MCMC EM algorithm and presents some effective practical applications on curve clustering analysis and prediction.

Bio-Sketch: Jinwen Ma received the Ph.D. degree in probability theory and statistics from Nankai University, Tianjin, China, in 1992. Then, he joined the Department or Institute of Mathematics of Shantou University, Guangdong Province, China, and become a full professor in 1999. Since September 2001, he has joined the Department of Information Science at the School of Mathematical Sciences, Peking University, where he currently serves as a full professor and a Ph. D. tutor in applied mathematics. During 1995 and 2004, he visited several times at the Department of Computer Science & Engineering, the Chinese University of Hong Kong as a Research Associate or Fellow. From September 2005 to August 2006, he was also a Research Scientist at the Amari Research Unit, RIKEN Brain Science Institute, Japan. His main research interests include neural computation, independent component analysis (ICA), statistical learning theory and algorithms, intelligent information processing, and bioinformatics. He is the author or coauthor of more than 150 academic papers among which more than 60 papers were indexed by the Science Citation Index (SCI)－Expended. He was or is the Principal Investigator (PI) of seven natural science foundation of China (NSFC) grants as well as more than 10 other scientific research grants. He has given more than 10 invited lectures or talks at the national and international academic conferences.

Overview of Technical Program

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Saturday</th><th>November 4
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<tr><td>8:00-8:20</td><td>--</td><td colspan="2">Registration</td><td colspan="3" rowspan="2">Registration</td><td rowspan="5">Workshops</td><td rowspan="9">Social Activity</td></tr>
<tr><td>8:20-8:30</td><td>--</td><td colspan="2">ICIS2018 Opening Ceremony</td></tr>
<tr><td>8:30-10:00</td><td>--</td><td colspan="2">Plenary Session 1</td><td>Session A1
Brain Cognition</td><td>Session B1
Machine Learning I</td><td>Session C1
Language Cognition Ⅰ</td></tr>
<tr><td>10:00-10:30</td><td>--</td><td colspan="5">Coffee Break</td></tr>
<tr><td>10:30-12:00</td><td>--</td><td colspan="2">Plenary Session 2</td><td>Session A2
Data Intelligence</td><td>Session B2
Machine Learning II</td><td>Session C2
Language Cognition Ⅱ</td></tr>
<tr><td>12:00-13:30</td><td>--</td><td colspan="5">Lunch</td></tr>
<tr><td>13:30-15:00</td><td rowspan="3">Registration</td><td>Plenary Session 3I</td><td>Plenary Session 3II</td><td>Session A3
Perceptual Intelligence Ⅰ</td><td>Session B3
Intelligent Robot I</td><td>Session C3
Fault Diagnosis</td><td rowspan="3">Campus Tour</td></tr>
<tr><td>15:00-15:30</td><td colspan="5">Coffee Break</td></tr>
<tr><td>15:30-17:00</td><td>Plenary Session 4I</td><td>Plenary Session 4II</td><td>Session A4
Perceptual Intelligence Ⅱ</td><td>Session B4
Intelligent Robot Ⅱ</td><td>Session C4
Ethics of Artificial Intelligence</td></tr>
<tr><td>18:00-20:00</td><td></td><td colspan="2">Reception</td><td colspan="3">Banquet</td><td></td><td></td></tr>
</table>

Technical Program

Thursday November 1, 2018

13:30 – 17:00: Registration
Place: Hall of the No.1 Science building

Friday November 2, 2018

8:00 – 17:00: Registration

8:20-8:30: ICIS2018 Opening Ceremony
Place: Beijing International Center for Mathematical Research
Chair: Yixin Zhong

8:30-10:00 Plenary Session 1
Room: Beijing International Center for Mathematical Research
Chair: Cyriel M. A. Pennartz

Andrew Schwartz: Progress toward a high-performance brain interface
Xu Zhang: Brain Science and Artificial Intelligence

10:00-10:30 Coffee Break

10:30-12: 00 Plenary Session 2
Room: Beijing International Center for Mathematical Research
Chair: Tiejun Huang

Cyriel M. A. Pennartz: Predicting the present: experiments and computational models of percep-tion and internally generated representations
Zhongzhi Shi: Intelligence Science Will Lead the Development of New Generation of Artificial Intelligence

12:00-13:30: Lunch Break

13:30-15:00 Plenary Session 3I
Room: No.1 Science building
Chair: Huajin Tang

Yixin Zhong: Scientific Paradigm Shift for Intelligence Science Research
Tianzi Jiang: The Human Brainnetome Atlas and its Applications in Neuroscience and Brain Diseases
Jiali Feng: Clifford Geometric Algebra

13:30-15:00 Plenary Session 3II
Room: No.1 Science building
Chair: Jinwen Ma

Tiejun Huang: Visual Information Processing – From Video to Retina
Zhouchen Lin: A Brief Overview of Practical Optimization Algorithms in the Context of Relaxation

Yu Zheng: Urban Computing: Building Intelligent Cities Using Big Data and AI

15:00-15:30: Coffee Break

15:30-17:00: Plenary Session 4I
Room: No.1 Science building
Chair: Zhouchen Lin

Huajin Tang: Neuromorphic Computing: A Learning and Memory Centered Approach
Yujian Li: Theory of Cognitive Relativity

15:30-17:00: Plenary Session 4II
Room: No.1 Science building
Chair: Yu Zheng

Xiaohui Zou: New Approaches to Natural Language Understanding
Jinwen Ma: Two-layer Mixture of Gaussian Processes for Curve Clustering and Pre-diction

18:00 – 20:00: Reception

Saturday November 3, 2018

8:30– 10:00: Parallel Sessions

Session A1: Brain Cognition
Room: No.1 Science building
Chair: He Ouyang

1. Multi-task Motor Imagery EEG Classification using Broad Learning and Common Spatial Pattern
   Zou Jie and She Qingshan
2. Solution of brain contradiction by extension theory Entanglement of Inner Product,
   Germano Resconi and Chunyan Yang
3. From Bayesian Inference to Logical Bayesian Inference: A New Mathematical Frame for Semantic Communication and Machine Learning
   Chenguang Lu
4. Cognitive Features of Students Who Are Tired of Learning Geometry
   Yan Wang and Xiaohui Zou, Fangju Xu

Session B1: Machine Learning I
Room: No.1 Science building
Chair: Chuyu Xiong

1. Semantic Channel and Shannon's Channel Mutually Match for Multi-Label Classification
   Chenguang Lu
2. Exploiting the similarity of top 100 beauties for hairstyle recommendation via perceptual hash
   Chentong Zhang and Jiajia Jiao
3. Attribute Coordinate Comprehensive Evaluation Model Combining Prin-cipal Component Analysis
   Xiaolin Xu, Guanglin Xu and Jiali Feng,
4. A Specialized Probability Density Function for the Input of Mixture of Gaussian Processes
   Longbo Zhao and Jinwen Ma

Session C1: Language Cognition Ⅰ

Room: No.1 Science building
Chair: Xiaohui Zou

1. Using Two Formal Strategies to Eliminate Ambiguity in Poetry Text
   Wei Hua, Shunpeng Zou and Xiaohui Zou
2. Discussion on Bilingual Cognition in International Exchange Activities
   Mieradili-jiang Maimaiti, Xiaohui Zou
3. The Cognitive Features of Interface Language and User Language
   Xi Luo and Xiaohui Zou
4. The Cognitive Features of Programming Language and Natural Language
   Wen Xu, Xiaohui Zou and Fangqu Xu
5. Ten-years Research Progress of Natural Language Understanding Based on Perceptual Formalization
   Peihong Huang, Guo-Lei Zheng and Shilong Ma

10:00-10:30 Coffee Break

10:30-12:00: Parallel Sessions

Session A2: Data Intelligence

Room: No.1 Science building
Chair: Yujian Li

1. D-JB: An Online Join Method for Skewed and Varied Data Streams
   Chunkai Wang, Jian Feng and Zhongzhi Shi
2. The Application of Association Analysis in Mobile Phone Forensics System
   Huan Li, Bin Xi, Shunxiang Wu, Jingchun Jiang and Yu Rao
3. How to Do Knowledge Module Finishing
   Shunpeng Zou, Xiaoqun Wang and Xiaohui Zou
4. The Art of Human Intelligence and the Technology of Artificial Intelligence
   Feng Tao and Xiaohui Zou

Session B2: Machine Learning II

Room: No.1 Science building
Chair: Jiali Feng

1. Research of Port Competitiveness Evaluation Based on Attribute Evaluation Method
   Xueyan Duan and Jieqiong Liu
2. Universal Learning Machine – Principle, Method, and Engineering Model
   Chuyu Xiong
3. An improved CURE algorithm
   Cai Mingjuan and Liang Yongquan

Session C2: Language Cognition II

Room: No.1 Science building
Chair: Houfeng Wang

1. Learning Word Sentiment with Neural Bag-Of-Words Model Combined with Ngram
   Chunzhen Jing, Jian Li and Xiuyu Duan
2. Related Text Discovery Through Consecutive Filtering and Supervised Learning
   Wu Daqing and Ma Jinwen
3. Natural Language Semantics and Its Computable Analysis
   Zhao Liang and Zou Chongli

4. Can Machines Think in Radio Language?
   Yujian Li
5. Language Understanding of the Three Groups of Connections
   Guangsheng Wang, Hanglin Pan and Xiaohui Zou

12:00-13:30: Lunch Break

13:30- 15:00: Parallel Sessions

Session A3: Perceptual Intelligence Ⅰ
Room: No.1 Science building
Chair: Zhouchen Lin

1. CSSD: An end-to-end deep neural network approach to pedestrian detection
   Feifan Wei, Jianbin Xie, Pinqin Li and Wei Yan
2. Exploring Feasibility of Predicting Text Readability with Personal Pro-nouns
   Boyang Sun and Ming Yue
3. The Influence of Facial Width-to-Height Ratio on Micro-expression Recognition
   Siwei Zhang, Jinyuan Xie and Qi Wu
4. Shortest Paths in HSI Space for Color Texture Classification
   Mingxin Jin, Yongsheng Dong, Lintao Zheng, Lingfei Liang, Tianyu Wang and Hongyan Zhang

Session B3: Intelligent Robot Ⅰ
Room: No.1 Science building
Chair: Tianzi Jiang

1. Self-developing Proprioception-based Robot Internal Models
   Tao Zhang, Fan Hu, Yian Deng, Mengxi Nie, Xihong Wu and Dingsheng Luo
2. Artificial Unintelligence: Analysis of "Anti-Intelligence" Features of Intelligent Algorithms
   Yuhong Zhang
3. XiaoA: A Robot Editor for Popularity Prediction of Online News Based on Ensemble Learning
   Fei Long, Meixia Xu, Yulei Li, Zhihua Wu and Qiang Ling
4. Design and Implementation of Location Analysis System for Mobile Devices
   Yu Rao, Shunxiang Wu, Bin Xi, Huan Li and Jingchun Jiang

Session C3: Fault Diagnosis
Room: No.1 Science building
Chair: Zhihua Cui

1. Automatic Fault Detection for 2D Seismic Data Based on The New Seismic Coherence
   Wenli Zheng and Jinwen Ma
2. UAV assisted Bridge Defect Inspection System
   Shuzhan Yang, Gang Xiong and Zhen Shen
3. Fault Diagnosis and Knowledge Extraction Using Fast Logical Analysis of Data with Multiple Rules Discovery Ability
   Xiwei Bai, Xuelei Wang and Jie Tan
4. Improved Feature Selection Algorithm for Prognosis Prediction of Primary Liver Cancer
   Yunxiang Liu, Qi Pan and Ziyi Zhou
5. A Novel Spatial-Spectra Dynamics-based Ranking Model for Sorting Time-varying Functional Networks from Single Subject fMRI Data
   Nizhuan Wang, Hongjie Yan, Yang Yang and Ruiyang Ge
6. Bat Algorithm with Individual Local Search
   Maoqing Zhang, Zhihua Cui, Xingjuan Cai and Hui Wang

15:00-15:30: Coffee Break

15:30-17:00: Parallel Sessions

Session A4: Perceptual Intelligence II

Room: No.1 Science building
Chair: Qi Wu

1. The 3D Point Clouds Registration for Human Foot
   Yi Xie, Xiuqin Shang, Yuqing Li, Xiwei Liu, Fenghua Zhu, Gang Xiong, Susanna Pirttikangas and Jiehan Zhou
2. The Cognitive Philosophical Problems in Visual Attention and Its Influence on Artificial Intelligence Modeling
   Jingjing Zhao
3. Parallel Dimensionality-varied Convolutional Neural Network for Hyper-spectral Image Classification
   Haicheng Qu, Xiu Yin, Xuejian Liang and Wanjun Liu
4. Model Selection Prediction for the Mixture of Gaussian Processes with RJMCMC
   Qiang Zhe and Ma Jinwen

Session B4: Intelligent Robot II

Room: No.1 Science building
Chair: Dingsheng Luo

1. Control Information Acquisition and Processing of the AMT System Based in LabVIEW and MATLAB
   Zhisen Zhang and Chengfu Yang
2. Multi-robot distributed cooperative monitoring of mobile targets
   Jinqiang Jiang, Bin Xin and Lihua Dou
3. Research on the Micro-blog User Behavior Model based on Behavior Matrix
   Zhongbao Liu, Changfeng Fu and Chia-Cheng Hug
4. Probe Machine Based Consecutive Route Filtering Approach to Symmetric Travelling Salesman Problem
   Md. Azizur Rahman and Ma Jinwen

Session C4: Ethics of Artificial Intelligence

Room: No.1 Science building
Chair: John Wu

1. Research on Artificial Intelligence Ethics Based on the Evolution of Population Knowledge Base
   Liu Feng and Shi Yong
2. Does AI share same ethic with human being?——from the perspective of virtue ethics
   Zilong Feng
3. Five Ethical Issues of Robot Care for the Elderly in the Current Foreign Sci-Fi Movies and -TV-play Series
   Lin Cheng

18:00-20:00: Banquet
Room: TBA

Sunday November 4, 2018

8:30– 10:00: Parallel Workshop

Workshop W1: Noetic Science

Room: No.1 Science building
Chair: Jiali Feng, Xiaofeng Wang

1. Obstacle Detection Based on Computer Vision
   Hongwei Mo, Haoran Wang, Weihao Ding and Xiaosen Chen
2. Quantum Computer revised by morphogenetic computation and neural network in noetic paradigm
   Germano Resconi, Jiali Feng and Vivian Yong-Chang Liu
3. Algebraic Expression of Subjective Spatial and Temporal Patterns
   Chuyu Xiong
4. A Comparative Study of Yangming's Mind Theory and Artificial Intelligence
   Lijun Ke, Xiaohui Zou and Rong Zhang
5. The Integration of Quantitative and Qualitative Thinking Method is the Source of Traditional Chinese Medicine
   Zhisheng Zhao

Workshop W2: Statistical Learning

Room: No.1 Science building
Chair: Jinwen Ma, Yatong Zhou

1. Personal Credit Risk Assessment Based on XGBoost-LR Hybrid Model
   Maoguang Wang, Jiayu Yu and Zijian Ji
2. Keyword Extraction for Short Text via Word-Doc2Vec and TextRank
   Jun Li
3. Dimension Reduction of Chaotic Time Series Based on Geodesic Distance
   Jiancheng Sun,
4. Recurrent Convolutional Neural Network with Attention for Sentiment Classification
   Shuang Wen and Jian Li
5. Active Contours Driven by Local Image Difference Fitting Energy
   Hongyan Zhang, Yongsheng Dong, Lingfei Liang, Lintao Zheng, Tianyu Wang and Mingxin Jin
6. A New Web Page Classification Method based on HITS Algorithm
   Zhongbao Liu
7. Neural Network Diagnosis Algorithm and the application in Embedded System
   Shuai Zhang, Qingkai Han, Zhongzhi Shi and Hongwei Dai

Workshop W3: Language Cognition Ⅰ

Room: No.1 Science building
Chair: Zhiwei Feng, Houfeng Wang, Xiaohui Zou

1. Special Lecture: Machine Translation
   Zhiwei Feng
2. The Dilemma of “Moral Algorithm” for Automated Vehicles
   Huiren Bai
3. Fundamental Laws of Information：Prove by Knowledge Procedures and Language Symbols
   Xiaohui Zou and Shunpeng Zou
4. The Coding Theory of Natural Numbers and Real Numbers: From the Perspective of Set Theory
   Chenjun Lv and Xiaohui Zou

10:00-10:30 Coffee Break

10:30-12:00: Parallel Workshop

Workshop W4: Intelligent Education

Room: No.1 Science building
Chair: Wansen Wang, Hongguang Fu, Shimin Meng

1. The Language Cognitive Features of Geomking Software
   Bo Shen and Xiaohui Zou
2. Using to deconstruct geometric language's "Basic Graphic Analysis Method"
   Zhenlin Xu, Xiaohui Zou, Lei Di and Fangqu Xu

Workshop W5: Phase Theorem

Room: No.1 Science building
Chair: Chuan Zhao

1. Computability on Expanded Categorical Propositions
   Yinsheng Zhang
2. On the aesthetics needed by artificial intelligence
   Zhimin Wang and Bin Zhao
3. Does AI Fit With Extended Mind? Enchantment or Reality?
   Linfan Zhu

Workshop W6: Language Cognition II

Room: No.1 Science building
Chair: Zhiwei Feng, Houfeng Wang, Xiaohui Zou

1. How to Overcome Language Cognitive Difficulties: Taking Geometric Learning as an Example
   Li Wang and Xiaohui Zou
2. The Cognitive Features and Comparative Analysis of Geometric Language and Programming Language
   Zhenlin Xu, Xiaohui Zou and Lei Di

12:00-13:30: Lunch Break

Sunday November 4, 2018

13:30- 17:00: Campus Tour

Conference Venue

Venue Location: The conference will be held at Beijing International Center for Mathematical Research（北京国际数学研究中心） and No.1 Science building, Peking University (北京大学理科一号楼). Both venues are on the campus of Peking University.

1. From *Beijing Capital International Airport (首都国际机场)* to the Venue

Option 1: Taxi --- Travel time is about 68 minutes; cost is approximately ￥106; recommended for group of people

Option 2: Subway--- cost is ￥31; Take the Airport Express, transfer to Subway Line 10 at Sanyuanqiao Station (三元桥站), and then change to Subway Line 4 at Haidianhuangzhuang Station (海淀黄庄站) and get off at East Gate of Peking University Station (北京大学东门站)(leave from Exit D).Then enter the Peking University from the southeast gate and go straight 150m to the No.1 Science building; Or go straight to the first intersection of 300m, then turn right and go straight for 500m to arrive at Beijing International Center for Mathematical Research.

乘坐机场线,在三元桥站换乘地铁 10 号线(外环),在海淀黄庄站下车转乘地铁 4 号线大兴线(安河桥北方向),在北京大学东门站下车(D 口出)， 从东南门进入北京大学。直行 150 m，到达北京大学理科一号楼；或者直行 300m 到第一个路口，再右转直行 500 米，到达北京国际数学研究中心。

2. From *Beijing West Railway Station (北京西站)* to the Venue

Option 1: Taxi --- Travel time is about 34 minutes; cost is approximately ￥39; recommended for group of people

Option 2: Subway--- cost is ￥4.Take the Subway Line 9, transfer to Subway Line 4 at National Library Station (国家图书馆站) and get off at East Gate of Peking University Station (北京大学东门站)(leave from Exit D).Then enter the Peking University from the southeast gate and go straight 150m to the No.1 Science building; Or go straight to the first intersection of 300m, then turn right and go straight for 500m to arrive at Beijing International Center for Mathematical Research.

乘坐地铁 9 号线(国家图书馆方向),在国家图书馆站下车，转乘地铁 4 号线大兴线(安河桥北方向),在北京大学东门站下车(D 口出)， 从东南门进入北京大学。直行 150 m，到达北京大学理科一号楼，或者直行 300m 到第一个路口，再右转直行 500 米，到达北京国际数学研究中心。

3. From *Beijing South Railway Station (北京南站)* to the Venue

Option 1: Taxi --- Travel time is about 48 minutes; cost is approximately ￥60; recommended for group of people

Option 2: Subway--- cost is ￥5; Take the Subway Line 4 and get off at East Gate of Peking University Station (北京大学东门站)(leave from Exit D).Then enter the Peking University from the southeast gate and go straight 150m to the No.1 Science building; Or go straight to the first intersection of 300m, then turn right and go straight for 500m to arrive at Beijing International Center for Mathematical Research.

地铁 4 号线大兴线(安河桥北方向), 在北京大学东门站下车(D 口出) ，从东南门进入北京大学。直行 150 m，到达北京大学理科一号楼，或者直行 300m 到第一个路口，再右转直行 500 米，到达北京国际数学研究中心。

4. From *Beijing Railway Station (北京站)* to the Venue

Option 1: Taxi --- Travel time is about 55 minutes; cost is approximately ￥60; recommended for group of people

Option 2: Subway--- cost is ￥5; Take the Subway Line 2, transfer to Subway Line 4 at Xizhimen Station (西直门站) and get off at East Gate of Peking University Station (北京大学东门站)(leave from Exit D).Then enter the Peking University from the southeast gate and go straight 150m to the No.1 Science building ; Or go straight to the first intersection of 300m, then turn right and go straight for 500m to arrive at Beijing International Center for Mathematical Research.

乘坐地铁 2 号线(内环),在西直门站下车，转乘地铁 4 号线大兴线(安河桥北方向),在北京大学东门站下车(D 口出), 从东南门进入北京大学。直行 150 m，到达北京大学理科一号楼，或者直行 300m 到第一个路口，再右转直行 500 米，到达北京国际数学研究中心。

Hotel Information (住宿信息)

1. Recommended Hotels (推荐酒店)

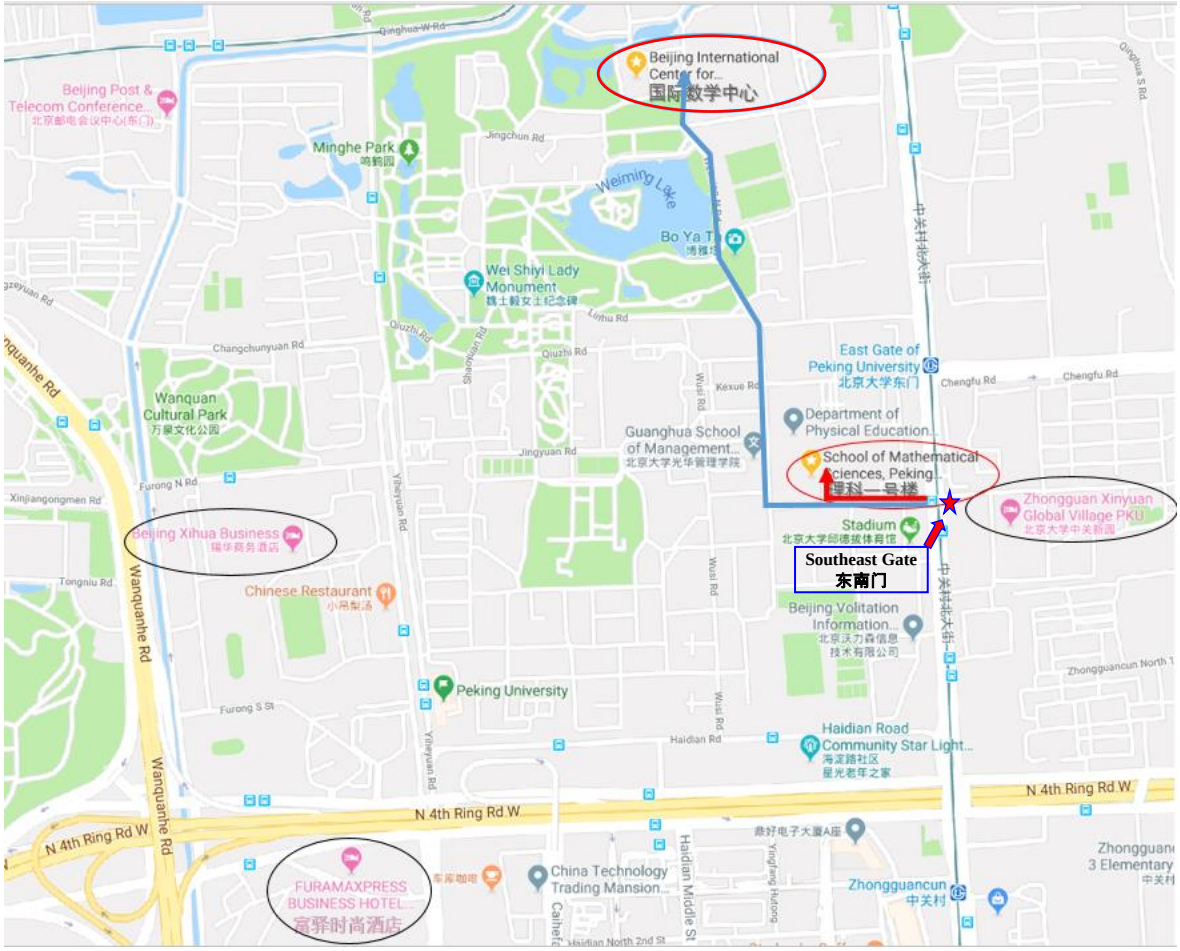
Name	Tel	Website	Price	Distance
FXHotel(Beijing Zhongguancun Branch) 富驿时尚酒店(北京中关村店)	010-58986688	http://fxhotels.com/Hotel.aspx?city=PEK&hotelId=PEKZGC	¥385 up	1.0km
Zhongguanyuan Global Village PKU 北京大学中关新园酒店	010-62752288 转 70888	http://pkugv.pku.edu.cn/	¥438 up	0.5km
Beijing Xihua Business Hotel 锡华商务酒店	400-817-0003	http://www.bjxhhotel.cn/hotel_order.asp	¥691 up	1.0km

2. Other Hotels (其他酒店)

Name	Tel	Website	Price	Distance
The Lakeview Hotel 北京北大博雅国际酒店	010-82689999	http://www.thelakeviewhotel.com.cn/	¥1108 up	0.7km
Wenjin Hotel 北京文津国际酒店	010-62525566	http://www.wenjin.com.cn/cn/index.html	¥988 up	1.5km
Jinjiang Inn(Beijing Zhongguancun Branch) 锦江之星(北京中关村店)	010-82623688	http://hotel.bestwehotel.com/HotelDetail/?hotelId=JJ60699	¥388 up	1.7km
Hanting Hotel (Beijing Zhongguancun Branch) 汉庭酒店(北京中关村店)	010-53102567	http://hotels.huazhu.com/hotel/detail/1000864	¥569 up	1.4km
99 Hotel 99 旅馆连锁北京清华北大地铁站店	010-82888382	http://m.99inn.cc/index.html	¥259 up	1.3km

Maps (地图)

1. How to reach the Conference Venue



2. Location of Peking University