Imperial College London




2014 ZJU-IMPERIAL DAY

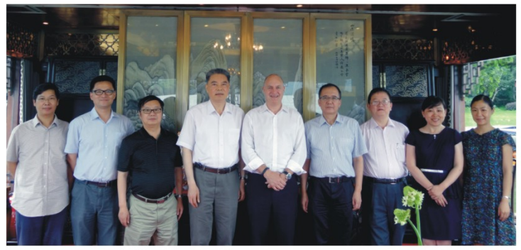
PROGRAMME BOOKLET 18-19 July

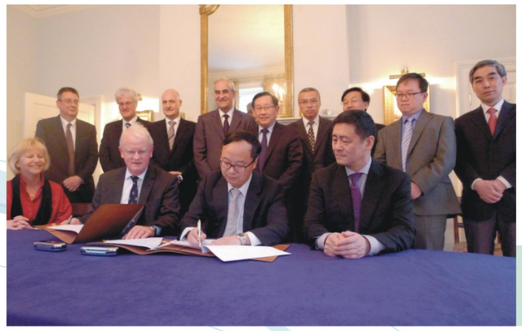
A member of the C9 League, Zhejiang University is consistently rated as one of the most prestigious institutions of higher education in China. With the university motto "Seeking the Truth and Pioneering New Trails", it is committed to the pursuit of excellence in education, research and social service. It has been reputed as an engine of innovation and a pool of talent.

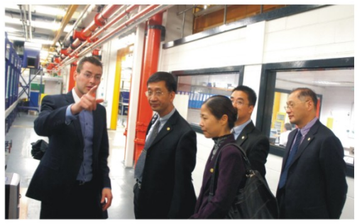
http://www.zju.edu.cn

Zhejiang University, 866 Yuhangtang Road, Hangzhou, Zhejiang Province, 310058, P. R. China

Collaboration Highlights







2014
ZJU-IMPERIAL DAY

CONTENTS

P1 Welcome Messages

P2-P3 ZJU-Imperial Day Programme

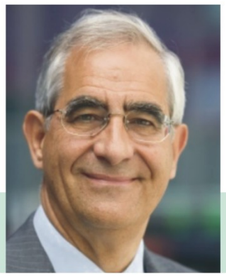
P4-P20 Big Data Conference

P21 QI ZHEN Global Lecture Series

P22 Imperial Alumni Gathering

P23 Imperial Delegation Members

Welcome Messages from the Presidents



Sir Keith O'Nions

Imperial College London

On behalf of the Imperial College London delegation I am delighted to greet all participants and welcome you to the "ZJU–Imperial Day" and conference on "Big Data: Smart Cities, Healthy Citizens."

Zhejiang University and Imperial College London are both renowned as centres of excellence in research and education. The new Imperial College London and Zhejiang University Joint Lab for Applied Data Science creates a critical mass of expertise which will drive innovation and the creation of new solutions and technologies.

International partnerships such as this are vitally important as the global community confronts challenges in energy, the environment, health, data and security that are well beyond the ability of individual universities or nations to solve.

As the China–UK relationship grows in strength, so does Imperial's relationship with Zhejiang University and I hope further opportunities arise for us to deepen our collaborative links.

Jianhua Lin

Zhejiang University

It's my great pleasure to welcome all our friends from Imperial College London to join us at the "ZJU–Imperial Day".

Featuring the conference on "Big Data: Smart Cities, Healthy Citizens", Sir Keith O'Nions' lecture and "Imperial Alumni Gathering", the "ZJU–Imperial Day" will be the opportunity to review what we have accomplished in our strategic partnership and explore how we proceed further.

The launch of Imperial College London and Zhejiang University Joint Lab for Applied Data Science is a firm step forward in our relationship, affirming our shared commitment to collaborative innovation in addressing grand challenges the world is facing today. I look forward to the fruitful, open and stimulating exchange and dialogue at the "ZJU–Imperial Day" and hope that the dialogue will develop a broader and deeper partnership between our institutions.

ZJU-Imperial Day 18-19 July

Friday 18 July

9:00-12:15

ZJU–Imperial Conference on "Big Data: Smart Cities, Healthy Citizens"

(Session 1: Healthy Citizens)
Venue: Lizhou Hall, 4F of Yuanzheng Qizhen Hotel
MC: Professor Gang Bao, Chairman, Department of Mathematics, ZJU
Keynote speech by Dr. Jian Wang – Data–centric Cloud Computing for College Education and Research

Format: Each speaker will present for 20 minutes. A panel discussion will take place at the end.

ZJU speakers:

- Professor Jianhui Zhong–Big Medical Data and Medical Imaging
- Professor Peng Zhang–Inference on Area under the Curve Based on Methods of Quantiles
- Professor Hong Mi–Demographic Changes and Public Policy Simulation–Case study based on big data
- Professor Junling Jia–Biological Big Data (BBD): a lesson from a biologist

Imperial speakers:

- Professor Daniel Rueckert–Big Data in Medical Imaging – Learning clinically useful information
- Dr Aldo Faisal – Breaking into your Brain – by analysing the perception–action loop
- Professor Paul Matthews – Grand challenges mean great opportunities: emerging science to transform future healthcare
- Professor Yike Guo – Big Data for Better Science: The vision and mission of Imperial College London's Data Science Institute

12:30

Lunch
Venue: Haoyue Hall, 1F of Yuanzheng Qizhen Hotel

14:30-15:30

Opening Ceremony of ZJU–Imperial Day
Venue: Qizhen Report Hall, 3F of Yuanzheng Qizhen Hotel
MC: Professor Yonghua Song, Executive Vice President, ZJU

- Photo video on the cooperation and exchange between ZJU and Imperial
- Imperial College London video
- Speeches by:
  Professor Jianhua Lin, President, ZJU
  Sir Keith O'Nions, President & Rector, Imperial
  Matt Burney, Consul, British Consulate General in Shanghai
- Mr. Deshui Jin and Sir Keith O'Nions jointly unveil the plaque of ZJU–Imperial Joint Lab for Applied Data Science
- Speech by Professor Gang Bao, Chair, Department of Mathematics, ZJU
- Speech by Professor Yike Guo, Director of the Data Science Institute, Imperial
- Speech by the representative of ZJU–Imperial Joint Education Program

15:30-15:35

Group photo

15:35-15:45

Chinese folk music performance by ZJU Wenqin Troupe

15:45-16:45

Qi Zhen Global Lecture Series—by Sir Keith O'Nions, President & Rector, Imperial
Venue: Qizhen Report Hall, 3F of Yuanzheng Qizhen Hotel

17:30

Dinner hosted by Mr. Deshui Jin (Chairman of University Council) and Professor Jianhua Lin (President)
Venue: Qiushi Multifunctional Hall, 3F of Yuanzheng Qizhen Hotel

Saturday 19 July

9:00-12:15

ZJU–Imperial Conference on "Big Data: Smart Cities, Healthy Citizens"
(Session 2: Smart Cities)
Venue: Lizhou Hall, 4F of Yuanzheng Qizhen Hotel
MC: Professor Yike Guo, Director of Data Science Institute
Keynote speech by Professor David Gann – London 2020: opportunities for data–driven innovation

Format: Each speaker will present for 20 minutes. A panel discussion will take place at the end.

Imperial speakers:

- Professor Christopher Pain–Detailed Modeling of Air Pollution in Cities
- Professor Eric Yeatman–Pervasive Sensing for Smart Cities and Environments
- Dr Chao Wu–Cognitive Sensing: from Human Intelligence to Sensor Intelligence

ZJU speakers:

- Professor Xiaofei He–Learning with Parallel Vector Field
- Professor Zhengyue Zhang–Big Data: Nonlinear dimensionality reduction and sparse recovery
- Professor Xi Li–Big Visual Data Analysis for City Public Security
- Professor Yibing Wang, Professor Yueping Xu, Professor Qiuxiao Chen–Big Data in Civil Engineering and Architecture

12:30

Lunch
Venue: Restaurant, 2F of Yuanzheng Qizhen Hotel

2014 ZJU-IMPERIAL DAY 浙江大学—帝国理工日 18-19 July

ZJU-IMPERIAL DAY

Keynote Speech on 18 July:

Data-centric Cloud Computing for College Education and Research

Dr. Jian Wang
Chief Technology Officer, Alibaba Group

SYNOPSIS

Data–centric cloud computing for everyone is the vision since the establishment of Aliyun (Alibaba cloud computing) in 2009. While data technology has been Alibaba's key strategy and has fundamentally transformed its business, computing and data are transforming our society in every aspect. We understand that cloud computing infrastructure with thousands of servers is critical for the success of a company's data strategy since large scale cost–effective computing power is the foundation for the processing of a gigantic amount of internet data. Unfortunately, lack of such a large scale computing infrastructure in universities makes it difficult for students and professors to do internet and big data researches at a scale like Google and Microsoft. Easy access to such a computing infrastructure for college education and research will be the competitive advantage over industry research labs. It also unleashes students' creativity by empowering them with computing power and internet data. Aliyun is committed to opening its data–centric cloud computing infrastructure to universities. In 2014, Alibaba organized a worldwide data competition and provides a large scale data processing platform (ODPS, open data processing service) for university students. It has attracted more than 7,000 teams with tens of thousands of students from universities around the world. Cloud computing infrastructure will be the next biggest innovation in universities.

SHORT BIOGRAPHY

Dr. Jian Wang has served as chief technology officer of Alibaba Group since August 2012. Prior to his current position, he was the chief architect since joining the company in September 2008. He also served as president of Alibaba Cloud Computing from its inception in September 2009 until September 2013.

Before joining Alibaba, Dr. Wang was assistant managing director at Microsoft Research Asia, where he had served since 1999. Prior to that, he worked at Zhejiang University in Hangzhou, China as a professor and head of the psychology department.

Jian Wang holds a bachelor's degree in psychology and a Ph.D. in engineering from Hangzhou University.

Keynote Speech on 19 July:

London 2020: opportunities for data-driven innovation

Professor David Gann CBE

Vice President - Development and Innovation, Imperial College London
Chair, Mayor of London's Smart London Board

SYNOPSIS

The 'smart city' agenda is gathering momentum. The drivers are clear, fuelled by increasing constraints on urban resources, such as transport, energy and healthcare and our desire to provide attractive and enjoyable places to live and work. London is the fastest growing city in Europe, adding 100,000 people per year to its population. It plans to be the best city to live, work and play, avoiding peak–load and congestion.

But nothing stands still. We are entering a 'perfect storm' of technological innovation. Rapid growth of mobile Internet applications, the internet–of–things, cloud computing and insights from big data, offer new business opportunities and can enhance quality of life. Data is the new infrastructure and London is ideally placed to lead its development and use.

Home to world–leading academic institutions and the MedCity and TechCity clusters, London has access to some of the best talent in the world. It has capabilities to develop next generation data science and the services that will flow from it, and ideal test–bed markets too. London's citizens are early adopters of technology, using intelligent products, technologies and services.

In this session, Professor David Gann CBE shares insights into the holistic and highly ambitious plan that is keeping London ahead. A world–leader in Innovation and Leadership, Professor Gann introduces the Smart London Plan and its implementation projects.

Grounded in the context of Professor Gann's research on new patterns of innovation, the discussions are brought to life with engaging Digital Economy case studies from Imperial College: spanning digital money, instrumented city infrastructure, data integration platforms, and smart water systems.

This is a chance to hear how the Mayor's Smart London Board has defined a vision for a smarter London, and is moving from vision to reality.

SHORT BIOGRAPHY

Professor David Gann CBE is responsible for shaping the vision, strategy and innovation agenda for Imperial College, and the development of its new London campus: Imperial West. He holds the Chair in Innovation and Technology Management at Imperial College Business School and Department of Civil & Environmental Engineering, Imperial College London. He is a Chartered Civil Engineer with a PhD in Industrial Economics.

He is the recipient of the 2014 Tjalling C. Koopmans Asset Award, for extraordinary contributions to the economic sciences, and was appointed Commander of the Order of the British Empire (CBE) in the 2010 Queen's Birthday Honours for services to engineering.

Professor Gann's research focuses on innovation in the digital economy, new business models and innovation strategy in technology firms. He founded Imperial's Innovation and Entrepreneurship Group, consistently ranked in the top tier worldwide by the FT. The Group collaborates closely with large and small firms, including IBM, Microsoft, Nokia, Citigroup, Finmeccanica, Arup and BP. Professor Gann leads executive programmes on innovation for business leaders in organisations such as IBM, Laing O'Rourke, Total, Citigroup, Arup and the Royal Society.

Professor Gann has deep experience at executive board level in industry, starting new businesses and advising senior ministers on government policy. From 2007–2011 he was Group Innovation Executive at Laing O'Rourke plc, responsible for establishing group–wide innovation strategy and R&D programmes. Professor Gann has co–founded four spin–out companies. In 2011 he was a member of the panel for the UK Government's Review of Intellectual Property and Growth. In 2012 he led a study of Open Innovation and Intellectual Property for the World Intellectual Property Organisation.

Professor Gann is Chairman of the Smart London Board, reporting to Boris Johnson, Mayor of London. He is a member of the London Enterprise Panel's Digital, Creative, Science & Technology Group and member of the UK's Information Economy Council. He sits on the Advisory Board of the Association of Consultancy and Engineering and is a Trustee and Director of the Institute for Sustainability. Professor Gann is also a Patron, Trustee and Board Member of Brighton Dome & Festival.

Professor Gann is the author of a large number of academic papers in the field of Innovation Management.

Big Medical Data and Medical Imaging

Professor Jianhui Zhong

SYNOPSIS

In this presentation we will discuss big data issues in medical records and medical imaging. We will then present some related researches we have been engaged in in this area.

With the wide use of Internet and Internet of Things in medical field, patient–centered medical data recording of the full clinical process is becoming a new reality, which results in explosive growth of medical data. The data collection and storage is however only the beginning. What is more critical is to quickly and quantitatively process the big medical data, to identify key information, discover meaningful medical knowledge, eventually to support clinicians in improving the quality of medical care and health service, to achieve the real value of big medical data.

We are clearly dealing with "big data" in modern medical imaging. For example, a conventional MRI structure image set of brain has 256x256x70 or about 4.5 million values. In modern MRI scanner we can now scan from head to toe in a full body MRI or CT exam, resulting in consequently huge datasets. Furthermore, an expanding utility of imaging is in its ability to observe dynamic processes, such as blood flow, physiological or functional activities, which typically involve time–series or repeated measurements, or combination of different imaging modes. To achieve personalized and quantitative medicine, an important progress in imaging is to follow disease progress or effects of therapeutic treatments with longitudinal imaging study, and to achieve even higher spatial and temporal resolution in both structural and functional images. Eventually imaging may provide biomarkers for patho–physiological processes. The obvious need for expanding our capability to deal with even–increase data size is high.

We will use several recent studies of our own to demonstrate the progress in these two important areas of research and clinical practice.

SHORT BIOGRAPHY

Jianhui Zhong is "One–Thousand Program" Professor in Biomedical Engineering, and Director of Center for Brain Imaging Science and Technology, Zhejiang University. He received BS from Nanjing University, China, MS and PhD from Brown University, USA, all in Physics. He worked at Yale University as post–doctor, assistant and then associate professor for 8 years, and since 2004 he has been tenured full Professor in Radiology, Physics and BME, Associate Director of Rochester Center for Brain Imaging, University of Rochester, USA. He has over 25 years' experience in magnetic resonance imaging (MRI) physics, engineering, and its biomedical, clinical, and neuroscience applications, with over 140 publications and 5 US patents. He also plays leadership roles in international organizations, serving in US and international funding agencies and leading scientific journals. He is a grantee of many national and foundation funds. His recent research Interest includes MR brain diffusion imaging, quantitative analysis of brain fMRI and network, and fast MR imaging techniques.

Inference on Area under the Curve Based on Methods of Quantiles

Professor Peng Zhang

SYNOPSIS

In the age of big data, we are interested in distinguishing a small group of objects from others. The applications of this type include, information retrieval, outliers detection (fraud transactions, intrusions detection) in data mining, rare disease screening and diagnosis, unusual patterns detection, gene association in medical research, target chemical compounds detection in pharmaceutical research. The objective is to identify the rare targets as early as possible. Recall, precision and average precision (AP) are three popular performance measures for evaluating different detection methods. The AP is found also a good performance measure in medical screening test and diagnostic test, similar to the receiver operating characteristic (ROC) curve but focusing more on earlier cases. Developing fast and accurate inference methods for the area under the curve (AUC), including AP and ROC, is essential to evaluate and compare algorithms in data mining and testing methods in medical research. We propose to carry out statistical inference on AUCs with a nonparametric approach which can handle ranking data without observing underlying decision scores or in a categorization form. The true positive rate is treated as a survivor function in a time–to–event process where false positive rates and precision are the survival time in ROC and AP respectively. The areas under the curve are the mean life time in the Kaplan–Meier method. Another popular approach to the AUC inference is the parametric method assuming that the underlying decision variables having abnormal distribution, with positive class following a standard normal distribution and the negative class following another normal distribution with unknown mean and variance parameters. However, the existing maximum likelihood (ML) methods for estimating the parameters require the actual observations and the calculation is time consuming. We propose a regression method and a maximum likelihood method based on quantiles of positive and negative classes that depend on ranking data only. The sequence of ranks of positive and negative classes facilitates us to set up a linear regression function with the parameters of mean and variance of the normal distribution being the intercept and slope respectively. A likelihood function also can be written where the categories of multinomial distribution are determined by the sample quantiles of the two classes. Simulation studies and real data analysis show the good performance of these approaches.

SHORT BIOGRAPHY

Peng Zhang is a special term professor of statistics in the Department of Mathematics at Zhejiang University. Trained in information science and finance at Nankai University of China, with a bachelor and a master degree respectively in 1990 and 1997, he went on to study statistics at York University with a master degree in Statistics and was awarded a PhD degree in Statistics at University of Waterloo in 2006. Joined University of Alberta after his graduation in 2006 as an assistant professor in the Department of Mathematical and Statistical Sciences, University of Alberta, Dr. Zhang has been interested in a variety of research in statistics, including longitudinal data analysis, measurement error models, data mining and cluster analysis. He has published 8 papers in peer–reviewed top statistical journals and 3 papers in proceedings of peer–reviewed conferences. Besides continuing on his major research area, non–normal mixed effects models in longitudinal and other correlated data, from which he has published 3 papers, he developed clustering algorithms and proposed methods for determining number of clusters for categorical data. The methodology from his work has become popular in real life data analysis, shown from the number of the citations. He was Principal Investigator of a NSERC project studying random mean models and measurement error models in longitudinal data analysis.

He established interdisciplinary collaborations with researchers around the world in medical, agricultural and engineering areas. He served as a leading statistician in a multi–center clinical trial on controlling cancer pain cosponsored by Beijing Mundipharma Pharmaceutical Co., Ltd and Zhejiang University affiliated Sir Run Run Shaw Hospital. In Canada, his researches provided solutions to data analyses in renal disease study, stem cell transplantation and glaucoma study.

Dr. Zhang has undertaken many service duties at the department and the society of statistics. He has been serving as the chair of the Statistics PhD Advisory Committee for 4 years and he is presently the director of Statistics Training Consulting Center of the Department of Mathematical and Statistical Sciences. Dr. Zhang also served in the Election Committee of Statistical Society of Canada Biostat Section.

Demographic Change and Public Policy Simulation - Case study based on big data

Professor Hong Mi

SYNOPSIS

China's Urbanization and Energy Consumption

From a macro perspective, we associate demographic change (population scale and structure and distribution and migration and growth rate and etc.), industry structure, energy consumption, carbon emissions. We apply Possibility–Satisfiability model to calculate the P–S degree of carbon emissions' peak and propose optimization approach. We apply urbanization and migration model to estimate urbanization speed and migration size. Spatial data mining method is used to measure population density and the gap between economy center and population center.

From a micro perspective, we analyze the links between household demographic structure and energy consumption. Supported by the National Science Foundation of China, we conducted a survey in Huzhou City, Zhejiang Province, investigating 557 community households and 447 village households. We do multilevel analysis on household socio–economic characteristics, household energy consumption characteristics and environment and health characteristics.

System Dynamic Simulation of the aging boundary of China's Urban and Rural Pension Insurance System

Supported by Central Government of China and the Ford Foundation, we conduct a series of investigations,collecting more than 30,000 micro–data and more than 500 rural and urban community–level socio–economic data on rural and urban resident social pension insurance and rural migrant worker social pension insurance, covering several provinces in western, middle and eastern regions. Besides, another part of the database is from Chinese 6th National Census Data. Methods such as multi–state demography, System Dynamics Model, and actuarial method are applied.

Multi–state demography includes death, migration, education, marital status, gender, etc. Based on Multistate Life Table method, we calculate future population in three insurance groups with/without regard to urbanization trend to reflect the aging trend of China's urban and rural residents more intuitively.

The aging boundary of China's Urban and Rural Pension Insurance System is defined as the inflection point to the decay of expenses of the insurance system, which are increasing gradually at present. We calculated financial expenditure by actuarial method based on the results of population base. Mathematical demography, actuarial science and economics methods are used to simulate the number of participants and recipients, the system coverage rate, premium and pension, security level, government financial allowance and fund accumulation, especially in the limited financial responsibility division between central and local governments.

Based on the System Dynamics Model of the pension insurance system, we simulated the corresponding financial expenditure and take urbanization into account. Urbanization shifts the ageing boundary to an earlier time.

In conclusion, demographic change impacts the complexity of the link between urbanization and energy consumption and environment in China, and it also exerts great influence on the reform and development of social old–age insurance policy in China.

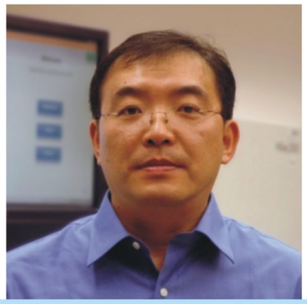
SHORT BIOGRAPHY

Dr. Hong Mi is a Professor of Public Administration and Policy in the Department of Social Security and Risk Management of the School of Public Affairs (SPA), and Executive Director of the Institute for Population and Development Studies of Zhejiang University. He is the Director of the Base for System Simulation Co–organized by Ministry of Human Resource and Social Security Bureau of China, Chinese Academy of Labour Security Sciences and College of Public Administration of Zhejiang University. He is also Executive Deputy Director of the Centre for Non–Traditional Security & Peaceful Development Studies (NTS–PD) of Zhejiang University.

The main research interest of Prof. Mi includes systematic model and technology of sustainable development of population, resource, environment and economy, data mining analysis, geographical information network analysis, etc.

With his researches, Prof. Mi has made some influential contributions to public administration and policy–making. He is currently a consultant for the Department of Human Resource and Social Security as well as the National Development and Reform Commission of Zhejiang Province. He is also a delegate of the Expert Consulting Commission of Human Resource Management and Social Security Bureau of China. He is a grantee of more than twenty national funds and has published over forty papers in this area.

Biological Big Data (BBD): a lesson from a biologist



Professor Junling Jia

SYNOPSIS

The biological behaviour of human being exists on molecular, cell, organism and individual levels including complex interactions within or among them. Although traditional methods of biochemistry, cell biology and genetics have been providing tremendous information for understanding human biological behaviours, the dynamics and complexity of the interactions make complete understanding of biological behaviours not easy and sometimes impossible. The primary reason is that traditional approaches cannot provide systematic and holistic investigations and lack corresponding quantitative measurements.

Gene Regulatory Networks (GRNs) are the set of interactions among genes and their products (RNAs and proteins) which are the primary drivers of biological behaviors. Given GRNs are both complex (hard–to–predict/nonlinear behaviors) and complicated (including large numbers of component parts and interactions), mathematical and computational approaches are essential in GRN analysis and are changing how modern biology is performed. Because GRNs are ultimately specified by the digital code of DNA, they are uniquely accessible via Next Generation Sequencing (NSG)–based big data capturing technologies. Using NSG our Initial study on embryonic stem cell has revealed a Yin–Yang regulatory mechanism organizing bivalent chromatin, which is essential for the pluripotency of embryonic stem cells.

During our practice of NSG we recognize that current models of biological big data analysis are far too simplistic and need updating for explaining complicated underlying biological behaviors. Now we are advocating a novel Project oriented Biological Big Data analysis strategy (ProBBD). The key of ProBBD is that parameters of employed algorithmic models will be converted from related wet–lab experiences and background knowledge case by case. In order to implement ProBBD wet–lab biologists need to communicate with professional computational persons through their “computational languages”. So a hybrid training program which can give wet–lab biologist substantial computational knowledge is required for the era of BBD.

SHORT BIOGRAPHY

Dr. Junling Jia is Professor and Principal Investigator in Life Sciences Institute, Zhejiang University. He was a postdoctoral fellow of Howard Hughes Medical Institute in Carnegie Institution for Science, Baltimore, MD, USA.

Prof. Jia received a M.S. in Virology and Immunology from Chinese Centre for Disease Control and Prevention, Beijing, and a Ph.D. in Molecular Physiology and Biophysics, Baylor College of Medicine, Houston, TX, USA. He has 10 publications in Cell and others.

Big Data for Better Science: The vision and mission of Imperial College London's Data Science Institute

Professor Yike Guo

SYNOPSIS

Data is a new natural resource, and the new driving force of modern economies and scientific research The establishment of the Data Science Institute (DSI) at Imperial College represents our firm commitment to bring this new data revolution into the world and make it possible to extract greater value from this resource. The DSI will do this by working with partners to become the focal point for multidisciplinary research across the faculties of engineering, medicine, natural science and business at Imperial. Our mission is to be the catalyst for cross disciplinary research, to build up capacity for data driven research, to educate the next generation of data scientists, to become the hub for international partnerships and to enable the translation of innovation into social and economic value.

The DSI will collaborate with colleagues from across the College in the fields of statistical computing, big data management, machine learning, modelling and simulation, visualisation and cloud computing to support data–driven research in application areas such as astrophysics, particle physics, biology, meteorology, medicine, finance, healthcare and social sciences. As a result these collaborations will open up opportunities for external companies to collaborate closely and to address significant complex and multi–dimensional problems in new ways. This talk will demonstrate some of the research we are undertaking and illustrate the opportunities for partnership.

SHORT BIOGRAPHY

Yike Guo is a Professor of Computing Science in the Department of Computing at Imperial College London. He leads the Discovery Science Group in the department, as well as being the founding Director of the Data Science Institute at Imperial College. Professor Guo also holds the position of CTO of the tranSMART Foundation, a global open source community using and developing data sharing and analytics technology for translational medicine.

Professor Guo received a first–class honours degree in Computing Science from Tsinghua University, China, in 1985 and received his PhD in Computational Logic from Imperial College in 1993 under the supervision of Professor John Darlington. He founded InforSense, a healthcare intelligence company, and served as CEO for several years before the company's merger with IDBS, a global advanced R&D software provider, in 2009.

He has been working on technology and platforms for scientific data analysis since the mid–1990s, where his research focuses on knowledge discovery, data mining and large–scale data management. He has contributed to numerous major research projects including: the UK EPSRC platform project, Discovery Net; the Wellcome Trust–funded Biological Atlas of Insulin Resistance (BAIR); and the European Commission U–BIOPRED project. He is currently the Principal Investigator of the European Innovative Medicines Initiative (IMI) eTRIKS project, a □23M project that is building a cloud–based informatics platform, in which tranSMART is a core component for clinico–genomic medical research, and co–Investigator of Digital City Exchange, a £ 5.9M research programme exploring ways to digitally link utilities and services within smart cities.

Professor Guo has published over 200 articles, papers and reports. Projects he has contributed to have been internationally recognised, including winning the “Most Innovative Data Intensive Application Award” at the Supercomputing 2002 conference for Discovery Net, and the Bio–IT World "Best Practices Award" for U–BIOPRED in 2014. He is a Senior Member of the IEEE and is a Fellow of the British Computer Society.

Pervasive Sensing for Smart Cities and Environments

Professor Eric Yeatman

SYNOPSIS

Distributing sensing capability throughout urban environments, in the paradigm often known as pervasive sensing, is becoming increasingly practical, through advances in low power electronics, sensor miniaturisation and wireless communication. Such pervasive sensing offers major advantages in the development and use of urban (and other) systems, including energy efficiency, system resilience and adaptability, and the provision of new functions and services for users. This talk will introduce this topic, with a focus on one technological hurdle and its potential solutions. This hurdle is power provision; the maintenance burden of replacing or recharging thousands of batteries is a major impediment to full adoption of wireless sensor networks.

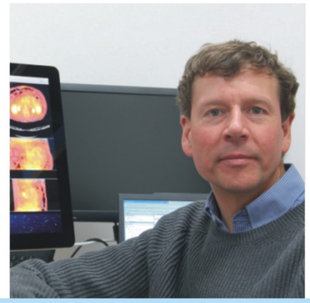
Energy harvesting – the collection of otherwise unexploited energy in the local environment – is attracting increasing attention as a solution to this problem. While the power levels that can be reached are typically modest (microwatts to milliwatts), this can be sufficient for an increasing range of wireless devices. Imperial College has been a major innovator in miniature energy harvesting, particularly from ambient motion and dynamic temperature change. This talk will present a number of these techniques, and some potential applications.

SHORT BIOGRAPHY

Eric M. Yeatman has been a member of academic staff in Imperial College London since 1989, and Professor of Micro–Engineering since 2005. He is Deputy Head of the Department of Electrical and Electronic Engineering, and has published more than 200 papers and patents, primarily on optical devices and materials, and micro–electro–mechanical systems (MEMS). He is also Co–Director of the college's Digital Economy Lab, and Principal Investigator of the multi–faculty project Digital City Exchange. He is a Fellow and Silver Medalist of the Royal Academy of Engineering, and a Fellow of the IEEE. Prof.Yeatman is also co–founder and chairman of Microsaic Systems plc, which develops and markets miniature mass spectrometers for portable chemical analysis. His current research interests are in energy sources for wireless devices (particularly energy harvesting), radio frequency and photonic MEMS devices, pervasive sensing and sensor networks.

Grand challenges mean great opportunities: emerging science to transform future healthcare

Professor Paul Matthews



SYNOPSIS

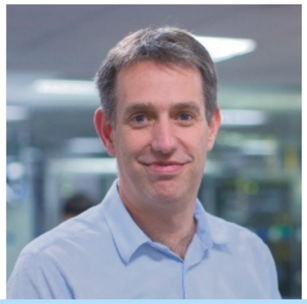
Healthcare systems globally face unprecedented challenges with shifting demographics for an aging population. This will bring a greater morbidity burden at the same time that we are developing higher expectations for mental and physical health across a lifespan. Recognition of a role of the environment in influencing health and quality of life has also grown with increasing urbanization. I will describe how Imperial College London has coordinated efforts internally and across the UK to develop new ways of working to address these questions more effectively. Examples of translational brain science will be highlighted. "Grand Challenges" that we are addressing will be presented. In this work, we are seeking new partners who will help us realize solutions to transform "Grand Challenges" into "Great Opportunities".

SHORT BIOGRAPHY

Paul M. Matthews, OBE, MD, DPhil, FRCP, FMedSci, is Professor of Clinical Neurosciences and Head of the new Division of Brain Sciences at Imperial College London. His broad area of research interest has been in molecular and functional neuroimaging and in neurological therapeutics development. Specific personal research interests have focused on use of advanced imaging to assess brain plasticity and the mechanisms of disability progression in multiple sclerosis. Amongst other external activities, he is Chair of the Imaging Enhancement Working Group and a member of the steering group for UK Biobank (https://www.ukbiobank.ac.uk/), which has initiated a programme to image the brain, heart, carotids, bones and body of 100,000 people to understand disease risk in later life. He is a member of the steering group of the Critical Path Institute's Multiple Sclerosis Outcomes Assessment Consortium (http://c–path.org/programs/msoac/), and serves on a number of other scientific and advisory boards. He was the founding Director of the Centre for Functional Magnetic Resonance Imaging of the Brain (FMRIB) (http://www.fmrib.ox.ac.uk/) and of the GSK Clinical Imaging Centre at the Hammersmith Hospital, for which he was a lead in spinning out Imanova Ltd., which is run as a public–private partnership between Imperial College, UCL, Kings College and the Medical Research Council (http://www.imanova.co.uk/).

Big Data in Medical Imaging - Learning clinically useful information

Professor Daniel Rueckert



SYNOPSIS

This talk will focus on the convergence medical imaging and machine learning techniques for the discovery and quantification of clinically useful information from medical images: The first part of the lecture will describe machine learning techniques such a dictionary learning that can be used for image reconstruction of very large datasets, e.g. the acceleration of 4D MR imaging. The second part will discuss model–based approaches that employ statistical as well as probabilistic approaches for segmentation. In particular, we will focus on atlas–based segmentation approaches that employ advanced machine learning approaches such as manifold learning and classifier fusion to improve the accuracy and robustness of the analysis of images from large population studies.

SHORT BIOGRAPHY

Daniel Rueckert is Professor of Visual Information Processing in the Department of Computing, Imperial College London where he heads the Biomedical Image Analysis group consisting of over 30 PhD students and post–docs. He received a M.Sc. in Computer Science from the Technical University Berlin and a Ph.D. in Computer Science from Imperial College London. His research focuses on biomedical image analysis and computing, machine learning in medical imaging, computer aided diagnosis and clinical applications of medical image computing in neurology, cardiovascular and oncology. He made many important and influential contributions to medical image registration, segmentation, shape analysis and classification which are actively commercialized by IXICO, an Imperial College spin–off company, co–founded by Professor Rueckert. He has published more than 100 journal papers and more than 200 peer–reviewed conference papers in this area. Together with his research team he has won several international awards including MICCAI (2004, 2012) and MLMI (2011). In 2012, the European Research Council (ERC) awarded him and his colleagues an ERC Synergy Grant which is one of the most prestigious awards for scientists in Europe. Professor Rueckert is an associate editor of IEEE Transactions on Medical Imaging, a member of the editorial board of Medical Image Analysis, Image & Vision Computing and a referee for a number of international medical imaging journals and conferences. He has served as a member of organising and programme committees at numerous conferences, e.g. he has been General Co–chair of MMBIA 2006, WBIR 2012 and FIMH 2013 as well as Programme Co–Chair of MICCAI 2009 and ISBI 2012.

Detailed Modelling of Air Pollution in Cities

Professor Christopher Pain

SYNOPSIS

Here we outline a detailed city air flow and pollution modelling approach, including the generation of city scape geometries, adaptive numerical resolution that places resolution optimally so as to make best use of computational resources, traffic and their emissions modelling, and micro–physics associated with particle/rain dynamics. We also outline future trends in this area including how best to link the vast array of city pollution/flow sensor data that will soon be available, with modelling, so one can best predict into the future and possibly even control, to some extent, an individual's pollution exposure.

SHORT BIOGRAPHY

Prof. Christopher Pain (CCP) was the originator and original developer of the Fluidity modelling framework (https://launchpad.net/fluidity) that he conceived in the first year of his PhD. He has won more significant research funding for its development and application from UK research councils, the EU and industry. Fluidity has also been released as open source software and has a rapidly growing user/developer community across North America, Europe and Asia. He is head of the Applied Computation and Modelling Group (AMCG) of about 70 scientists and engineers at Imperial College. Prof. Christopher Pain's main academic interests are in general Computational Fluid Dynamics (including multiphase flow, oceanography and geophysical fluid dynamics), Optimisation, Data Assimilation, sensitivity analysis, reduced order modelling, Numerical Research, including parallel solution techniques, recurrent and feed– forward neural networks, a priori error measures and mesh adaptivity, Discretisation techniques, Resolution of linear and non–linear equations, Non–linear dynamics, Numerical shape description and differential geometry. Inverse modelling has included anisotropic electrical inversion, 3D seismic inversion and inversion of transient 3–D coastal flows using the adjoint method. The Imperial College Ocean model ICOM is being actively considered by NERC and by bodies such as the Met Office, as a candidate for a 'next generation' ocean model. Professor Pain has supervised 35 successful PhDs and published 150 journal papers.

Breaking into your Brain – by analysing the perception-action loop

Dr Aldo Faisal

SYNOPSIS

Our research fuses neuroscience with technology to contribute to the emerging discipline of neurotechnology. We combine methods from computing, physics and engineering with experimental human studies to understand how the brain works: We pursue both basic science and translational work, a) by reverse engineering from first principles, the algorithms that drive brains and behaviour and b) translating this understanding into technology that helps patients and people in general. Specifically, we combine cross–disciplinary computational and experimental approaches to investigate how the brain and its neural circuits are designed to learn and control goal–directed behaviour. Our findings enable us to develop behavioural analysis algorithms based on eye tracking and motor behaviour enabling novel technology for clinical and research applications (Neurotechnology) for a variety of neurological and motor disorders, as well as amputees. I will present some examples of our recent research.

SHORT BIOGRAPHY

Dr Faisal is an Associate Professor in Neurotechnology jointly at the Dept of Bioengineering and the Dept. of Computing at Imperial College London. He is also Associate Group Head at the MRC Clinical Sciences Center (Hammersmith Hosptial) and is affiliated faculty at the Gatsby Computational Neuroscience Unit (University College London). Aldo read Computer Science and Physics in Germany, where he wrote his Diplomarbeit (M.Sc. thesis) in non–linear dynamical systems and neural networks (with Helge Ritter). He moved on to study Biology at Cambridge University (Emmanuel College) and wrote his M.Phil. thesis on the electrophysiological and behavioural study of a complex motor behaviour in freely moving insects with Tom Matheson in the group of Malcolm Burrow FRS. For his Ph.D. he joined Simon Laughlin FRS group at the Zoology Department in Cambridge investigating the biophysical sources of neuronal variability. He was elected a Junior Research Fellow at Cambridge University (Wolfson College) and joined the Computational & Biological Learning Group(Engineering Department) to work with Daniel Wolpert FRS on human sensorimotor control. Between and after his studies he gained insights into strategic management consulting with McKinsey & Co. and as a "quant" with the investment bank Credit Suisse. In winter 2009 Aldo setup the Brain & Behaviour Lab at Imperial College to pursue a research program that aims at understanding the brain with principles from engineering which often immediately translates into direct technological applications for patients and society.

Cognitive Sensing: from Human Intelligence to Sensor Intelligence

Dr Chao Wu

SYNOPSIS

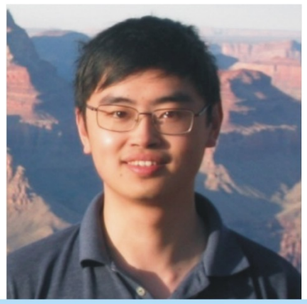
As intelligent agents, humans can understand and adapt to their changing and dynamic environments with limited cognitive effort. Inspired by this ability, we propose a sensing framework for use in dynamic environments. Within this framework, perception is viewed as a series of modelling actions to minimize the KL divergence between (subjective) recognition density and (objective approximate) distribution. This is achieved according to the principle of free–energy and unplanned minimization (or prediction error correction). In addition, sensing is viewed as a connected action to reduce the space between KL and real KL divergence (i.e. between recognition density and real distribution). This enables us to conduct the sensing and modelling with a focus on two challenges. Firstly, how to adapt the model (and even the model space) to fit the unexpected changes in sensing the target, and secondly, how to reduce the dimensionality of sensing, to balance performance within resource constraints.

SHORT BIOGRAPHY

Dr Chao Wu was awarded his PhD from Zhejiang University in 2010. He then worked in the Department of Computing, Imperial College London as a Research Associate in Prof.YikeGuo's Group, funded on the EPSRC projects "Elastic Sensor Network" and "Digital City Exchange". His work concentrates on sensor data modelling and analysis, and this is now being applied to human cognition, such as attention mechanisms, in order to facilitate the controlling and knowledge acquisition for sensor networks.

Learning with Parallel Vector Field

Professor Xiaofei He



SYNOPSIS

Big data is both a challenge and an opportunity for modern information processing tasks. When there is sufficient amount of data, it is possible to uncover the hidden structure in the data. In this talk, I will introduce our recent work on manifold learning from the perspective of vector fields. Unlike conventional graph–based techniques that mainly use the graph Laplacian operator, we propose a novel dimensionality reduction method using connection Laplacian operator, called parallel vector field embedding (PFE). The theory of vector fields is a basic tool for discovering the geometry and topology of the manifold. The fundamental geometric quantities such as metric tensor, curvature tensor and the fundamental topological quantities such as homology groups can usually be characterized by vector fields. In this work, we focus on the geometry of the manifold. We first give a discussion on local isometry and global isometry to show the intrinsic connection between parallel vector fields and isometry. The problem of finding an isometry turns out to be equivalent to finding orthonormal parallel vector fields on the data manifold. Therefore, we first find orthonormal parallel vector fields by minimizing the covariant derivative of a vector field. We then find an embedding function whose gradient field is as close to the parallel field as possible. In this way, the obtained embedding function would vary linearly along the geodesics of the manifold. Naturally, the corresponding embedding consisted of embedding functions preserves the metric of the manifold. As pointed out by Goldberg et. al 2008, almost all spectral methods use global normalization for embedding, which sacrifices isometry. PFE overcomes this problem by normalizing vector fields locally. Our theoretical study shows that, if the manifold is isometric to a connected open subset of Euclidean space, our method can faithfully recover the metric structure of the manifold. Besides, the out of sample extension of our proposed algorithm is also discussed. It turns out to be local computation problem, which is suitable for analyzing big data. I will also present some experimental results on both synthetic and real data sets. Finally, I will provide some concluding remarks and suggestions for future work. If the manifold is isometric to Euclidean space, then the obtained vector field is parallel. If the manifold has high curvature or complex topology, then the obtained vector field may be twisted and may have loops or singular points. These properties can be used to study the yopological structure of the manifold. Parallel fields play a central role for finding an isometry. Moreover, parallel fields provide a natural parametric representation of the manifold. Besides dimensionality reduction, they are also useful for other learning problems on the manifold. For example, we can perform classification and regression on the manifold by requiring that the function varies smoothly along the vector fields.

SHORT BIOGRAPHY

Xiaofei He is a professor in the College of Computer Science at Zhejiang University, China. He received the PhD degree from the University of Chicago, thereafter worked as a research scientist at Yahoo! Research Labs, and then joined Zhejiang University as a full professor. His research is mainly focused on applying statistics and mathematics for data analysis problems in pattern recognition, multimedia, and computer vision. He has extensive publications in leading international journals/conferences, e.g., IEEE TPAMI, IEEE TIP, IEEE TCSVT, IEEE TKDE, ACM Multimedia, CVPR, ICCV, NIPS, and ICML. He served and serves as associate editor, session chair, PC member and reviewer of top journals/conferences. His entire publications have been cited over 10,000 times. The Google H–index of his publications is 42. He serves as Associate Editor for IEEE TKDE, IEEE TCYB, Computer Vision and Image Understanding (Elsevier) and Neurocomputing (Elsevier). He received the Best Paper Award at AAAI 2012 and the best paper Runner–Up Award at ACM Multimedia 2010. He is a senior member of the IEEE and a member of the ACM.

Big Data: Nonlinear dimensionality reduction and sparse recovery

Professor Zhengyue Zhang

SYNOPSIS

It is a challenging task for big data analysis to exploit the dominating variables behind data. Due to the inexactness of data representation or missing information in collection, modelling the structure of noisy data is a key issue for this task. In this talk, we will focus on several structure models in the point of mathematics view, matching variant noise scales: nonlinear dimensionality reduction, linear projection preserving nonlinearity, and linear sparse representation.

Nonlinear dimensionality reduction (NDR) is a very important idea for highlighting the dominating features, assuming the scale of data noise is relatively small with respect to the data scales.NRD models data as samples from an unknown nonlinear manifold and the dominating variables are the low dimensional representation of the manifold in the point of mathematics view. We will talk about our contributions to dimensionality reduction, including the ideas, algorithms and theoretical analysis for answering worries on the credibility and efficiency of NDR algorithms. For data with large noise and bad distribution, NRD may over match the nonlinearity from noises, meanwhile classical linear projections like PCA may lose the nonlinear structures of data. We will show our work on the approach of linear projection that tries to preserve the nonlinear property in the low–dimension projection. This approach connects the two poles of the linear and nonlinear low–dimensionality reductions.

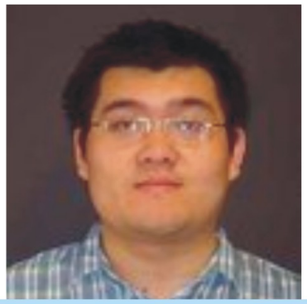
Sparse recovery is also a hot topic in data analysis, which has a wide application in many research fields. Sparse recovery looks for a sparse representation with the smallest cardinality under a given dictionary. We will also show the forward movements in our resent work on sparse recovery. Different from the classical way using L_1 approximation to the cardinality, our approach is navel and flexible, which relaxes the cardinality function by its locally convex envelope in a box, and it can be adaptively improved by moving the convex hull to capture the ideal sparse signal iteratively. We will show its performance supported by theoretical analysis and experiments.

SHORT BIOGRAPHY

Professor Zhenyue Zhang received his B.S. degree in mathematics from Fudan University, Shanghai, China, in 1982, and his Ph.D. in scientific computing from Fudan University in 1989. Zhang was an assistant professor of the Department of Mathematics, Fudan University from 1982 to 1985, and is a full professor of the Department of Mathematics, Zhejiang University since 1998. Zhang's current research interests include numerical linear algebra, scientific computing, machine learning with applications, recommendation systems, sparse recovery, and data science. During the past twenty years, he visited Pennsylvania State University, Stanford University, Lawrence Berkeley National Laboratory, University of California at Los Angeles, Georgia Institute of Technology, and North Carolina State University in USA, and also had short visits to University of Bonn, National University of Singapore, and several universities in Hong Kong and Taiwan, China. His several research papers were published in some famous journals like Mathematics Review, SIAM J. Scientific Computing, SIAM J. Matrix Analysis and Application, SIAM J. Numerical Analysis, IEEE T Pattern Analysis and Machine Intelligence, and Patten Recognition, and also the Neural Information Processing Systems Conference(NIPS), and IEEE conference Computer Vision and Pattern Recognition (CVPR). One of his papers was listed in the fifth place of highly cited papers (last 10 years) for SIAM J. Scientific Computing during the recent three years.

Big Visual Data Analysis for City Public Security

Professor Xi Li



SYNOPSIS

With the rapid development of imaging devices and Internet technologies, recent years have witnessed an explosive growth of digital visual data (e.g., images from Flickr as well as videos from Youtube and surveillance cameras).Such massive visual data usually involve a wide variety of topics and events, which typically characterize their semantic content from either the static orthe dynamic perspectives(e.g., object class information and object activities). Therefore, effectively understanding such visual data play an important role in public event detection, public opinion analysis, and public security early–warning. In general, the task of visual data understanding for public security analysis needs to address the W4H problems (i.e., when, where, what, which, and how) for the objects involved in the visual data. More specifically, the "when" and "where" problems are usually resolved by automatically analyzing the system–generated meta–information (e.g., date and GPS location) from smart mobile devices (e.g., iphone).In contrast, the "what" problem is generally converted to that of object detection, which aims to discover and localize a set of visual object entities (e.g., human or car) by automatically learning a number of object category–specific classifiers using massive training data. The "which" problem corresponds to that of object identification that seeks to uniquely identify the object instances (e.g., face recognition in the wild or person identification across camera networks), while the "how" problem is typically cast as that of analyzing the semantic events among object entities and recognizing the single–object or group–object semantic activities (e.g., human action recognition or people crowd motion analysis). Moreover, the forms of visual data in modern times are often interleaved with some other modalities (e.g., image with texts). As a result, visual data understanding for public security analysis in Internet environments needs to bridge the semantic information across different modalities, that is, cross–media visual data analysis. Moreover, it is also interdisciplinary because of involving a set of mutually related research fields such as computer vision, machine learning, data mining, multimedia, human cognitive science, etc. Hence, scalable and intelligent visual data analysis for public security is of great significance and importance to modern city management and society development.

SHORT BIOGRAPHY

As a young 1000–plan talent, Dr. Xi Li is currently a full professor of Zhejiang University, China. From September 2010 to February 2014, he worked as a senior research fellow in Australian Center for Visual Technologies, School of Computer Science, University of Adelaide, Australia. His research interests focused on visual surveillance. From June 2009 to June 2010, Xi Li was a postdoctoral researcher in CNRS, ParisTech Telecom, Paris, France. His research topics were image segmentation and annotation. In April 2009, he received the doctoral degree from National Laboratory of Pattern Recognition, Institute of Automation, Chinese Academy of Sciences. At that time, he focused on visual tracking, object behaviour analysis, image classification, object recognition, and web data mining.

Prof. Xi Li has already published a number of international conference and journal papers (e.g., ICCV, CVPR, ECCV, ICML, WWW, ACM MM, TPAMI, TIP, TKDE, IJCV, PR, and IVC). The algorithms proposed in these papers have significantly advanced the development of the following research areas: visual tracking, object behaviour analysis, image classification and retrieval, webpage analysis, and large–scale data clustering. Due to his significant contribution in image annotation, Dr. Xi Li won the best paper award in ACCV 2010.Due to his excellent research record, Dr. Xi Li is appointed as an associated editor of an international journal called Neurocomputing, and serves as a program committee member of ACM International Conference on Multimedia, 2014.

In addition to cutting–edge academic research, Dr. Xi Li was also active in turning research ideas into reality. He applied for four Chinese National Invention Patents, and one of them was already approved and nominated as China Patent Excellence Award. This approved invention patent concentrates on designing a multi–modal method for detecting the pornographic events occurring within the videos, which contributes greatly to high–precision web video filtering. Due to his excellent research contribution, Dr. Xi Li was awarded by the Peking City Government as a distinguished researcher.

Big Data in Civil Engineering and Architecture

Professor Yibing Wang

Professor Yueping Xu

Professor Qiuxiao Chen

SYNOPSIS

Big Data has been one of the current and future research frontiers. Information growth has been so rapid as to produce excessive data that is making great troubles to human beings. There are however so much potential and highly useful values hidden in the huge volume of data. Consequently data–intensive scientific discovery (i.e. Big Data problems) has emerged as a new scientific paradigm. It is challenging to handle a Big Data problem. Many scientific fields have already become highly data driven with the development of computer science. How to efficiently extract knowledge from data produced by large–scale scientific study and simulation? The answer to this general question is not yet much clear. This talk attempts to check the Big Data problems in the field of civil engineering and architecture, more specifically, traffic Engineering, hydrology and water resources, and urban and rural planning. In terms of traffic engineering, we will be focusing on the modeling, surveillance and control of large–scale freeway network traffic with special attention paid to the Big Data problems. As an emerging example of traffic Big Data, vehicular ad hoc networks are briefly discussed. In hydrology and water resources, the Big Data problems are discussed using several examples. Some major approaches to the handling of water Big Data are described. Finally, with respect to urban and rural planning, typical trends of variation around utilized data are first discussed, through which the Big Data problems are identified. The cloud–GIS–based design framework is then presented as a solution scheme.

SHORT BIOGRAPHY

Dr. Yibing Wang received the B.Sc. degree in electronics and computer engineering from Sichuan University, the M. Eng. degree in automatic control engineering from Chongqing University, and the Ph.D. degree in Control Theory and Applications from Tsinghua University, China. He is a full professor with the Institute of Transportation Engineering, the College of Civil Engineering and Architecture, at Zhejiang University, China. He was with the Dynamic Systems and Simulation Laboratory, Department of Production Engineering and Management, Technical University of Crete, Greece, where he was a Postdoctoral Researcher from 1999 to 2001 and a Senior Research Fellow from 2001 to 2007. He was a Senior Lecturer with the Department of Civil Engineering, Monash University, Australia from 2007 to 2013. His research interests include traffic flow modelling, freeway traffic surveillance, ramp metering, route guidance, urban traffic signal control, vehicular ad hoc networks (VANETs). From 2000 to 2008, he participated in Several European projects on freeway traffic surveillance and control, and collaborated with transportation research and practice professionals from Greece, Germany, the U.K., Belgium, Italy, and the Netherlands. In 2012 he was awarded a research grant by the prestigious Discovery program of the Australian Research Council (ARC), and was elected into the Zhejiang 1000–talent Program in China. Dr. Wang is a member of IEEE, an Associate Editor for the IEEE Transactions on Intelligent Transportation Systems and for Transportation Research Part C: Emerging Technologies. He is a member of the traffic flow theory committee of the Transportation Research Board (TRB) of the US National Academy, a member of the IFAC (International Federation of Automatic Control) Technical Committee on Transportation Systems, and a member of the Advisory Committee of the European Project NEARCTIS (Network of Excellence for Advanced Road Cooperative Traffic management in the Information Society, 2009–2013).

Dr. Yueping Xu received her B.Sc. degree and M.Sc. in Hydraulic Engineering from Wuhan University of Hydraulic and Electric Engineering, China, and her Ph.D. degree from the Water Engineering and Management Group, Civil Engineering, University of Twente, the Netherlands. She was a Postdoctoral Researcher from 2006–2007 in the Department of Civil Engineering, Hong Kong University of Science and Technology, Hong Kong. She joined Zhejiang University in 2007 and is currently an associate professor with the Institute of Hydrology and Water Resources, the College of Civil Engineering and Architecture, at Zhejiang University, China. Her research interests include flood damage Assessment and risk analysis, uncertainty analysis in hydrology and water resources management, climate change impact analysis on hydrology and water resources, hydrological modelling, and appropriate modelling in decision support systems etc. She has been actively involved in several international cooperation projects, including "Uncertainty in extreme stream flow simulation under climate change", "Appropriate modelling in decision support system for river basin management" between the Netherlands and China, and "Climate change scenarios of daily extremes in Zhejiang Province" between China and Canada.

Dr. Qiuxiao Chen received the B.Sc. degree in Geography from Hangzhou University, the Master degree in Industry Psychology from Zhejiang University, and the Ph.D. degree in Cartography and Geographic Information Systems from the State Key Laboratory of Resources and Environmental Information Systems, Chinese Academy of Sciences. He is currently an associate professor with the Institute of Urban Planning Engineering and Information Technology, the College of Civil Engineering and Architecture, at Zhejiang University, China. He is the vice Head of the Department of Regional and Urban Planning at Zhejiang University since Nov. 2009. He was a visiting scholar in the University of Western Ontario from Oct. 2006 to May 2007, and Dec. 2007 to Oct. 2008. His research interests include GIS and RS application in urban analysis, parametric technology in urban and rural planning, geo–info retrieval from high resolution images in urban environment. As a principal investigator, he has conducted several projects supported by National Natural Science Foundation of China, National High–Tech Research and Development Program of China (863 Program), and International S&T Cooperation Projects of China since 2004. He is also a senior planner of the Urban & Rural Planning Design and Research Institute of Zhejiang University Co., Ltd. He has participated in several projects on urban and rural planning funded by local governments since 1999. In 2013 he was awarded the Third Prize of Best Urban and Rural Planning in Zhejiang Province. He is the member of the Science and Technology Committee of the Bureau of Housing and Urban–Rural Development, Zhejiang Province, China, and the Director of GIS and Remote Sensing Professional Committee of the Geographical Society of Zhejiang Province. He is the member of the Advisory Committees of several local governments in Zhejiang Province.

QI ZHEN Global Lecture Series

Globalisation and the 21st Century University

Sir Keith O'Nions
President & Rector, Imperial College London

International mobility in higher education and research has increased with globalisation as has the extent of collaborative research around the world. Universities have broadened their role beyond research and teaching to include translation and commercialisation. The major challenges that society faces, for example, in energy, the environment, health, data and security are well beyond the ability of individual universities or even nations to address.

This presentation will consider some of the grand challenges now faced by the global community, and explore what attributes university graduates of the future will need to address them. At its best today's education offers opportunities for wider experience and takes place in an environment where interdisciplinary teaching and research are co–located. The presentation will also consider how Imperial West, Imperial College London's major new campus in west London, is endeavouring to go beyond this world to produce an innovation district where entrepreneurship, innovation, management and global business are embedded alongside research and education.

SHORT BIOGRAPHY

Sir Keith O'Nions took up the post of Rector of Imperial College London on 1 January 2010, after joining the College in July 2008 to set up and direct a new Institute for Security Science and Technology. In line with the transition towards a new leadership model, from 30 April 2012 Sir Keith assumed the title of President & Rector.

Sir Keith holds an undergraduate degree in geology from the University of Nottingham and a PhD in earth sciences from the University of Alberta, Canada. After completing his PhD he took up a Postdoctoral Fellowship at the University of Oslo before moving to the University of Oxford in 1971 as a Demonstrator and then Lecturer in geochemistry. He subsequently became Professor of Geology at Columbia University in 1975, Royal Society Research Professor at Cambridge in 1979 and Head of Earth Sciences at Oxford in 1995.

Sir Keith held the position of Chief Scientific Advisor to the Ministry of Defence between January 2000 and July 2004. He then moved to the Department of Trade and Industry, later known as the Department for Innovation, Universities and Skills, to become Director General, Science and Innovation, and Chief Scientific Advisor.

He has been the chairman, or a member, of a number of government and Research Council committees over the last 35 years, including a member of the Council of Science and Technology from 1998 to 2000, and was Trustee and then Chairman of the Natural History Museum from 1996 to 2005. He became a Fellow of the American Geophysical Union in 1979 and a Member of the Norwegian Academy of Science and Letters in 1980. He is a Fellow of the Royal Society (1983), Honorary Fellow of the Indian Academy of Sciences (1998), Fellow of the Indian National Science Academy (2001) and Honorary Fellow of the Royal Academy of Engineering (2005). Sir Keith holds Honorary Degrees from eleven universities.

He was knighted for services to earth sciences in the 1999 Queen's Birthday Honours.

Imperial East China Alumni Gathering 19 July

19 JULY

15:00

Registration
Venue: Shangri–La Hotel Hangzhou

15:30

Talks and presentations
– Welcome from Matt Burney, Consul (Cultural and Education), British Consulate–General in Shanghai
– Welcome from Sir Keith O'Nions, President & Rector, Imperial College London
– Talk by Professor David Gann, Vice–President (Development and Innovation)
– Video presentation

16:10

Traditional music performance by ZJU Wenqin Troupe
Afternoon tea

16:20

Networking session

17:30

Buffet dinner

Accommodation

Shangri-La Hotel Hangzhou

The venue for Imperial East China Alumni Gathering on 19 July
Add: 78 Beishan Road, Hangzhou, Zhejiang, China, 310007
TEL: 86–571–87977951
Website: http://www.shangri–la.com/en/hangzhou/shangrila/

Imperial Delegation Members

Sir Keith O'Nions, President & Rector
Professor David Gann, Vice–President (Development and Innovation)
Professor Dermot Kelleher, Vice–President (Health)
Professor G. 'Anand' Anandalingam, Dean of Imperial College Business School
Professor Yike Guo, Director of the Data Science Institute
Professor Paul Matthews, Professor of Clinical Neurosciences
Professor Christopher Pain, Professor in Earth Sciences and Engineering
Professor Daniel Rueckert
Professor Eric Yeatman, Professor of Microengineering
Dr Aldo Faisal, Senior Lecturer in Neurotechnology
Dr Chao Wu, Research Associate, Discovery Science Group
Mr Tom Miller, Director of Communications and Public Affairs
Mr Alastair Nuttall, Executive Officer to the President & Rector
Mr Tom Pearson, Acting Head of Alumni Relations
Ms Amna Siddiq, Events and Communications Officer

Imperial College London

Imperial College London is one of the world's great universities. It is the only UK university to focus exclusively on science, technology, engineering, medicine and business. It provides a critical mass of outstanding research expertise, which is the bedrock of high–quality innovation and enterprise.

Imperial is also the UK's number one university R&D collaborator with China in fields including nanotechnology, bioengineering, computing, data science, advanced materials, offshore energy, environmental engineering and entrepreneurship.

Imperial West

Imperial West is London's new 25–acre, GBP 3 billion (CNY 32 billion) innovation district, designed to bring together research, business and healthcare on an unprecedented scale, catalysing scientific development and economic growth.

At Imperial West, thousands of next generation thinkers from the UK, China and worldwide will co–locate in London to commercialise cutting–edge research to:

- further our understanding of the natural world;
- solve major engineering problems;
- lead the data science revolution;
- improve health and wellbeing.

The new campus hosts an outstanding research university, spinout companies, technology incubators and medical complexes in one powerful cluster.

Imperial West unites Chinese industry and business with Imperial College London's academic expertise in the search for their next sources of innovation.