CONFERENCE ABSTRACT

The 7th International Conference on Computational Systems - Biology and Bioinformatics (CSBio 2016）

The 8th International Conference on Advances in Information Technology (IAIT 2016)

International Conference on Behavior Engineering (ICBE 2016)

19-22, Dec. 2016 - University of Macau, Macau

Conference Venue

University of Macau

Avenida da Universidade, Taipa, Macau, China

Sponsored by

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Welcome Address

We are pleased to welcome you to International Conference on Behavior Engineering (ICBE 2016), The 7th International Conference on Computational Systems-Biology and Bioinformatics (CSBio2016), and The 8th International Conference on Advances in Information Technology (IAIT2016), which will takes place at University of Macau, Macau from December 19 to 22, 2016.

After several rounds review procedure, the program committee accepted those papers to be published in International Conference Proceedings Series by ACM and Elsevier Procedia Computer Science. We wish to express our sincere appreciation to all the individulas who have contributed to ICBE, CSbio and IAIT 2016 conference in various ways. Special thanks are extended to our colleagues in program committee for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee and the volunteers who had delicated their time and efforts in planning, promoting, organizing and helping the conference. Last but not least, our speacial thanks goes to invited keynote speakers as well as all the authors for contributing their latest research to the conference.

This conference program is highlyed by ten renowned international speakers: Prof. Lili Yang, School of Business & Economics, Loughborough University, UK; Prof. Boris Stilman, University of Colorado Denver, USA & STILMAN Advanced Strategies, USA; Prof. Volkhard Helms, Center for Bioinformatics, Saarland University, Germany; Prof. Shao Li, Tsinghua University, China; Prof. Anamik Shah, Vice-Chancellor of University Gujarat Vidyapith, Ahmedabad President of Indian Society of Chemists and Biologists, India; Dr. Siti Azma Jusoh, University of Technology MARA, Malaysia; Prof. Jonathan Hoyin Chan, King Mongkut's University of Technology Thonburi, Thailand; Prof. Luiz Moutinho, DCU Business School, Dublin City University, Ireland; Ms. Shimin Hu (Crystal), Co-Founder of iFang.cn; and Prof. Rita Li, Hong Kong Shue Yan University, founder and director of Sustainable Real Estate Research Center.

One best presentation will be selected from each session, evaluated from: Originality; Applicability; Technical Merit; PPT; English. The best one will be announced at the end of each Session, and awarded the certificate at dinner. The winners' photos will be updated on conference webpage.

We hope that your stay in Macau will be enriching and memorable! The technical program will send you back home motivated, enthusiastic, and full of innovative ideas.

We wish you a success conference and enjoyable visit in Macau.

Alice Wu
Organizing Committee

Organizing Committee ICBE 2016

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Local Information

Time:

GMT/UTC +8

Weather:

Macau has a humid subtropical climate, with average relative humidity between 75% and 90%. Similar to much of South China, seasonal climate is greatly influenced by the monsoons, and differences in temperature and humidity between summer and winter are noticeable. The average annual temperature of Macau is 22.7 °C (72.9 °F). July is the warmest month, the average temperature being 28.9 °C (84.0 °F). The coolest month is January, with a mean temperature of 14.5 °C (58.1 °F).

Located on China's southern coast, Macau has ample rainfall, with average annual precipitation being 2,120 millimeters (83 in). However, winter is mostly dry. Autumn in Macau, from October to November, is sunny and still pleasantly warm with lower humidity. Winter (December to early March) is generally mild with temperatures above 13 °C (55 °F) most of the time, although it can drop below 8 °C (46 °F) at times. Humidity starts to increase from late March. Summer is very warm to hot (often rising above 30 °C (86 °F) during the day). The hot weather is often followed by heavy rain, thunderstorms and occasional typhoons.

Banks and Foreign Exchange:

The currency for the Macau dollar (PATACA or MOP). The paper money face value has 10 MOP, 20 MOP, 50 MOP, 100 MOP, 500 MOP, 1000 MOP; The coin has 10 cents, 50 cents, 1 MOP, and 5 MOP.

Tourist Information:

Ruins of St. Paul's, façade originally built in 1602
Macau Cathedral
Cotai Strip (Venetian, Parisian, Studio City, Galaxy, Wynns Palace, Sands, Crown, etc.)
Senado Square
Fisherman's Wharf
http://www.macaotourism.gov.mo

Useful phone numbers:

- Emergency (police, fire, ambulance) : 999
- Area Code: 00853
- Tourist Complaint Hotline: +853-2833-3000

Conference Venue

The Conference Venue will be arranged at The campus of University of Macau.
Address: Avenida da Universidade, Taipa, Macau, China

Campus Map: http://www.umac.mo/cs/U-Mall/English/Map_E.html

Dinner @ N2

Conference Venue @ E4

Lunch @ S8

University Shopping Mall: http://www.umac.mo/cs/U-Mall/Shopping%20Mall_E.html

Note that the conference period covers some Macau and University holidays. Actually not all shops will be opened.

Restaurants in S8, their opening hours during holidays are:

Red Forest (Canteen) 8:00-20:45   Old Macau (Western restaurant) 11:00 – 22:00

The cafe at E2: Pacific Coffee (Cafe) 10:00-21:00

The restaurant at N1: Fortune Inn (Chinese restaurant) 11:00-15:00 & 17:30-22:30

Free campus Wifi is provided:

Connect to Wireless Network: UM_WLAN_PORTAL

Then login from the web browser using the following account:
User ID: guest2390   Password: uhfk5653

Transportation

Bus route:

From Macao	71, 73
From Taipa	72
From Barrier Gate	Take 3A, 10B and transfer 73 at AV.1° DE MAIO
From Lotus Border Gate	Take 25, 26A and transfer 72 at EST Baia N S ESPERANÇA – ISTMO
From Macau Ferry Terminal	Take 3A, 10B, 28A and transfer 71, 73 at PRAÇA FERREIRA AMARAL
From Macau International Airport / Taipa Temporary Ferry Terminal	Take MT1, MT2 and transfer 72 at EST Baia N S ESPERANÇA - ISTMO

Introductions for Oral & Poster Presentations

Oral Presentations

- **Timing:** a maximum of 15 minutes total, including speaking time and discussion. Please make sure your presentation is well timed. Please keep in mind that the program is full and that the speaker after you would like their allocated time available to them.

- You can use CD or USB flash drive (memory stick), and make sure you scanned viruses in your own computer. Each speaker is required to meet her/his session chair in the corresponding session rooms 10 minutes before the session starts and copy the slide file (PPT or PDF) to the computer,

- It is suggested that you email a copy of your presentation to your personal inbox as a backup. If for some reason the files can't be accessed from your flash drive, you will be able to download them to the computer from your email.

- Please note that each session room will be equipped with a LCD projector, screen, point device, microphone, and a laptop with general presentation software such as Microsoft PowerPoint and Adobe Reader. Please make sure that your files are compatible and readable with our operation system by using commonly used fronts and symbols. If you plan to use your own computer, please try the connection and make sure it works before your presentation.

- Movies: If your PowerPoint files contain movies please make sure that they are well formatted and connected to the main files.

Poster Presentations

- Maximum poster size is 36 inches wide by 48 inches high (3 ft. x 4 ft.)

- Posters are required to be condensed and attractive. The characters should be large enough so that they are visible from 1 meter apart.

- Please note that during your poster session, the author should stay by your poster paper to explain and discuss your paper with visiting delegates.

Dress code

- Please wear formal clothes or national characteristics of clothing

Abstracts and Speakers Biodata

Prof. Luiz Moutinho

DCU Business School, Dublin City University, Ireland

About Prof. Luiz Moutinho: Prof. Luiz Moutinho is the Professor of BioMarketing and Futures Research (the first Chair in the world in these two scholarly fields) at the DCU Business School, Dublin City University in Ireland. Previously, and for 20 years, he had been appointed to the Foundation Chair of Marketing at the Adam Smith Business School, University of Glasgow, Scotland. He completed his PhD at the University of Sheffield in 1982. He has been a Full Professor for 26 years and held posts at Cardiff Business School, University of Wales College of Cardiff, Cleveland State University, Ohio, USA, Northern Arizona University, USA and California State University, USA. He has held Visiting Professorship positions at Hubei University, China, Hubei University of Economics, China, Hebei United University ,China, University of Vilnius, Lithuania, University of Innsbruck, Austria, Otago University, New Zealand, University of Aarhus, Denmark, Bled School of Management, Slovenia, University of Aveiro, Portugal, Gyor University, Hungary, Feng Chia University, Taiwan, University of Coimbra, Portugal, Technical University of Lisbon, Portugal, FGV-Sao Paulo, Brazil, Catholic University, Brazil, University of Los Andes, Colombia, and University of Cyprus. Between 1987 and 1989 he was the Director of the Doctoral Programmes at the Confederation of Scottish Business Schools and at the Cardiff Business School between 1993 and 1996. He was Director of the Doctoral Programme in Management at the University of Glasgow between 1996 and 2004. He is the Founding Editor-in-Chief of the Journal of Modelling in Management (JM2) and has another 4 Associate Editorships as well as being in the Editorial Boards of another 46 international academic journals.

His areas of research interest also encompass bio-marketing, neuroscience in marketing, EMOWEAR, a wearable tech device that detects human emotions, evolutionary algorithms, human-computer interaction, the use of artificial neural networks in marketing, modelling consumer behaviour, marketing futurecast in management, tourism and marketing. Other primary areas of Professor Moutinhos academic research are related to modelling processes of consumer behaviour. He has developed a number of conceptual models over the years in areas such as tourism destination decision processes, automated banking, supermarket patronage, among other areas. The testing of these research models has been based on the application of many different statistical, computer and mathematical modelling techniques ranging from multidimensional scaling, multinomial logit generalised linear models (GLMs) and linear structural relations to neural networks, ordered probit, simulated annealing, tabu search, genetic algorithms, memetic algorithms and fuzzy logic. He has over 140 articles published in refereed academic journals, 30 books, more than 8,700 academic citations, an h-index of 44 and an i10-index of 142.

Title of Talk: Brainport-detecting the Cognizant Mind

Abstract: The presentation will initially centre on the developments related to the Internet of Things, the Internet of Everything and all its different applications. The talk will the address a myriad of facets related to the Internet of Emotions such as, affective computing, ubiquitous computing, natural user interfaces and the concept of sensorium. The issue is sensing affect and emotion- sensing technology is here to stay. Based on the trend to emulate and design an algorithmic self, the concept of brainport will be introduced ranging from a stimulation circuitry to an electrode array. Finally, the main facets, components and platforms of the EMOWEAR Project will be discussed. This is a wearable tech garment geared towards detecting, sensing and measuring human emotions.
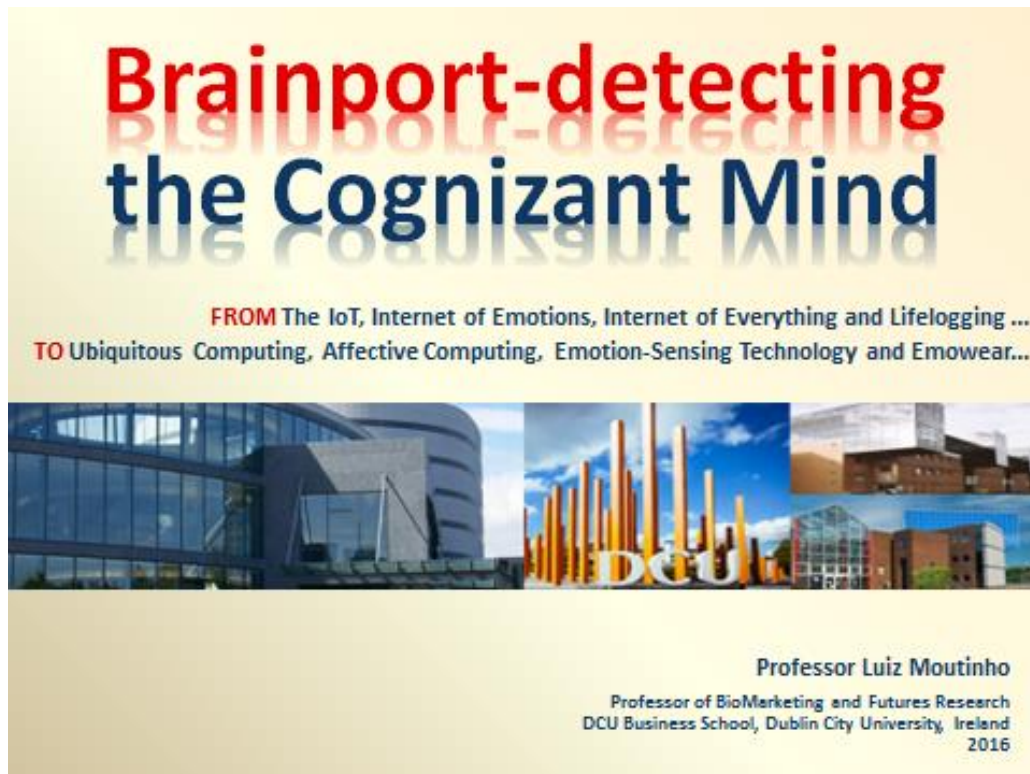
Prof. Volkhard Helms

Center for Bioinformatics, Saarland University, Germany

About Prof. Volkhard Helms: Volkhard Helms is a full professor at the Center for Bioinformatics, Saarland University, Germany since 2003. He did his PhD research at EMBL Heidelberg, Germany and obtained a diploma in physics from the Ludwig Maximilian University of Munich, Germany. Subsequently, he held positions at UC San Diego and the MPI for biophysics in Frankfurt, Germany. His research group in Saarbruecken works in the areas of bacterial resistance and cell fate transitions. They develop and employ computational methods ranging from molecular modeling of biomolecular interactions to data mining of genomic datasets. He has published more than 150 reviewed articles in the areas of biomolecular dynamics and interactions, structure and function of transmembrane proteins, gene-regulatory and protein interaction networks.

Title of Talk: Regulatory and Interaction Networks Associated with Cell Fate Transitions

Abstract: Modern high-throughput genomics and proteomics techniques allow researchers to characterize cell differentiation and disease processes at unprecedented levels of detail. For example, in normal breast cells about 130.000 interactions take place between different pairs of proteins. In matched breast cancer tissue, about 10.000 of these interactions are "rewired", because e.g. one or both interaction partners are no longer expressed or due to alternative splicing. One important task in modern bioinformatics is to identify statistically significant transitions that occur at higher frequency than expected by chance and their possible biological meanings. The talk will present our recent work on breast cancer ogenesis and for different lineages of hematopoiesis, namely the differentiation from blood stem cells into the different types of blood cells. Differentiation and diseases processes are typically regulated by so-called gene-regulatory networks formed by transcription factors, microRNAs and target genes. Our webserver TFmiR enables researchers to identify partial gene regulatory networks around a set of deregulated input genes and microRNAs and to identify statistically overrepresented 3-node and 4-node motifs in the graph. Our combinatorial algorithm DACO combines protein interaction data and domain-domain interaction data and constructs multi-protein complexes containing e.g. multiple transcription factors. In this way, data integration provides deeper biological insight into the complex regulatory machinery of cells. In summary, the talk addresses the problem of not being able "to see the forest for the trees", and how the identification of small local building blocks may aid in this. e.g. in hundreds of breast cancer patients rather than enumerating all of the differences.

Although much focus has been applied to the facet of data mining in big data, less focus has been put on the foundations of big data upon which data mining is based. These foundations include transforming raw data in a wide variety of formats and, if any, structures, to a consistent and meaningful schema upon which data mining may operate. These transformation techniques will be briefly discussed. Application of some of these techniques on an emerging source of raw data, social media, will be demonstrated.

Prof. Lili Yang

Reader in Information Systems and Emergency Management

School of Business & Economics

Loughborough University, United Kingdom

About Prof. Lili Yang: Lili Yang is a reader in the School of Business & Economics at Loughborough University. She received her MSc (Loughborough) and PhD (Derby) in the UK, joining the school in September 2006 as a lecturer. Prior to this appointment, she worked in the Computer Science department at Loughborough University as a part-time lecturer (2004-2006), and in the Applied Computing department at the University of Derby as a lecturer/senior lecturer (2001-2004). She is a fellow of the British Computer Society (FBCS) and a Chartered IT Professional (CITP).

Lili has taught a variety of modules on computing and business at both postgraduate and undergraduate levels including Business Analysis for Decision Making, Quantitative Methods for Business, Information Systems Development, Business Information Management, Business Modelling, From Networks to Internet, Programming, Data Communications etc. Currently she is the program director of MSc Business Analysis and Management. She has played the role as an external examiner for UG and PG teaching programs for a number of universities in the UK.

Lili has conducted a significant amount of research both independently and working in team. As the principal investigator she has led 12 projects and carried out 4 projects as co-investigator. The total budget has reached to over £3 million. She has published over 70 journal papers, conference papers and books. Recent publications appear in quality journals such as Information Systems Research, European Journal of Operational Research, Technological Forecasting and Social Changes, IEEE Transactions on Systems, Man, and Cybernetics (SMC), to be named.

Lili's research interests include emergency information systems design and development, evacuation modelling, data analytics, water resource management, risk management, and decision making. Her recent research has been supported by many research funding bodies and industries, such as European Commission, EPSRC, the Department of Trade and Industry (DTI), British Council, the Royal Society, the Royal Academy of Engineering, Santander, UK Fire and Rescue Services, BAE Systems etc.

By invitations, she has given a seminar in the Cabinet Office in London, DSTL, and many universities. She reviewed research proposals for the Luxembourg National Research Fund and the Portugal Foundation for Science and Technology and serves as a programme co-chair, finance chair, track chair and web-chair for a number of international conferences.

Some selected projects, include: Wireless Sensor Network for Fire Safety (SafetyNet), £1.3 Million, funded by the DTI. Integrating Security Technology and Organizational Culture for Employee Risk Management (ERA), £135K, funded by the DTI. Integrated Support System for Efficient Water Usage and Resources Management (ISS_EWATUS), 2.5 million euros, funded by European Commission

Title of Talk: Domestic Water Consumption and Behaviour Intervention by Employing IoT Technologies

Abstract: In the history of humanity, water plays a key role in sustaining life and building of social structures. With the climate change and population growth, it has posed potential threats towards water resources sustainability. Conservation of water has a high priority around the globe. Study on water management and conservation becomes an important research problem. To meet the growing demand of water resources, novel and interdisciplinary solutions have to be in place.

There are two main categories of water saving measures to reduce water use: technical measures include network improvement, repair leaks, developing water-efficient appliances; non-technical measures cover information, education, awareness that may change consumptive habits.

This talk may more focuses on the non-technical measure and presents the outcomes of our near-to-complete European project – ISS-EWATUS (issewatus.eu), a large scale project on water management at both household and municipal levels. The focus will be:

In IoT system for households giving consumer precise information on their water consumption on a single water-using appliance scale; the structure of the global IoT system and it's features will be presented;

Water consumption prediction based on the data collected wirelessly from each water-using appliance; a time series model will be established for each household with their family structure and other variables as the model inputs.

Decision support system for households generating practical advices regarding water-saving activities and classifying water consumption behaviour for individuals; advices and behaviour classification were automatically generated through the analysis on the actual water consumption data.

Prof. Shao Li

Deputy Director, Bioinformatics Division, Tsinghua National

Lab for Information Science & Technology

Tsinghua University, Beijing, China

About Prof. Shao Li: Shao Li is a tenured professor at Tsinghua University and the deputy director of Bioinformatics Division, Tsinghua National Laboratory for Information Science and Technology. He received the MD degree from Beijing University of Chinese Medicine in 2001. From 2001, he has been devoted to the exploration of traditional Chinese medicine (TCM) from a network perspective, and the development of network pharmacology, bioinformatics, and systems biology methods. He is the founder and chairman of Specialty committee of network pharmacology, World Federation of Chinese Medicine Societies (WFCMS), and the vice chairman of Specialty committee of network pharmacology, Chinese Pharmacological Society. He has published over 100 papers, and held over 10 US and China patents. His works were highlighted by Nature China, F1000, and made the headlines in The Wall Street Journal, which was selected as one of "The World top 10 news of TCM in 2014" by WFCMS. Prof. Li won the National Outstanding Young Scientist Award (2012), Grand Challenges 2015-Young Scientists (2015), National Science & Technology Award (2004), National Education Award (2009), and National Excellent Doctoral Dissertation (2003) in China.

Title of Talk: Network-based TCM Precision medicine

Abstract: Traditional Chinese Medicine (TCM) has a long history of viewing and treating an individual patient as an imbalanced system to guide the patient-tailored treatment by using numerous herbal formulae, making TCM a kind of traditional precision medicine. The holistic philosophy of TCM shares a lot with the key idea of systems biology, and also meets the requirement of overcoming complex diseases in a systematic manner. However, it is challenging to access such a holistic medicine by current reductionist "one target, one drug" approach due to the complexity nature not only in the chemical compositions of herb formula, but also in the biological systems of individual patients. To understand TCM from a systems perspective, we proposed a new approach of "network target, multi-component drug" and created a set of network target analysis algorithms to infer the association among herbs, compounds, biomolecules, phenotypes, and diseases and/or TCM syndromes. The follow-up clinical and experimental investigations demonstrated the effectiveness of our network target approach in discovering biomarkers, bioactive compounds, as well as molecular

mechanisms for TCM holistic diagnosis and treatments in inflammation diseases and cancer. The results suggest that the network approach promises to be an innovative way to understand TCM, narrow the gap between Eastern and Western medical practices, and eventually achieve a systematic precision medicine.

Prof. Boris Stilman

University of Colorado Denver, USA & STILMAN Advanced Strategies, United States of America

About Prof. Boris Stilman: Professor of Computer Science at the University of Colorado Denver (UC Denver), USA, and the Chairman & CEO at STILMAN Advanced Strategies (STILMAN), USA.

Boris Stilman received MS in Mathematics from Moscow State University (MGU), USSR in 1972, and two Ph.Ds in Electrical Engineering and Computer Science from National Research Institute for Electrical Engineering (VNIIE), Moscow, USSR in 1984. In 1972-1988, in Moscow, he was involved in the research project PIONEER led by a former World Chess Champion Professor Mikhail Botvinnik. Based on these experiences over a number of years, in Moscow and later, at McGill University, Montreal, Canada, Dr. Stilman developed Linguistic Geometry (LG), a new theory for solving abstract board games. Since 1991, Dr. Stilman was developing the theory and applications of LG at UC Denver. A leap in the development LG was made in 1999, when he (with a group of scientists and engineers) founded STILMAN, LLC. A growing number of applications of LG developed at STILMAN passed comprehensive testing and are currently transitioning to the real world command and control systems around the world. In 2010, Dr. Stilman broadened the scope of his research of intelligent behavior via investigating the structure of the Primary Language of the human brain (including the Algorithm of Discovery).

Dr. Stilman published several books and over 200 research papers. He is a recipient of numerous R&D awards, including the top research awards at University of Colorado, substantial grants from the US government agencies such as major multiple awards from DARPA, US Dept. of Energy, US Army, US Navy, US Air Force, etc.; Ministry of Defence of UK; from the world leading defense companies such as Boeing (USA), Rockwell (USA), BAE Systems (UK), SELEX/Finmeccanica (Italy-UK) and Fujitsu (Japan). More information about Dr. Stilman, history of LG, and projects.

Title of Talk: Engineering Intelligent Enemies for Defense Systems

Abstract: The difficulties of engineering behavior for defense systems are related to adversarial reasoning. The main problem is to generate in real time intelligent predictive courses of action for all sides in a conflict. This problem is considered intractable by conventional approaches that suffer from the curse of dimensionality. Linguistic Geometry

(LG) is a new type of game theory scalable to engineering behavior for real world defense systems. LG allows us to overcome combinatorial explosion by changing the paradigm from search to construction (from analysis to synthesis). Modern applications of LG, related to the US national defense, generate, in real time, courses of action that are highly creative and even exceed the level of those developed by human commanders. Currently, the U.S. Army is adopting the LG software to global intelligence systems to stationary and mobile command posts around the world to command and control systems inside thousands of infantry assault vehicles, to soldiers' handhelds, and to commanders' training systems. In my talk, I will introduce participants to several advanced applications of LG and to several US Army and DARPA experiments utilized those applications. I will also establish link between LG and legendary battles of Alexander the Great and Hannibal. I will introduce the hypothesis that LG is one of the ancient algorithms based directly on the Primary Language of the human brain (as suggested by J. von Neumann).

Prof. Anamik Shah

Vice-Chancellor of University Gujarat Vidyapith, Ahmedabad

President of Indian Society of Chemists and Biologists, India

About Prof. Anamik Shah: President, Indian Society of Chemists & Biologists
Vice-chancellor, Gujarat Vidyapith, Ahmedabad, Gujarat, India.
In charge, Center of Excellence for Drug Discovery
Professor, Department of Chemistry (UGC-SAP-DSA-I and DST-FIST Supported), Saurashtra
University, Rajkot - 360005 (INDIA)

Professor Anamik Shah is currently attached to a heritage and historical Gandhian University, Gujarat Vidyapith, Ahmedabad, Over and above his academic pursuits,Professor Shah has worked in diverse fields of Science & Technology, Spearheaded several scientific organizations & now sharing responsibility of few Scientific Institutes, Research Centers and more recently many rural centric Gandhian educations & extension organizations attached with Gujarat Vidyapith, Ahmedabad.

Title of Talk: Antitubercular Heterocyclic NCEs through Computer Aided Tools: Review of A Decade Long Journey

Abstract: Tuberculosis is a global challenge across the boundaries of rich and poor nations alike due to one third population of the entire globe is infected with latent Mycobacterium tuberculosis. Increasing case of drug resistance is a big threat to the current treatment. Identification of new leads and drugs is a herculean task like finding a needle in haystack, where bioinformatics and chemoinformatics plays an important role in drug discovery research by assisting medicinal chemists in designing new molecules and its virtual evaluation. Involvement of computer aided drug design (CADD) is notable due to its great success in recent years. Also, open source platform, through which many institutes and organizations are connected, is endowed to provide affordable healthcare. Present lecture will address the efforts of our research group towards development of anti-TB agents through synthesis of focused libraries and molecular modelling. Some molecules are identified as promising leads and currently at the advanced level of screening, results of which will be discussed.

Ms. Shimin Hu (Crystal)

Co-Founder of iFang.cn, 广东爱房网络科技有限公司

About Ms. Shimin Hu: Crystal is an outstanding international scholar with strong leadership and entrepreneurship whom have experienced different education systems in four countries: China, Singapore, USA and UK. She received the National Youth Achievement Award in Singapore 2007. In 2008, with full distinctions she was successfully graduated from Warwick Business School that is one of the best universities in the world (according to Times its ranked top 7th in UK league tables). In 2008, the BEGO Company she co-founded won The Queen's Award For Enterprise. In 2014, she graduated from the Shenzhen Tsinghua Graduate School EMBA, and the iFang company she co-founded awarded one million RMB from entrepreneurial funding which was provided by Tsinghua University and FOSHAN local government. In 2015, she was voted as The Rising Star of FOSHAN, awarded by Southern Entrepreneur Magazine.

Title of Talk: How Fintechs Help Us Manage Wealth Smartly, Effectively and Wisely

Abstract: This talks aims to explore the concepts of latest IT-driven business models in real estate industry: the smartphone Apps smarten up the O2O property transactions and the eREIT platform which maximizing the power of Crowdfunding; by analyzing the macro-scope perspective national bureau of statistics of the People's Republic of China and the micro-scope of the financial reports of the listed companies in real estate sector we will evaluate their impacts and feasibilities. Second, we will explain how the enabling technologies such as mobile Apps, data mining and LBS marketing tools as IT infrastructure provides the foundation for e-commerce application in the enterprise strategically and revolutionarily leading to the Information Age of real estate investment in China. Finally, we will investigate the possibilities of the new wave of data science application and Pareto Optimization in Chinese real estate industry.

Prof. Rita Yi Man Li

Hong Kong Shue Yan University, Hong Kong

Founder & Director of Sustainable Real Estate Research Center

About Ms. Rita Li: Rita Li, Graduated from the University of Hong Kong (HKU) (global subject ranking 11 in QS 2016), She is the founder and director of Sustainable Real Estate Research Center. Rita is also an Adjunct Associate Professor in China-Australia Centre for Sustainable Urban Development, Tianjin University. Rita first started her academic career as a visiting lecturer in Polytechnic University, then a lecturer, an Assistant Professor and now an Associate Professor in HKSYU. Outside the academia, Rita is a chartered surveyor by profession. She has also received formal training in arbitration and mediation. She is an associate member of CIArb and HKIArb.

Over the years, Rita won many local and international awards and grants. She was a recipient of a Fellowship from the US to study the impact of law and culture on housing fittings in China which offered me a chance to present a paper to Prof Douglass North, Nobel Prize Winner (for his contribution in new institutional economics). Rita also received the top three presenter award among all the fellowship recipients. She previously received a competitive fellowship from Australia Govt to act as a visiting research fellow in School of Natural and Built Environment, University of South Australia (ranks 69 for Engineering and Technology inTimes Higher Education) from late May to late September 2014 (worked with my host Prof Simon Beecham, current Pro Vice-Chancellor of University of South Australia). She was also a recipient of a grant issued by Ministry of Education jointly with scholar from The People's Republic of China and a finalist award for competition law research in the US.

Her papers are published in Journal of Cleaner Production, Journal of Environmental Health etc. Rita is a journal editor for many academic peer review journals and a regular reviewer for Scopus/SSCI/SCI journals such as Journal of Cleaner Production,International Journal of Environmental Research and Public Health, Sustainability, Housing Studies, Journal of Youth Studies (housing only), Land Use Policy, Facilities, Urban Studies etc.

Outside the ivory tower, Rita's research activities have been covered by mass media in different places, such as:
--The Guardian (UK)
--Hong Kong Economic Times, Skypost headline (Hong Kong)

--QOOS (Macau)
--China Review News, (China)
--EcoGisments (France)

Title of Talk: 5D GIS Virtual Heritage

Abstract: In recent decade, a wave of apprehension swept across the Pearl of Oriental With regards to the disappearance of high value tangible and intangible heritages due to Urban renewal and redevelopment. The flourish of computer science and engineering, however, offers a rosy spectacle for heritage preservation. Virtual heritage is no longer an idea in cloud-cuckoo-land. In this research, we propose the ground breaking five dimensional GIS virtual heritage. Whilst traditional two dimensional GIS stores the information of X and Y axis, the recent three dimensional GIS includes the information of building height and other information is useful to urban planners when they make decision in change in use of land. The fourth dimension includes time with collective memories of Hong Kongers. The invaluable intangible heritage can be kept by record of oral history. Changes in ethnic minorities, different walks of lives provide dazzling and interesting angles of the modern city. We also include the concept of the fifth dimension of automated virtual and augmented heritage with drone and robots' help in taking 360-degree virtual reality videos and photos. Whilst strand of literatures on VR, AR, 3D GIS and memories scatter in different areas of research, combination of all these technologies is the first of its kind. Research on automated VR and AR is scarce or non-exist. It is expected that the 5D GIS virtual heritage offers a new angle to historian, economists, sociologists, urban planners.

Plenary Speaker

Prof. Jonathan Hoyin Chan

School of Information Technology

King Mongkut's University of Technology Thonburi, Thailand

About Prof. Jonathan Hoyin Chan: Dr. Jonathan H. Chan is an Associate Professor of Information Technology, King Mongkut's University of Technology Thonburi (KMUTT), Thailand. Jonathan holds a B.A.Sc., M.A.Sc., and Ph.D. degree from the University of Toronto and was a visiting professor there back in 2007, 2009 and 2016; he was also a visiting scientist at The Centre for Applied Genomics at Sick Kids Hospital in Toronto in several occasions. He is a member of the editorial board of Neural Networks (Elsevier), Proceedings in Adaptation, Learning and Optimization (Springer), Heliyon (Elsevier), International Journal of Machine Intelligence and Sensory Signal Processing (Inderscience), and a reviewer for numerous refereed international journals including Information Science, Neural Computation & Applications, BMC Bioinformatics, BMC Genomics, International Journal of Data Mining and Bioinformatics, Applied Soft Computing, Computers in Biology and Medicine, and Memetic Computing.

He has also served on the program, technical and/or advisory committees for numerous major international conferences. Dr. Chan has organized/co-organized many international conferences, and he is the Past-President and a current Governing Board Member of the Asia Pacific Neural Network Assembly (APNNA). He is a senior member of IEEE and INNS; a member of the IEEE CIS Emergent Technologies Technical Committee (ETTC); a member of ACM and the Professional Engineers of Ontario (PEO). His research interests include intelligent systems, biomedical informatics, bioinformatics and systems biology, and data science.

Title of Talk: Biomedical Text Mining and Beyond

Abstract: Readily available biomedical literature provides a rich and valuable source of knowledge for biomedical research. Text mining (TM) enables the extraction of pertinent information and knowledge from a vast amount of text and it is currently widely utilized in biomedical research. Many researchers have taken advantage of text mining technology to discover novel knowledge to improve the development of biomedical research, especially

those pertaining to disease and intervention. This talk will provide an overview of the text mining process in the context of biomedical informatics, including some of the latest research in biomedical corpus development and application of machine learning and data science techniques. Practical case studies in Thyroid cancer intervention and metabolic interaction network reconstruction will be provided.

Workshop and Tutorial

Dr. Siti Azma Jusoh

University of Technology MARA, Malaysia

About Dr. Siti Azma Jusoh: Siti Azma Jusoh is a researcher and senior lecturer at Faculty of Pharmacy, Universiti Teknologi MARA Malaysia. She obtained her PhD degree in Computational Biology from Center of Bioinformatics, Saarland University, Germany, where she applied molecular dynamics (MD) simulations to study membrane proteins. She then spent 2 years postdoctoral training in University of California San Diego (UCSD) implementing MD simulations in the area of structure-based drug design. Her current research interest focus on structural bioinformatics employing docking/high throughput virtual screening, protein modeling and molecular dynamics simulations for the applications in early drug discovery, and to understand dynamics of protein structure and their functions.

Title of Workshop: Protein Modeling, Structure-based Function Prediction and Applications

Abstract: In this workshop, participants will learn basic principles in structural bioinformatics and applications of protein modeling in structure-based function prediction, genomics (e.g. SNPs, mutation effects), and early drug discovery phase (e.g. protein-ligand binding). Participants will have a hands-on session to use free web-based programs to perform sequence analysis, secondary structure prediction and homology modeling, so that they can straight away apply these skills and knowledge in their research works without depending on installed software. In addition, we will also demonstrate how to use commercial softwares when dealing with challenging proteins. By end of this workshop, participants should be able to make own decision on protein modeling procedures, select which programs that best suit the available data, aware of the method limitations, and be able to present results in research articles.

Prof. Boris Stilman

University of Colorado Denver, USA & STILMAN Advanced Strategies, USA

About Prof. Boris Stilman: Professor of Computer Science at the University of Colorado Denver (UC Denver), USA, and the Chairman & CEO at STILMAN Advanced Strategies (STILMAN), USA.

Boris Stilman received MS in Mathematics from Moscow State University (MGU), USSR in 1972, and two Ph.Ds in Electrical Engineering and Computer Science from National Research Institute for Electrical Engineering (VNIIE), Moscow, USSR in 1984. In 1972-1988, in Moscow, he was involved in the research project PIONEER led by a former World Chess Champion Professor Mikhail Botvinnik. Based on these experiences over a number of years, in Moscow and later, at McGill University, Montreal, Canada, Dr. Stilman developed Linguistic Geometry (LG), a new theory for solving abstract board games. Since 1991, Dr. Stilman was developing the theory and applications of LG at UC Denver. A leap in the development LG was made in 1999, when he (with a group of scientists and engineers) founded STILMAN, LLC. A growing number of applications of LG developed at STILMAN passed comprehensive testing and are currently transitioning to the real world command and control systems around the world. In 2010, Dr. Stilman broadened the scope of his research of intelligent behavior via investigating the structure of the Primary Language of the human brain (including the Algorithm of Discovery).

Dr. Stilman published several books and over 200 research papers. He is a recipient of numerous R&D awards, including the top research awards at University of Colorado, substantial grants from the US government agencies such as major multiple awards from DARPA, US Dept. of Energy, US Army, US Navy, US Air Force, etc.; Ministry of Defence of UK; from the world leading defense companies such as Boeing (USA), Rockwell (USA), BAE Systems (UK), SELEX/Finmeccanica (Italy-UK) and Fujitsu (Japan). More information about Dr. Stilman, history of LG, and projects.

Title of Tutorial: Constructing Strategies for Adversarial Games

Abstract: Linguistic Geometry (LG) is a type of game theory that serves as a foundation for the development of multiple intelligent defense systems in the USA and abroad. This lecture will consist of two parts:

A brief introduction to the LG Game Construction for solving real world defense problems (with a short movie). I will introduce participants to the construction of the Abstract Board Games and LG Hypergames including construction of the abstract board, abstract pieces, and relations of reachability.

An extensive theoretical account into the LG Game Solving. I will introduce participants to the so-called No-Search Approach in LG. It will include step-by-step explanation of the major result in LG, which shows that LG generates optimal solutions for a class of opposing games without search and demonstrates construction of those solutions. I will initiate the Terminal Set Expansion, i.e., expansion of the subsets of terminal states into "bubbles," the larger sets of states. For each of the states from those bubbles I will determine a strategy leading to the respective terminal states. Then, we will realize that the bubbles of states permit to decompose the whole game state space into subspaces. This decomposition will be implemented via constructing a visual model called a State Space Chart. This Chart will serve as a strategic "geographical map" of the state space by providing guidelines for "travel" from state to state. Then I will utilize this Chart for constructing classes of potential strategies for all the opposing sides and for pruning those classes that cannot be implemented for a given problem. Subsequent application of the non-pruned potential strategies will lead to construction of the optimal solution – the only real strategy existing in this problem.

Eight narrated movies on past LG projects can be downloaded from http://www.stilman-strategies.com (click to "Demos"). A brochure "Linguistic Geometry Tools: LGPACKAGE" can be downloaded from:
http://www.stilman-strategies.com/movies/LGPACKAGE.pdf

Daily Schedule of Events – Day 1

Dec.19| Monday | Morning	Registration (Lobby) Renne Gao, Amy Hu, Jennifer Rowe		10:00-17:00
	Address: E4 Anthony Lau Building, University of Macau, Avenida da Universidade, Taipa, Macau		
	Notes: *Collecting conference materials. Delegates will get the certificate at the registration desk. The organizer won't provide accommodation, and we suggest you make an early reservation.		
	Workshop, Computer Training Room, Venue E6-2093		
	Protein Modeling Workshop 1: Siti Azma Jusoh, PhD University of Technology MARA, Malaysia		10:30-12:00
Dec.19| Monday| Afternoon			
	Workshop, Computer Training Room, Venue E6-2093	**Tutorial** **Venue E4-G062**	
	Protein Modeling Workshop 2: Siti Azma Jusoh, PhD University of Technology MARA, Malaysia	**Constructing Strategies for Adversarial Games** Prof. Boris Stilman University of Colorado Denver, USA & STILMAN Advanced Strategies, USA	13:30-15:30
	Coffee Break		15:30-16:00
	Protein Modeling Workshop 3: Siti Azma Jusoh, PhD University of Technology MARA, Malaysia		16:00-18:00

If you are joining the Protein Modelling Workshop, you should prepare a laptop and install this software here:
http://www.ks.uiuc.edu/Development/Download/download.cgi?PackageName=VMD

If you are joining the Constructing Strategies for Adversarial Games Tutorial, please visit the following website for background information:
http://www.stilman-strategies.com/

Daily Schedule of Events – Day 2

	Registration: Renne Gao, Amy Hu, Jennifer Rowe	8:30-15:00
	E4-G062-Anthony Lau Building on UM campus	
Dec.20 | Tuesday| Morning	**Opening Remarks:** Prof. Jonathan Chan University of Macau, China	8:55-9:00
	Keynote Speech 1: Prof. Luiz Moutinho DCU Business School, Dublin City University, Ireland	9:00-9:45
	Keynote Speech 2: Prof. Volkhard Helms Center for Bioinformatics, Saarland University, Germany	9:45-10:30
	Coffee Break	10:30-10:45
	Keynote Speech 3: Prof. Lili Yang, School of Business & Economics, Loughborough University, United Kingdom	10:45-11:30
	Plenary Speech: Prof. Seonphil Sunny Jeong United International College, China	11:30-12:00
	Group Photo, Lunch @ Old Macau Restaurant (S8)	12:00-13:30

Dec.20 | Tuesday | Afternoon	**E4-G062-Anthony Lau Building on UM campus**		
	Keynote Speech 4: Prof. Shao Li Tsinghua University, China		13:30-14:15
	Keynote Speech 5: Prof. Boris Stilman, University of Colorado Denver, USA & STILMAN Advanced Strategies, USA		14:15-15:15
	Coffee Break		15:15-15:30
	E4-G051	**E4-1051**	15:30-18:00
	Session-1:Bioinformatics Chair: S. Siu	Session-2: Network and information technology Chair: B. Stilman	
	E4-G053	**E4-1052**	
	Session-3: Evolutionary Computation, Swarm Intelligence and Their Applications Chair: S. Fong	Session-4: Image and Data Processing Technology Chair: W. Song	
	Dinner @ Fortune Inn/UM		18:00-21:00

*A 2-way shuttle bus will be provided; depart at 18:00 E4 Entrance, return at 21:00 to S1@UM

Daily Schedule of Events D3

Dec.21 | Wednesday | Morning	Registration: Renne Gao, Amy Hu, Jennifer Rowe		10:00-17:00
	E4-G062-Anthony Lau Building on UM campus		
	Opening Remarks: Prof. Raymond K. Wong University of New South Wales, Australia		9:00-09:05
	Keynote Speech 6: Prof. Anamik Shah Vice-Chancellor of University Gujarat Vidyapith, Ahmedabad President of Indian Society of Chemists and Biologists, India		9:05-9:50
	Keynote Speech 7: Ms. Shimin Hu (Crystal), Co-Founder of iFang.cn		9:50-10:35
	Coffee Break		10:35-11:00
	Keynote Speech 8: Prof. Rita Li, Hong Kong Shue Yan University, and founder and director of Sustainable Real Estate Research Center		11:00-11:45
	Group Photo, Lunch @ Old Macau Restaurant (S8)		11:45-13:30
Dec.21 | Wednesday | Afternoon	**E4-G062-Anthony Lau Building on UM campus**		
	Plenary Speech Prof. Jonathan Hoyin Chan, King Mongkut's University of Technology Thonburi, Thailand		13:30-14:30
	Coffee Break & Poster Session		14:30-15:45
	E4-G051	**E4-1051**	
	Session-5: Computer Science and Engineering Chair: S. Fong	Session-6: Electronic Information Technology and Application Chair: R. Wong	15:45-18:00
	E4-G053	**E4-1052**	
	Session-7: Business Intelligence and Service Sciences Chair: L. Moutinho	Session-8: Genetic Engineering and Technology Chair: Siti A. Jusoh	
	Closing and Award Ceremony – * **Dinner @ Sofitel Resort, Macau**		18:00-21:00
Dec.22	**One day tour**		

*A 2-way shuttle bus will be provided; depart at 18:00 E4 Entrance, return at 21:00 to S1@UM

Oral Presentation and Abstract

Session-1-< Bioinformatics >

Venue: E4-G051
Chair: Prof. Shirley Siu
Time: 15:30-18:00

Note:

* The certification of Oral/Poster presentations, listeners, will be signed by the chairman at the end of each session.

* For the Best Presentation of each session, it is encouraged to award it to student author prior.

*To show the respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session; the scheduled time for presentations might be changed due to unexpected situations. Please come as early as you could.

* Session Photos will be taken and the end of each session and updated online.

C013-A

Time:15:30-15:45

A mobile application for following daily life and social activities of schizophrenic patients

Dr. Kemal Hakan Gulkesen
Akdeniz University, Turkey

Daily life and social activities of schizophrenic patients are important because these activities both help the patients getting better and they are also indicator of being functional for the patients. Traditionally, these activities are followed by the help of the observations of the patient's relatives and health professionals, or paper based records of the patient herself. Mobile phones can be used for this purpose, but there is no application serving to this purpose according to our knowledge. The purpose of this study is to evaluate the effect of such a mobile application on the health status of schizophrenic patients.

The application was designed to record personal self care activities (teeth brushing, taking shower, shaving etc.) and social activities (shopping, visiting friends-relatives, working, etc.) of the patients. The application was developed to work on android mobile phones. The application regularly asks to the patients her activities and wants her to record them. An additional medication reminding function is also present. The application development stage is completed and usability tests are near to be completed.

We are planning a study of matched pairs of study subjects. Prior data indicate that the difference in the PANNS (Positive and Negative Syndrome Scale) is normally distributed with standard deviation 20. If the true difference in the mean response of matched pairs is 20, we will need to study 13 pairs of subjects to be able to reject the null hypothesis that this response difference is zero with probability (power) 0.90. The Type I error probability associated with this test of this null hypothesis is 0.05.

Efficiency of the application will be tested on real patients. Thirteen patients who are 18-65 years old and without acute symptoms will be included in the study. After clinical evaluation and PANNS scoring, patients will use the application for one month. They will be revaluated clinically and by PANNS scoring again. The

evaluation results before the use application and after the use of application will be compared to see if there is a clinical improvement.

C016-A

Modeling Stress and Drug Resistance Development in Escherichia coli

Ms. Daria Gaidar, Maximilian Greil, Alexander Andreychenko and Volkhard Helms
Saarland University, Saarbruecken 66123, Germany

We study mechanisms of adaptation bacteria employ to resist the induced environmental stress. We address mechanisms of bacterial resistance to stress that is the adaptation of metabolism and physiology that leads to the emergence of a stress (drug) resistant phenotype.

Interested in studying resistance mechanisms employed by organisms to permit their growth in aggressive environments, e.g. treatment with antibiotics and ethanol, we focus on adaptive resistance. That is, the resistance developed over time that employed metabolic and physiological changes in the organism that are accessed for instance via measurements of minimum inhibition concentration (MIC) and gene expression levels.

Inspired by the high interest and need of the community to understand, tailor, and overcome drug resistance in bacteria we make an attempt to join emerging gene expression and proteomics measurements of Escherichia coli bacteria evolved under antibiotic or ethanol stress with the established flux based model to highlight and analyze metabolic, physiological, and phenotypic changes that shape bacterial adaptation to the given stress. We model an altered metabolic state of E.coli under ethanol and antibiotic stress.

A genome-scale metabolic flux model of Escherichia coli K–12 was constrained with the transcriptome and proteome data. The integration of the gene expression and proteome assay data from the strains (un)exposed to stress parameterized the model equations resulting in the condition-specific models. Condition-specific models then capture metabolic adaptations induced by changes in the gene expression the strain employed to adapt to the treatment.

We expect our analysis and model perspective on the resistance development to facilitate the identification of genes and metabolites guiding the resistance development and so design of the advanced drug therapies.

C022-A

Molecular Dynamics Simulation and Binding Studies of Beta-Sitosterol with Transcortin

Mr. Samith Rathnayake and Samantha Weerasinghe
University of Colombo, Sri Lanka

Beta-sitosterol is a plant sterol that is widely used to cure atherosclerosis, diabetics, cancer, and inflammation and is also an antioxidant. This study comprised of interaction of beta-sitosterol with transcortin protein in terms of molecular docking, and molecular dynamics simulation methods. The force field parameters of beta-sitosterol were developed and stored on online database "Sri Lankan Flora" (www.science.cmb.ac.lk/tools/slflora) which contains isolated compounds of flora of Sri Lanka.

Molecular docking procedure was employed to predict binding affinity and pose

of physiological ligands; cortisol, a synthetic glucocorticoid; dexamethasone and beta-sitosterol to transcortin receptor and the binding affinities were calculated. It revealed that the beta-sitosterol has been successfully docked onto the same binding site as cortisol and dexamethasone with compatible binding affinity. Thus these three ligand-protein complexes were pursued for molecular dynamics (MD) simulation study for 30 ns each to investigate the stability of the complexes in aqueous medium. The conformational fluctuations of the protein and, ligand-protein interaction and stability were studied in details in terms of root mean square deviations (RMSD), radius of gyration (Rg), total solvent accessible surface area (SAS) and root mean square fluctuations (RMSF). The MD analysis, especially the RMSF analysis (the Figure a) indicates that steroids; cortisol, dexamethasone and beta-sitosterol complexes exhibit similar effect on the receptor in aqueous medium producing identical fluctuations of amino acids. The non-covalent interactions of protein-ligand complexes were identified and the stability of all those H bonds was studied. The results reveal that each ligand; cortisol, dexamethasone and beta-sitosterol (the Figure b) forming at least one strong H bond with the receptor.

Therefore, it could be concluded that the binding affinity of beta-sitosterol to transcortin as an agonist may produce effects similar to that produced by glucocorticoids. Thus the revealed knowledge could leads to further investigations of the pharmaceutical potential of beta-sitosterol and biological functions of transcortin in vivo.

C024

GMFR-CNN: An Integration of Gapped Motif Feature Representation and Deep Learning Approach for Enhancer Prediction

Ms. Yu Shiong Wong, Nung Kion Lee and Omar Norshafarina
Universiti Malaysia Sarawak (UNIMAS), Malaysia

Unravelling gene expression has become a critical procedure in bioinformatics world today and required continuous efforts to form a complete picture of enhancers. Enhancers are explicit patterns of gene expression that bound by activators to stimulate transcription. It could reside in upstream or downstream thousands of base pairs away without any fixed position. Therefore, the identification task of enhancers is extremely challenging. The inclusion of gaps in motif identification improved the overall accuracy and sensitivity, however, this feature is not fully utilised in deep learning method yet. Deep learning, is a powerful machine learning technique that has been actively used in image recognition and this technique has begun to shed light in bioinformatics. The expressiveness of deep learning enables higher feature learning from lower level ones. As a result, an integration of gapped motif feature representation (GMFR) and deep learning approach called deep convolutional neural networks (CNNs) is introduced to improve the predictive power of enhancer prediction. We called this method as GMFR-CNN. Comparative studies indicate that GMFR-CNN outperforms the other deep learning and gapped k-mer SVM tools with average 98% prediction accuracy. Breakthrough in deep learning technique certainly improves the performance in the near future.

C032

Time: 16:30-16:45

Semantic Graph based Pseudo Relevance Feedback for Biomedical Information Retrieval

Yuanyuan Zhang, **Prof. James Z. Wang**, Pradip K Srimani
Clemson University, USA

Pseudo relevance feedback has been shown to be effective in improving the information retrieval performance. This paper proposed a novel pseudo relevance feedback strategy to facilitate the retrieval of more relevant biomedical documents by improving the quality of the feedback documents and expansion terms. Firstly, an ontology-graph based query expansion technique is applied to retrieve more relevant feedback documents by expanding the query with related concepts. Secondly, useful expansion terms are extracted from the feedback documents based on a semantic graph based ranking approach. The extracted expansion terms are expected to represent the feedback documents and thus capture the user search intention. We add the expansion terms to the user query to retrieve more relevant documents. We use 10-fold cross validation technique to evaluate the performance of the proposed pseudo relevance feedback strategy over OHSUMED test collection. The experimental results demonstrate that the proposed strategy improves the retrieval performance by 33.8% over the strategy based on un-expanded query in 11-point average precision. The proposed strategy also achieves better retrieval performance than two representative pseudo relevance feedback approaches. We have integrated this new strategy into G-Bean, a graph-based biomedical search engine. G-Bean also provides a feedback mechanism which allows the users annotate the search results that they are interested in and retrieves documents relevant to all interested results. G-Bean is available at: http://bioinformatics.clemson.edu:8080/GBean/index.jsp.

C030-A

Time:16:45-17:00

Optimized Protein-ligand Docking Using Cuckoo Search Algorithm

Mr. Hang Lin, Shirley Weng In Siu
Department of Computer and Information Science, University of Macau, China

Protein-ligand docking is a molecular modeling technique used to predict the conformation of a small molecular ligand inside the binding pocket of a protein receptor. There is a number of protein-ligand docking tools, among them Autodock Vina is the most popular open-source docking software. There were numerous attempts to enhance the search algorithm in Vina by means of heuristic optimizations such as Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) algorithm. In this work, we proposed Cuckoo Search (CS) algorithm for docking. Our experiments using the benchmark dataset PDBbind 2012 core-set showed that CS improved the global exploration ability of Vina and avoided the premature convergence problem. We will also discuss how to compile a better dataset to compare different optimization methods fairly.

C021

Time:17:00-17:15

High-frequency Noise Attenuation of a Two-component System Responding to Short-pulse Input

Mr. Akifumi Nishida, Ryoji Sekine, Daisuke Kiga, and Masayuki Yamamura
Tokyo Institute of Technology, Japan

Among the various biological devices developed and characterized in synthetic biology, light-sensing biological devices can serve as an input–output system owing to their light modulation property. The well-characterized devices in living systems are useful for modulating cellular sensing and transducing information. In this study, we examined short pulse responsiveness of a light-sensing two-component system (TCS), Cph8-OmpR, which was generated by replacing the sensor domain of the EnvZ-OmpR osmoregulatory system with the light sensor Cph1. We varied the input pulse width of the Cph8-OmpR system and found that an input width of <1 s was sufficient to alter the accumulation of a reporter gene upregulated by Cph8 phosphorylation of OmpR. Based on this result and the mathematical model showing that the timescale for the upstream Cph8-activity transition was much faster than that of downstream gene expression, we evaluated the merit of a TCS with such an unbalanced cascade. Our mathematical simulation of a cascade TCS suggests that high-frequency noise arising from fast transitions in kinase activity was attenuated throughout the cascade reaction. In terms of noise attenuation, these results will contribute to future designs of biological cascade systems with fast upstream transitions.

C020

Time:17:15-17:30

Function Prediction of Disease-Related Long Intergenic Non-Coding RNA Using Random Forest

Mr. Hiromu Ide, Masakazu Umezawa, Hayato Ohwada
Tokyo University of Science, Japan

A non-coding RNA (ncRNA) is an RNA molecule that is not coded into a protein. ncRNAs are important regulators of gene expression, and have a wide range of functions in cellular and developmental processes. However, to date, only a few well-studied ncRNAs have provided important clues about their relevance to particular diseases.
This study aims to find disease-related mRNAs and long intergenic non-coding RNAs (lincRNAs) from microarray data. More specifically, this study focuses on acute lung injury (ALI) disease. It seeks to distinguish between ALI and normal one. We utilize microarray data including mRNAs and lincRNAs that contain transcriptomic characterization of mice's brain inflammation during ALI.These samples are obtained at six time points (1h, 1.5h, 3h, 4h, 18h, and 24h) after injection of oleic acid or physiological serum. Because microarray data contains a large number of genes with a small number of samples, we must extract genes that are relevant for classification. First, we divide the dataset into three groups according to elapsed time after injection: group1 with early elapsed time (1h, 1.5h, 3h, and 4h), group2 with late elapsed time (18h and 24h), and group3 with full-length elapsed time (1h to 24h). We then extract some genes using a random forest algorithm for each group. A random forest algorithm can identify which features (genes) are important for classification. Finally, we obtain some

important genes (mRNAs and lincRNAs) for classification as output.

From these result, we distinguish between mRNA and lincRNA, and extract some mRNAs and lincRNAs using a random forest algorithm from microarray data. The final results indicate that some extracted lincRNAs may function like some mRNAs in ALI disease. This study provides new knowledge for biologists and medical scientists by investigating lincRNAs that may be related to ALI disease.

C035-A

Time: 17:30-17:45

CIDR: Ultrafast and accurate clustering through imputation for single-cell RNA-Seq data

Dr. Peijie Lin, Michael Troup and Joshua Ho
Victor Chang Cardiac Research Institute, Australia

Most existing dimensionality reduction and clustering packages for single-cell RNA-Seq (scRNA-Seq) data deal with dropouts by heavy modelling and computational machinery. Here we introduce CIDR (Clustering through Imputation and Dimensionality Reduction), an ultrafast algorithm which uses a novel yet very simple 'implicit imputation' approach to alleviate the impact of dropouts in scRNA-Seq data in a principled manner. Using a range of simulated and real data, we have shown that CIDR consistently outperforms the state-of-the-art methods, namely t-SNE, ZIFA and RaceID, in terms of clustering accuracy, and typically completes within minutes for processing a dataset of thousands of cells.

IT0036

Time:17:45-18:00

The Deadlift form Analysis System using Microsoft Kinect

Ms. Suputtra Sutthiprapa, Vajirasak Vanijja, Thanakrit Likitwon
King Mongkut's University of Technology Thonburi, Thailand.

Weight training leads to muscle injury for inexperience exercise. The deadlift form is one of high risk posture of weight training. Therefore, the prevention of incorrect deadlift form needs an expert trainer. Some people are not be able to effort the private trainer cost. This research presents the deadlift form analysis system using Microsoft Kinect. Microsoft Kinect can be applied to detect the deadlift form with its full body motion capability the Chaffin's biomechanical modeling. The Chaffin's model is used to calculate two forces, compression force and shear force, on lumbosacral disc (L5/S1). Results of this research can help the people to practice the corrected deadlift form and reducing injuries on lumbosacral disc (L5/S1) using Microsoft Kinect. The accuracy of this system is 80.9%.

Session-2-< Network and information technology >

Venue: E4-1051
Chair: Prof. B. Stilman
Time: 15:30-18:00

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IT0001

Time:15:30-15:45

Simulated Performance of TCP, SCTP, DCCP and UDP Protocols over 4G Network

Dr. Shahrudin Awang Nor, Raaid Alubady, Wisam Abduladeem Kamil
Universiti Utara Malaysia (UUM)

Forth Generation (4G) network support for wide geographical locations proves its use as a more advanced wireless technology. The Long-Term Evolution (LTE) is a 4G mobile communications standard set by International Communication Union (ITU), specifically ITU Radio communication Sector (ITU-R). At the moment, video traffic and telecommunications grow under the expansion of LTE, which is considered as the actual motivating access technology of 4G network. Throughout the deployment of LTE, various transport protocols are advised and broadly experimented, for instance, TCP, SCTP, DCCP and UDP that may execute differently on 4G networks subject to the network scenarios and parameter settings. Even though the deployment of LTE is swiftly enhanced, there is a lack of performance evaluation of its protocols. Hence, a widespread scrutiny is required for the evaluation of the operation of numerous protocols for high-end applications such as multimedia. Adopting these applications with flexible quality of service constraints with improved usage of resources is a challenging task. In this paper, the output results of different transport protocols for multimedia streaming applications, e.g., video, through extensive simulations are analyzed. The performance of an MPEG-4 video streaming is evaluated using NS-3. The performance metrics used are delay, jitter, throughput, and packet loss. These metrics are evaluated at the base station via TCP, SCTP, DCCP and UDP protocols over the 4G-LTE technology. The obtained results show that the DCCP performs the best in throughput improvement with the minimization of delay and jitter as compared to UDP, TCP, and SCTP.

IT0037

Time: 15:45-16:00

RaCA: A Joint Rate and Channel Adaptation Scheme for dense 802.11n Networks

Dr. Tingpei Huang, Shibao Li, Shaoshu Gao
China University of Petroleum, Qingdao, China

With the rapid deployment of 802.11n networks, the communication in 802.11n network suffers severe interferences. Traditional rate adaptation algorithms do not consider this problem. In this paper, we design a joint rate and channel adaptation scheme called RaCA for dense 802.11n networks. Firstly, we use RSSI (Received Signal Strength Indicator) and CSI (Channel Station Information) to measure the current channel conditions. Secondly, we design a two-stage rate adaptation scheme TSRA to quickly adapt to appropriate rate based on RSSI and CSI. Finally, we propose a quorum-based channel adaptation algorithm QCA without control channel. If the channel suffers interferences, RaCA uses QCA to choose another channel to work on. Simulation results show that RaCA obtains significant aggregated throughput gain over Minstrel-HT.
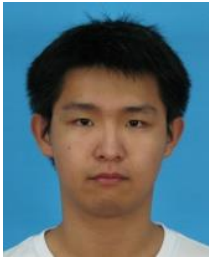
IT0059

Time:16:00-16:15

A Novel Broadcasting MAC Algorithm for Ad Hoc Networks

Mr. Chen Liang, Yu Zhang, Jian Song
Tsinghua National Laboratory for Information Science and Technology (TNList), Tsinghua University Department of Electronics Engineering, Tsinghua University, Beijing 100084, China

Wireless ad hoc networks with broadcasting are widely applied in IoT and emergency situations as the network can be set up without traditional infrastructures. In this paper, we propose a TDMA-based MAC algorithm which supports data transmission by broadcasting. The algorithm is similar with the mechanism in NbIA algorithm 1,2 in neighbour discovery, but differs a lot in collision detection and slot allocation. Our algorithm can dynamically allocate slots according to the demand of nodes and ensures every node get at least one slot a cycle. Based on spatial reuse, idle slots might be found and be used as extra slots of nodes which can promote throughput of our algorithm. After the network converges, only a few nodes need to adjust their slots to adapt to topology changes, while most of the nodes maintain their slots to transmit data. The performance of our algorithm and NbIA algorithm are compared with OPNET simulation. The results show that our algorithm outperforms NbIA especially in convergence time and average throughput of nodes.

IT0002

Time:16:15-16:30

Increasing the Expression Power of Person's Profiles in Semantic Social Networks

Prof. Juha Puustjärvi and Leena Puustjärvi
Department of Computer Science, University of Helsinki, P.O. Box 68, Helsinki, Finland

The amount of social information published in the Web has dramatically increased in the past years. FOAF, Dublin Core, and vCard are examples of popular vocabularies that are used to present computer understandable profiles of persons in social media. These profiles describe facts about a person such as his or her interests, and thereby we can easily find persons having the same interests. However, in reality we are rather interested in about the closeness of persons' interests than whether they have precisely the same interests. Such aspects are easily understandable for humans but they are not machine understandable without additional semantics. Therefore we have extended the vocabularies of social media by domain specific taxonomies. In addition, to increase the expression power of persons' profiles we have also attached weights to persons' interests. We have also consider a variety of ways for expressing and computing the closeness of weighted profiles.

IT 0087

Time:16:30-16:45

SER of OSTBC with Decode-Amplify and Forward for Cooperative Communications

Dr. Chirawat Kotchasarn
Telecommunication Program.,Faculty of Engineering, Rajamangala University of Technology Thanyaburi , THAILAND

The innovation of Wireless communication has been developed very fast in order to improve the performance of communication systems. Especially, a concept of Multiple Input Multiple Output (MIMO) is purposed to fulfill a high data rate service such as high quality video conference. However, a limitation in size and power of mobile device in the latest version of cellular system i.e. third Generation (3G) and fourth Generation (4G) causes difficulty to implement MIMO on mobile unit. Hence, Cooperative communication has been created to operate as a virtual MIMO in modern wireless communication. The objective of this paper, the performance analysis of Hybrid Decode-Amplify and Forward (HDAF) Cooperative communication using Orthogonal Space-Time Block Code (OSTBC) is derived in term of Symbol Error Rate (SER) against Signal-to-Noise Ratio (SNR) when the system applies different type of modulation techniques. Additionally, the error performance is derived base on Moment Generating Function (MGF) of the Rayleigh fading channel. We only focus on the downlink direction. Assuming that multiple antennas can be equipped into a transmitter which operates as base station in cellular system, mobile unit can be equipped with only single antenna due to the size limitation which operates as relays and destination. Moreover, the receiver uses Maximum Ratio Combining (MRC) to receive the transmitted signal.

IT6015

Time:16:45-17:00

Consumer Acceptance of eHealth among Rural Inhabitants in Developing Countries (A Study on PHC)

Md. Nazmul Hossain, Hiroshi Okajima, Hironobu Kitaoka, and Assoc. Prof. Ashir Ahmed (**Fumihiko Yokota** for presentation only)
Kyushu University, Japan

Numerous studies have been conducted on eHealth's structure, technological

aspects, current status, problems and prospects. However, there are only a few studies conducted in regards to the consumer acceptance of eHealth. This paper explores and analyzes the current level of, reasons behind and factors affecting consumer acceptance of Portable Health Clinic (PHC), an e-Health initiative in Bangladesh, currently serving on experimental basis. We have selected 600 rural respondents by applying stratified random sampling method. Data has been collected through structured questionnaire survey and analyzed with statistical tools including central tendency, frequency analysis, and chi-square test of association. Our findings revealed that, 40% of the respondents have idea of using ICT in healthcare while 21% have their own experience of using any of the existing mHealth or eHealth system. On the other hand, PHC's acceptance rate among our respondents is 32% i.e. they have received healthcare services from PHC at least once. This research also analyzed consumer's demographic and socio-economic factors that affect their acceptance of eHealth. Our finding says, consumer's age, occupation and purchasing power have very strong influence on their acceptance of eHealth services from PHC while their gender, level of education, access to cell phone and previous eHealth knowledge have very insignificant or weaker impact.

IT0032A

Time:17:00-17:15

Refection Function in Evacuation Instruction Training System using AR and Smartphone-based HMD

Mr. Keisuke Iguchi, Hiroyuki Mitsuhara, Masami Shishibori
Tokushima University,Japan

In recent years, incidence of disasters is increasing all over the world. Enlightenment of disaster prevention (i.e., spread of knowledge on disaster prevention) is important for protecting life from disasters. In this study, we aim at disaster education that can protect children who may be weak against disasters. In particular, we focus on disaster evacuation for teachers. In the event of a disaster, teachers must give children (students) proper evacuation instructions quickly. In order to train the teachers, we have developed an Evacuation Instruction Training (EIT) system which can represent disasters at school using visual marker-based Augmented Reality (AR) and a smartphone-based Head-Mounted Display (HMD)—Vuforia and Google Cardboard. The EIT system superimposes 3D virtual children and objects onto a real-time vision captured by the smartphone camera. While viewing AR-based virtual disaster situations (e.g., destructive shaking) through the HMD, the users (trainees) say evacuation instructions to the virtual children (e.g., "Hide under the table!")
To realize high immersive training, the EIT system enhances the visual reality by a stereoscopic view function that properly divides the real-time vision into two. The virtual children take various behaviors (e.g., huddling children) and the virtual objects transforms to various states (e.g., debris of glass). We conducted a preliminary experiment to examine whether the EIT system is acceptable to preschool teachers. The questionnaire results and opinions indicated that the EIT system was acceptable. However, we found that the EIT system could not be used for reflection and discussion on training, which are necessary for effective training. Therefore, we are implementing a reflection function in the EIT system. This function, which records the superimposed vision (i.e., a trainee's view) and sends it to a server, enables trainees to reflect on and share what they saw and said during training.

Session-3-< Evolutionary Computation, Swarm Intelligence and Their Applications >

Venue: E4-G053
Chair: Prof. Simon Fong
Time: 15:30-18:00

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IT0016

Time: 15:30-15:45

Migrating Birds Optimization (MBO) Algorithm to Solve Knapsack Problem

Prof. ERKAN ULKER and VAHIT TONGUR
SELCUK UNIVERSITY, Turkey

(MBO) which is a novel meta-heuristic algorithm for the solution of knapsack problem. The knapsack problem which is classified as NP-complete problem is a combinatorial optimization problem. Its aim is to achieve maximum benefit without exceeding the capacity of the knapsack with selected item. The Migrating Birds Algorithm is designed for discrete problems. Therefore, the performance of basic the MBO algorithm is tested on the some knapsack problems and obtained results are demonstrated in detail.

IT0027

Time: 15:45-16:00

Lanczos Kernel Based Spectrogram Image Features for Sound Classification

Ilyas Ozer, **Assoc. Prof. Oguz Findik** and Zeynep Ozer
Karabuk University Engineering Faculty Comp. Eng. Department
Karabuk/TURKEY

Automatic sound recognition (ASR) is a prominently emerging research area in recent years Recognition of sound events automatically through the computers in the complex audio environment is quite useful for machine hearing, acoustic surveillance and multimedia retrieval applications. Although a lot of features such as mel-frequency cepstral coefficients in ASR tasks provide very good results in noiseless environments, noisy conditions in the real world reduce success rates in a remarkable way. On the other hand, it was reported that spectrogram image features showed much better classification performance at low signal noise ratio values in many studies. In this article, it was proposed the preparation of feature vector after the images are reduced in size by applying the resizing process to

spectrogram images with Lanczos kernel. Classification performance was compared by using deep artificial neural networks in different noise levels and although the feature vector was reduced, parallel values with results in the literature were obtained in the noiseless environment. It has remained slightly below the current state-of-the-art techniques using spectrogram features while better results compared to other commonly used features such as MFCC were obtained under the noisy conditions.

IT0003

Time:16:00-16:15

A GA-based feature selection and parameter optimization for support tucker machine

Dewei Zeng, **Assoc. Prof. Shuqiang Wang,** Yanyan Shen, Changhong Shi
Shenzhen Institutes of Advanced Technology，Chinese Academy of Sciences

Compare with vector, tensor can reserve structural information and tensor model algorithm can exploit such information. Unfortunately, tensor contain many redundant information which is undesirable to Support Tucker Machines(STuMs), therefore we present a genetic algorithm (GA) based algorithm to feature selection and parameter optimization simultaneously for the STuMs. The proposed algorithm can sweep away the irrelevant information in tensor data and obtain a better generalized accuracy. Experiments conducted on third-order gait recognition datasets to examine the performance of the proposed algorithm. The results show that proposed algorithm can provide a significant performance gain in terms of generalized accuracy and training speed for tensor classification.

IT0011

Time:16:15-16:30

An approach on Chinese Microblog entity linking combining Baidu Encyclopedia and Word2vec

Mr. Dongchuan Huang, Jiali Wang
National University of Defence Technology, Changsha, China

Microblog such as Twitter and Sina Weibo provides a convenient and instant platform which makes information easy to share and acquire. However, Microblog's short, noisy, real-time features make Chinese Microblog entity linking task a new challenge. In this paper, we investigate many linking methods and introduce the implementation of our work on Chinese microblog entity linking task. By means of crawling Baidu encyclopedia web page, we generate polysemous, synonymous and index collections in MongoDB to manage the entities. We use a Chinese NLP tools named HanLP1 to perform noun words extracting, and then generate candidate set with these collections and word similarity. For disambiguation part, we take Word2vec2 whose model is trained by THUC news3 to determine the textual relevance. Our work performs pretty well on the Sina Weibo data set.

IT0004

Time:16:30-16:45

Role of E-Trainings in Building Smart Cities

Shipra Sharma, **Prof. Shalini Garg,** S.K. Mittal
GGSIP University, India

Recently, the concepts of building smart cities has come up which enforces urban development to build intelligent and digital cities. Smart cities are also known as digital cities that uses ICT practices. This framework offers a linkage between Information and Communication Technology and Urban planning and development (Wolfram, 2012). The linkage has surged for the development of innovative practices and capacity building. Smart cities have been defined in various forms from digital cities to wireless cities and now to smart cities.
This research brief mainly concentrates of administration, people and knowledge creation for developing organization's e-training platform helping in building smart cities with digital enterprise, administration and people or smart citizens. The paper tries to put forward the concept and designing of e-learning platform to provide instant training and education for shaping the new generation citizens.

IT0008A

Time: 16:45-17:00

How Can We Use Augmented Reality and Head Mounted Display for Immediate-Action Commander Training?

Assoc. Prof. Dr. Hiroyuki Mitsuhara, Keisuke Iguchi, Junya Kawai, Masami Shishibori
Tokushima University, Japan

Disasters (e.g., earthquakes, typhoons, and terrorist attacks) have occurred frequently all over the world. Therefore, disaster education should be more improved as a global high-priority issue. Especially, disaster education focusing on how we should take immediate actions after disasters strike is essential to protect our lives. However, children find it difficult to understand such disaster education. Instead of disaster education to children, adults should properly instruct them to take immediate actions in the event of a disaster. We refer to such adults as Immediate-Action Commanders (IACers) and explore digital game-based IACer training programs with high situational and audio-visual realities. In general, IACer training programs require seriousness because they deal with human life (survival). On the other hand, such seriousness may not motivate adults to undergo the programs. We believe that digital game will increase their motivation in terms of fun, and we adopt a scenario-based interactive fiction game. To heighten the realities, additionally we use augmented reality (AR) and head-mounted displays (HMDs): a binocular opaque HMD (Oculus Rift), a smartphone-based binocular opaque HMD (Google Cardboard), and an optical see-through HMD (Epson Moverio). We prototyped three AR systems that superimpose interactive virtual objects onto HMDs' real-time vision or a trainee's actual view based on interactive fictional scenarios. In other words, the systems superimpose AR-based interactive virtual children (i.e., 3DCG characters) who exhibit reactions and take immediate actions against disasters on a real-time vision (i.e., a trainee's view). All the systems were implemented using a game engine (Unity) that enables implementers to model 3DCG and program its animations on an integrated development environment. According to a brief comparative survey,

the AR system (System-2) equipped with a smartphone-based binocular opaque HMD has the most promising practical system for game-based IACer training programs in terms of visual reality and usability (wearability). Based on this result, we will continue to mainly focus on System-2 and realize voice-based interactions between the virtual objects (i.e., virtual children) and the trainee

IT0012

Time:17:00-17:15

Withering Process for Tree-Seed Algorithm

Prof. Mustafa Servet Kiran
Selcuk University, Computer Engineering Department, Turkey

The tree-seed algorithm (TSA) is first proposed to solve continuous optimization problems in 2015. The possible solutions of the optimization problems are represented as trees and seeds. Being used the relation between trees and seeds, the candidate solutions are obtained during the iterations. While a seed which is a possible solution is created, either best solution or current tree is used in updating strategy of TSA and the usage of best or current tree is controlled by a control parameter named as search tendency. For especially multimodal numeric benchmark functions, the population goes into stagnation behavior after a while because the stand swarms to a place on the solution space. Therefore, the new candidate solutions are very similar to previous solutions. To overcome this issue of TSA, a new control parameter named as withering process (WP) is added to basic version of TSA. The novel proposed version of TSA is called as TSAWP and applied to solve 13 multimodal benchmark functions. Experimental results show that TSAWP is better than the basic version of TSA in terms of solution quality and robustness based on standard deviations.

IT0013

Time: 17:15-17:30

Solving 2D Strip Packing Problem Using Fruit Fly Optimization Algorithm

Dr. Ismail Babaoglu
Selcuk University, Computer Engineering Department, Turkey

Two dimensional strip-packing problem (2DSPP) consists of packing a set of rectangular items on one strip with a restriction of a maximal width and height. Because the conventional algorithms are still sub-optimal, the researchers tend towards searching for more successful alternative algorithms to solve 2DSPP. The fruit fly optimization algorithm (FOA), which is one of the recently proposed meta-heuristic algorithms, has been successfully applied on many engineering and mathematical problems. This study presents an implementation of FOA for solving non-oriented 2DSPP. The aim of the study is to find the optimal sequence of the rectangles in a strip, and then to place the rectangles by bottom left fill approach to have the optimal height within a fixed width box. The experiments are concluded on online available set of 2DSPP test problems. The preliminary results of the study are compared with the results of some conventional or heuristic approaches which use the same problem set. The experimental results show the promising results are obtained by FOA on solving 2DSPPs.

IT0014

17:30-17:45

An Application of Fruit Fly Optimization Algorithm for Traveling Salesman Problem

Mr. Hazim Iscan and Mesut Gunduz
Selcuk University, Computer Engineering Department, Turkey

In this study, an application of fruit fly optimization algorithm (FOA) is presented. FOA is one of the recently proposed swarm intelligence optimization algorithms used to solve continuous complex optimization problems. FOA has been invented by Pan in 2011 and it is based on the food search behavior of fruit flies. The FOA has a simple framework and it is easy to implement for solving optimization problem with different characteristics. The FOA is also a robust and fast algorithm and some researchers used FOA to solve discrete optimization problems. In this study, a new modified FOA is proposed for solving the well-known traveling salesman problem (TSP) which is one of the most studied discrete optimization problems. In basic FOA, there are two basic phases, one of them is osphresis phase and the other is vision phase. In the modified version of FOA the ospherisis phases kept as it is and for vision phase two different methods developed. In vision phase, the first half of the city arrangement matrix is updated according to first %30 part of best solutions of the ospheresis phase. The other half of the city arrangement matrix is randomly reproduced because of the possibility that initial solutions are far from the optimum. According to the results, travelling salesman problem can be solved with FOA as an alternative method. For big scale problems, it needs some improvements.

IT0015

Time:17:45-18:00

The Estimation of the Electricity Energy Demand Using Particle Swarm Optimization Algorithm: a Case Study of Turkey

Saban Gulcu and **Assoc. Prof. Halife Kodaz**
Selcuk University, Computer Engineering Department, Turkey

Energy is the most important factor in improving the quality of life and advancing the economic and social progress. Demographic changes directly affect the energy demand. At present the world's population is growing quickly. As of 2015, it was estimated at 7.3 billion. The population and the export of Turkey have been increasing for two decades. Consequently, electricity energy demand of Turkey has been increasing rapidly. This study aims to predict the future electricity energy demand of Turkey. In this paper, the prediction of the electricity demand of Turkey is modeled by using particle swarm optimization algorithm. The data of the gross domestic product, population, import and export are used as input data of the proposed model in the experiments. The GDP, import and export data are taken from the annual reports of the Turkish Ministry of Finance. The population data are taken from the Turkish Statistical Institute. The electricity demand data are taken from the Turkish Electricity Transmission Company. The statistical method $R2$ and adjusted-$R2$ are used as the performance criteria. The experimental results show that the generated model is very efficient.

Session-4-< Image and Data Processing Technology>

Venue: E4-1052
Chair: Dr. Wei Song
Time: 15:30-18:00

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IT6002

Time: 15:30-15:45

A Dynamic Spatial Clustering for Emergency Response based on Hierarchical-Partition Model

Yilang Wu, **Assoc. Prof. Junbo Wang**, Sato Kouichi and Zixue Cheng
the University of Aizu, Japan

Understanding the situation distribution is a fundamental but important step in the emergency response to disaster. There is various emergency related spatial data available on Internet; however, it is still a big challenge in clustering the dynamic big spatial data. In this study, we provide a dynamic spatial clustering (DSC) to efficiently load and cluster the spatial big data based on a hierarchical-partition model (HPM). We have modeled the DSC to understand the distribution of emergency (Kumamoto earthquake, March 2016) from spatial data in tweets. The major contributions in the HPM-based DSC include loading dynamic big spatial data with optimal utilization of external memory, and rapid clustering to detect the dense regions of targeted emergency.

IT5014A

Time:15:45-16:00

Big Data Analytics for the Ambient Air Pollution and Risk of Cardiovascular Disease Hospitalization

Prof. Chien-Lung Chan, Jyun-Yun Lu, Chiung-Yi Wu, Ren-Hao Pan
Innovation Center for Big data and Digital Convergence, Yuan Ze University, Taoyuan, Taiwan

To investigate whether ambient air pollution was associated with increased risk of cardiovascular disease hospitalization, we conducted Big Data Analytics and constructed predictive model of cardiovascular disease by using data mining methods. We used a time stratified case-crossover design to assess the association of the level of air pollutants exposure preceding each acute cardiovascular disease hospitalization event. The data comes from the National Health Insurance Research Database (NHIRD) in Taiwan and Environmental Protection Department's "Environmental Statistics Database". Through Hadoop distributed

data processing platform, both data integration and instant access can be done to find out air pollution risk factors and cardiovascular disease hospitalizations. We found that PM10, O3 and CO are the most significant predictive factors of cardiovascular disease hospitalizations. Moreover, we constructed and compared four kinds of prediction models – Random Forest, Support Vector Machine, Decision Tree and Logistic Regression. As a result, Random Forest had the best AUC (Area Under Curve) on monthly-adjusted data. The accuracy was up to 88%, which was 1.7 times of traditional Logistic Regression, 11% higher than Decision Tree, and 4% higher than Support Vector Machine. In this study, we also used R-Studio and Shiny server to conduct risk analysis of cardiovascular disease hospitalization, which allowed the researchers to change the parameters and to observe the accuracy of risk prediction.

IT6007

Time:16:00-16:15

Gender Differences in Affective Response from warning pictorials on cigarette label

Dr. Arisara Jiamsanguanwong, Pat-Arin Chanduen, Wipawee Tharmmaphornphilas
Chulalongkorn University, Thailand

Consideration of designing an emotional warning pictorial on cigarette labels which will be used in public place, the effect from gender differences should be concerned. The aim of this study was to examine gender differences in emotional response from warning pictorials on cigarette labels. Sixty engineering students participated in this study. Half of them are males. Neutral affect manipulation using IAPS was conducted prior the experiments. Participants were asked to rate their emotional responses from sixty warning pictorials (positive, neutral, negative). Results revealed that both male and female participants could perceive target emotional affective warning pictorials, although there were some differences. Male participants perceived greater arousal than female participants which contradicts to previous study. Implications for affective warning pictorial design concerning gender differences.

IT0022

Time:16:15-16:30

Principal Component Analysis to Reduce Dimension on Digital Image

Dr.NG SOK CHOO
SEGi UNIVERSITY，Selangor, Malaysia

High-resolution image is referred as high-dimensional data space as each image data is organized into two-dimensional pixel values in which each pixel consists of its respective RGB bits value. The representation of image data poses a challenge to sharing image files over Internet. The lengthy image uploading and downloading time has always been a major issue for Internet users. Apart from data transmission problem, high-resolution image consumes greater storage space. Principal Component Analysis (PCA) is a mathematical technique to reduce the dimensionality of data. It works on the principal of factoring matrices to extract the principal pattern of a linear system. This paper aims to evaluate the application of PCA on digital image feature reduction and compare the quality of the feature reduced images with difference variance values. As a result of summarizing the

preliminary literature, dimension reduction process by PCA generally consists of four major steps: (1) normalize image data (2) calculate covariance matrix from the image data (3) perform Single Value Decomposition (SVD) (4) find the projection of image data to the new basis with reduced features. Experimental results showed that PCA technique effectively reduces the dimension of image data while still maintaining the principal properties of the original image. This technique achieved 35.3% for the file size reduction for the best feature reduced quality. The transmission time of image file over Internet has achieved significant improvement especially for the download activity via mobile devices.

IT0048A

Time:16:30-16:45

Single-Trial Electroencephalogram Classification Using Fuzzy Logic and Approximate Entropy

Prof. Wei-Yen Hsu
Department of Information Management, National Chung Cheng University

In this study, a single-trial electroencephalogram analysis system is proposed for motor imagery (MI) data classification. Combined with enhanced active segment selection and fuzzy neural network (FNN), fuzzy approximate entropy (fApEn) is used to enhance the discrimination of left and right MI data. Enhanced active segment selection is proposed to further precisely select the location of active segments in the time-scale domain. Features are then extracted from selected active segments by means of fApEn approach. Finally, fApEn features are recognized via FNN. Compared with "without enhanced active segment selection", adaptive autoregressive and approximate entropy features on MI data from two public data sets, experimental results demonstrate that the proposed system achieves promising performance, suitable for the applications of brain-computer interface works.

IT0049

Time:16:45-17:00

Effect of Network QoS on User QoE for a Mobile Video Streaming Service using H.265/VP9 Codec

Mr. Debajyoti Pal and Vajirasak Vanijja
King Mongkut's University of Technology Thonburi, Bangkok, Thailand

Online video streaming is one of the most popular yet challenging services being used today where the Internet Service Providers (ISP's) need to guarantee certain assured service quality level for the end user. However, as the data transmission takes place over an unreliable error-prone channel; it is a challenging task for the ISP's. Normally, the user perceived quality is best expressed in terms of the Quality of Experience (QoE) factor or Mean Opinion Score (MOS) factor. On the contrary, the various factors that affect the video streaming quality; commonly referred to as the Quality of Service (QoS) factors, are relatively easier and economic to be measured by the service providers. In this paper, we consider five network layer specific QoS impairment factors (variable initial delay, packet loss, jitter, bandwidth and buffering delay) and try to assess their impact on the QoE by considering each one of them separately. We use a non-linear regression approach to compare the various QoS to QoE mapping models and find out the most suitable/optimal model for our individual cases based upon a decision variable.

Session-5-< Computer Science and Engineering>

Venue: E4-G051
Chair: Professor Simon Fong
Time: 15:45-18:00

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IT0017

Time:15:45-16:00

Technology Profiles as Proxies for Measuring Functional and Frailty Status

Ms. Tiffany Tong, Mark Chignell, Mary C. Tierney, Marie-Josée Sirois, Judah Goldstein, Marcel Emond, Kenneth Rockwood, Jacques Lee
University of Toronto, Canada

Technology questionnaires can assist in developing profiles that characterize the ability of people to use new technologies. Technology profiles may also be related to physical and cognitive abilities, and may possibly serve as proxies for constructs that may be more difficult to measure. The purpose of the research reported in this paper was to examine possible relationships between responses to questions about use of technologies and functional and frailty status as measured using a digital, tablet-based test battery. A battery of digitized cognitive and functional assessments was administered on a tablet, along with a technology questionnaire, to Canadian adults over 65 years who called 911 for paramedic services or who presented to an emergency department. 330 people between the ages of 65 and 97 years (mean = 75.8 years, standard deviation = 7.6) participated in the study. We observed significant relationships between elderly adults' responses to questions about their technology use and their functional status and frailty scores with more technology use implying better functional status and less frailty. It is suggested that the present findings may lead to the use of more detailed technology profiles as efficient proxy estimates of overall functional ability and frailty status in elderly adults.

IT0033A

Time:16:00-16:15

Visualization of Evacuation Logs in Game-based Evacuation Drill

Mr. Yuhei Kiyosue, Hiroyuki Mitsuhara and Masami Shishibori
Tokushima University, Japan

Natural disasters have become a world-wide problem in terms of frequency and scale. In this situation, disaster education is globally important. However,

conventional disaster education is unrealistic and cannot always produce the desired effect. We think that disaster education should be realistic using ICT (Information and Communication Technology). Previously, we proposed game-based evacuation drill (GBED). In GBED, participants occasionally view digital materials on a tablet computer, while moving to an evacuation site. These digital materials correspond to places (i.e. current location), and represent possible disaster situations (virtual disaster damage) at these locations. The participants make decisions about the disaster situations at the designated locations in the real world. For example, when encountering an injured person escaping from a tsunami, an evacuee (participant) must make a difficult decision, i.e. whether to assist the injured person. The GBED system, which consists of a tablet application (GPS-based Android App.) and a web application (working on a standard web browser), can store evacuation logs in a database server and visualize the logs panoramically on Google Map. The visualized logs represent each participant's evacuation route and evacuation behaviors (i.e., decisions against the disaster situations). By viewing the visualized logs, the participants can reflect on their evacuation drills and discuss better evacuations. Currently we are implementing an altitude visualization function, which acquires elevation data of evacuation routes by using Google Maps Elevation API and draws the consecutive elevation data as line graphs (time and distance-based). By comparing the line graphs, the participants can reflect on their evacuation drills from more perspectives. In particular, the visualized elevations are effective for reflection on tsunami evacuation drills. In tsunami evacuation, people should escape speedily to a proximate high place. Therefore, the altitude visualization can remind participants how appropriate their tsunami evacuations (routes and decisions) were and facilitate discussion on more appropriate evacuations. For example, a short-time evacuation to a nearest tsunami evacuation building through a route with less height difference is more appropriate.

IT0041

Time:16:15-16:30

Risk of Overusing Mobile Phones: Technostress Effect

Mr. Veera Boonjing and Pisit Chanvarasuth
International College, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

Technostress is defined as the stress derived from the use of information technology. Prior researchers have studied this phenomenon in many situations such as in the work environment, concentrating on the effect of technostress on the individual who overwhelmed by the use of information technology on his/her job. In this study, we attempt to examine consequences of continuously overusing mobile phone which lead to technostress. Drawing from the stress-strain-outcome model of stress, we proposed that overusing mobile phone can lead to technostress, whereas technostress will cause problems in personal health and work-related issues. Results from surveying 400 working professionals provide a support for our proposed model.

IT0042

Time:16:30-16:45

The Impact of Screen Size toward QoE of Cloud-based Virtual Desktop

Dr. Tuul Triyason and Worarat Krathu
King Mongkut's University of Technology Thonburi, Thailand

The popularity and advantages of cloud-based solutions is currently in the steep trend. Due to its several characteristics, it leads to the paradigm shift in the field of client-server computing technology. Virtual desktop infrastructure service is also moving toward cloud-based technologies. It is important to improve services to retain the attraction from users. Besides network impairment factors, the factors regarding user context should also be included to consider the Quality of Experience (QoE) of the end-users. This paper presents the experiment to prove whether the screen size has an impact on QoE of using cloud-based virtual desktop. The experiment is conducted with 20 participants who have experience in using remote desktop through personal computer. The experiment is design to let participants using virtual desktop remotely through devices with different screen sizes and evaluating their experience. The result shows that screen size has an effect toward the QoE of remote cloud-based virtual desktop. In other words, screen size is one of the important factors in user context that influences QoE

IT6006

Time:16:45-17:00

Plagiarism Detection Using Document Similarity Based on Distributed Representation

Kensuke Baba, **Dr. Tetsuya Nakatoh** and Toshiro Minami
Kyushu University, Fukuoka, Japan

Accurate methods are required for plagiarism detection from documents. Generally, plagiarism detection is implemented on the basis of similarity between documents. This paper evaluates the validity of using distributed representation of words for defining a document similarity. This paper proposes a plagiarism detection method based on the local maximal value of the length of the longest common subsequence (LCS) with the weight defined by a distributed representation. The proposed method and other two straightforward methods, which are based on the simple length of LCS and the local maximal value of LCS with no weight, are applied to the dataset of a plagiarism detection competition. The experimental results show that the proposed method is useful in the applications that need a strict detection of complex plagiarisms.

IT0034A

Time: 17:00-17:15

Viewer Awareness in Digital Signage-based Learning Material Delivery

Mr. Tomonori Komatsu, Hiroyuki Mitsuhara and Masami Shishibori
Tokushima University, Japan

In recent years, the wide spread of ICT (Information and Communication

Technology) has diversified learning environments. In this situation, we focused on a learning environment using digital signage (public display systems) and proposed Niche-Learning that delivers digital learning materials (e.g., video and slideshow) via large-sized displays installed in public spaces on university campus (e.g., lounges and entrance halls). The Niche-Learning aims at making opportunities for many university students to view learning materials. However, the Niche-Learning could not accomplish the aim because of its one-sided delivery (i.e., fixed delivery based on time schedule). In this study, we have focused on Adaptive Niche-Learning (ANL) that aims at increasing viewers by delivering learning materials based on their interests. An ANL system (1) detects viewers using a high-power RFID (Radio Frequency Identification), (2) stores their viewing data, (3) estimates their interests based on the viewing data, and (4) delivers a learning material that many of them will be interested in. To improve the ANL system, we are developing a new function "Viewer Awareness" (VA), which makes viewers recognize who are interested in the learning material being delivered. The VA divides the display screen into two areas: Learning Material Area (LMA) and Viewer Information Area (VIA). In the LMA, a learning material is delivered in the conventional method. In the VIA, information about the current viewers with common interest (i.e., those who are viewing the same learning material simultaneously beyond the ANL systems installed in some public spaces) is displayed in real time so that they can recognize each other. The information consists of viewer's (a) name, (b) class (major), (c) face photo, (d) viewing history, and (e) estimated interest. In other words, the information can cause encounter with viewers who can learn collaboratively. For example, a viewer can ask nearby viewers to learn together while referring to the displayed information, and then they can learn face-to-face while viewing the same learning material. To protect viewers' privacy, the VA enables them to control the displayable information. As another solution on the privacy issue, we are considering the use of their mobile devices (e.g., smartphone).

IT4002

Time: 17:15-17:30

Comparison of Open Source Maturity Models

Ms. Umm-e-Laila, Adnan Zahoor, Khalid Mehboob, Sarfaraz Natha
Sir Syed University of Engineering and Technology, CED, Gulshan –e- Iqbal, Karachi, Pakistan

Component based development was formerly dependent on propriety/closed source software's (CSS) components. Open Source software components has attracted noteworthy attention and become an operational alternative of proprietary software because of OSS security, cost effectiveness, quality, flexibility and freedom. Due to the increased attention on component-based development in the past decades, companies have widely adopted open source software (OSS), with the view that using the right software is critical to project success. The availability of Internet as a marketplace for components and wide adoption of OSS has introduced new challenges for selection of software components. Source Forge, other general and domain specific software repositories, different software foundations and individual OSS providers offer an abundance of OSS components. Identification, evaluation and selection of best possible OSS Components for the required need is a quite challenging job. As a reaction to these challenges different methods have been proposed for OSS maturity measurements. E.g. Capgemini-Open Source Maturity Model(C-OSSM), Navicasoft-Open Source Maturity Model (N-OSSM),

Qualification and Selection of Open Source (QSOS), Open Business Readiness Rating (Open BRR) and Easiest Open Source (E-OSS). In this paper we compare different Open Source software maturity models available in the market that will help user in OSS component selection.

IT0018

Measuring cognitive capacity with smartphone dual-task gait measurement

Jenna Blumenthal, **Dr. Andrea Wilkinson**, Rocco Tak For Cheuk, Prachaya Charoenkitkarn, Nipon Charoenkitkarn, Mark Chignell
University of Toronto, Department of Mechanical and Industrial Engineering, Ontario, Canada

Walking and cognitive function are interrelated, and thus normal control of gait is perturbed by cognitive impairment. Changes in gait, as measured by quantitative analysis, can be a useful mechanism for detecting early indicators of cognitive decline. Observing changes in gait in the dual-task paradigm, i.e. when the subject walks while performing an attention-demanding task, can be a more sensitive measure. In the study reported in this paper, we developed a mobile application to perform quantitative gait assessment in the single and dual-task condition, using a smartphone's built in sensor system. We show that the gait parameters, as measured by a mobile device, are significantly related to the corresponding parameters reported by a gold-standard motion capture system. We also demonstrate that this approach may be comparable to previously validated assessments of cognition and executive functioning. Mobile technologies offer a platform for sensitive assessment of changes in cognitive function through gait analysis in dual-task conditions. This methodology opens the way for more frequent assessments of cognition, as part of physiotherapy and rehabilitation practice.

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IT0026

Time:15:45-16:00

Monitoring Frozen Shoulder Exercises to Support Clinical Decision on Treatment Process Using Smartphone

Mr. Nuntiya Chiensriwimol, Pornchai Mongkolnam, Jonathan Chan and Keerin Makhora
King Mongkut's University of Technology Thonburi, Thailand

Continuously performing rehabilitation exercises are important for frozen shoulder patients to recover and increase their range of motion (ROM). Every time patients go to see their medical practitioner, they will be assigned home program rehabilitation exercises and the results of the ROM measurements will be measured on their return to their practitioner's clinic. At present, there are many kinds of technology that can detect movements. Many researchers have studied and used them to develop applications to facilitate tele-rehabilitation. This study aims to develop an application that supports a medical practitioners' decision making process. This application animates the exercise pattern of the patient and it is developed on Android and Web platforms. The web-based treatment process manages the patient's details, assigned tasks, and medical practitioners' profiles. The Android application part provides three exercise types: flexion, abduction, and horizontal flexion. These are useful for the patient in performing frozen shoulder tele-rehabilitation. We performed a preliminary study with five participants. The participants were assigned three exercise types according to the target angles set by the medical practitioner. When the subjects reached the target angle, an audio biofeedback was provided. In the experiment, the subjects needed to exercise in the time period set by the medical practitioners in order to track the shoulder rehabilitation progress. The preliminary results found that our application can possibly help medical practitioners in the treatment process and tele-rehabilitation tracking. In the future our application can be applied to other parts of the body and possibly modified to apply to stroke rehabilitation tracking.
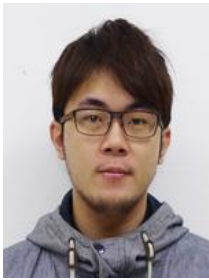
IT0028

An Authentication and Authorization Mechanism for Long-term Electronic Health Records Management

Nai-Wei Lo, Chia-Yi Wu, **Mr. Yo-Hsuan Chuang**
National Taiwan University of Science and Technology, Taiwan

In the past five decades, major improvement on sanitation, new invention on medicines, and novel development on medical technologies had been widely deployed and adopted in modern societies. In consequence, the average lifetime of human being is much longer than it was before. Therefore, to safely establish and manage personal health records for each individual during his/her lifetime within the electronic form has gradually become an interesting topic for individual citizens and social welfare departments; the reason is that a well-maintained health records document of an individual can help doctors and hospitals know important and necessary medical and body conditions of the targeted patient in time before conducting any therapy. In this paper, we proposed an authentication and authorization protocol to manage which organization (usually a hospital) is allowed to have the access right on the long-term historical electronic health records of a targeted individual. By using the proposed scheme, a person can migrate his/her health records to a specific organization along with access right authorization. In our protocol, the cumulatively notarized signature mechanism is introduced to preserve the evidence on the ownership transfer of targeted electronic health records between two organizations. A trusted notary is used to verify the management privilege of involved organizations on those health records of targeted individuals. In addition, we show that the protocol achieves data integrity, non-repudiation for data authorization and data availability.

IT0029

Estimation of Crowd Density in Surveillance Scenes Based on Deep Convolutional Neural Network

Shiliang Pu, **Dr. Tao Song**, Yuan Zhang, and Di Xie
Hikvision Research Institute, China

As an effective way for crowd monitoring, control and behavior understanding, crowd density estimation is an important research topic in artificial intelligence applications. In this paper, we propose a new crowd density estimation method by deep convolutional neural network (ConvNet). The contributions are two-folds: first, typical deep networks are imported for crowd density estimation. Second, a new dataset including 31 crowd Subway-carriage scenes with over 160K density annotated images is introduced to better evaluate the accuracy of cross-scene crowd density estimation methods. Experiment results confirm the good performance of our proposed method for real-world application.

IT0039

Time:16:30-16:45

A Ubiquitous Power Management System Based on Environment Perception

Dr. Wei Song, Ning Feng, Yanwei Wang, Wentao Mao, Liangliang Song
North China University of Technology, China

Energy conservation is an important measure to protect the environment and conserve resources. To reduce power consumption of appliances, automatic and remote controllable smart meter has become one of the most advantageous means for power energy management. By integrating several internet-of-things (IoT) technologies, this paper proposes a ubiquitous power management system, which comprises a monitoring, ubiquitous controlling, and power management modules. In the monitoring module, multiple sensors are integrated to detect ambient information, such as temperature, humidity, and foreground moving objects. For real-time video surveillance, we develop a fast foreground segmentation algorithm using parallel computation. In the ubiquitous controlling module, the sensed datasets as decision making basis are reported to smart meters via a wireless network. Based on both environment perception and remote controlling signals, the power management module utilizes the smart meter to operate appliances automatically by specifying operation parameters or switching power supply. The proposed system was tested in a building and reduced around 35.7% power consumption, which show a significant portability and effectiveness in IoT.

IT0058

Time:16:45-17:00

Container based testbed for gate security using open API mashup

Mr. Dongwoo Kwon, Hyeonwoo Kim, Donghyeok An, Hongtaek Ju
Keimyung University, Korea

In this paper, we propose a container based testbed for the gate security system for a smart campus. The security system incorporated two-factor authentication, ID card based identification and face recognition, and authorization which were implemented using an open application programming interface (API) mashup. We analyzed requirements to provide an efficient and flexible testbed to developers and testers working simultaneously. Then, we designed and constructed a container based structure to satisfy the requirements including lightweight virtualization technology and dynamic private domain name management. Finally, we present the automation script to build the testbed and test the security system.

IT0075

Time: 17:00-17:15

Smart construction safety in road repairing works

Assoc. Prof. Rita Yi Ma Li
Sustainable Real Estate Research Center / Real Estate and Economics Research Lab /Department of Economics and Finance, Hong Kong Shue Yan University, Hong Kong, China

Construction workers, who work repair work on road, are often at risk. Careless driver may hit the worker accidentally. Alternatively, as workers work in the road usually work under hot sun shine for many hours, some workers may have accidents due to heat stress In this article, we propose to use of Internet of Things, robot / robotic arm to alleviate the problem. It also provides information on the global popularity of these tools Worldwide by collecting big data about these technologies.

IT0006A

Time:17:15-17:30

Effect of Digital Game-based Learning on Students' Academic Achievement: A meta-analysis

Wan-Ching Lai, **Prof. Yuen-kuang Cliff Liao**
Taiwan National Taiwan Normal University

Digital game-based learning (DGBL) is assumed to be effective because current students are digital natives. However, the results from previous reviews are ambiguous. This study applied meta-analysis as research tool, and searched 78 electronic databases, yielding 21,623 abstracts. A total of 76 articles fit the inclusion criteria out of a sample size of 9,556. Followed the research procedure suggested by Borenstein, Hedges, Hihhins and Rothstein (2009), 76 articles were carefully coded based on four characteristics: study characteristics, sample characteristics, program characteristics, and digital game characteristics, and their Effect Sizes (ESs) were cautiously calculated. The findings of this study are as follows: The effectiveness of DGBL in improving academic achievement was significantly superior to that of non-DGBL, the overall weighted mean ES =.58, 95% CI [.45, .70], DGBL achieved a medium effect size level. Moreover, 7 selected moderators: subject matter (i.e., language, math, nature and science, social study, health and PE, and computer science), publication year (i.e., 2001–2005, 2006–2010, and 2011–2015), educational level (i.e., elementary, junior high, senior high, and university students), sample locations (i.e., Asia, Europe, Africa, South America, North America, and Oceania), duration of treatment (i.e., 7 days, 8–30 days, and above 31 days), group size in experiment group (i.e., individual and group), and digital game categories (i.e., puzzle games, role-playing games, simulation games, and , strategy games) significantly moderated the effect of learning. Therefore, on the basis of the research findings, we provide eight suggestions: three for teachers, two for game designers, and three for future researchers.

Session-7-< Business Intelligence and Service Sciences>

Venue: E4-G053
Chair: Prof. Luiz Moutinho
Time: 15:45-18:00

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IT6001A

Time: 15:45-16:00

Will Business Intelligence Improve Operational Capability? When?

Prof. Andy C. L. Yeung
The Hong Kong Polytechnic University, Hong Kong

Researchers in Operations Management have long believed in the importance of fact-based management decision making. In fact, one of the requirements in quality excellence models stresses the use of data, statistics, and business intelligence. Will the use of business intelligence systems really improve firms' operational capability in terms of the relative efficiency in the industry? What will make the use of business intelligence more important? We hypothesize the effectiveness of business intelligence also depends on firm characteristics including such as R&D intensity, stakeholder relationship, use of social media etc. We explore and discuss these issue in this paper. This type of research will lead to some new insights in behavior engineering and operations management.

IT0005

Time:16:00-16:15

The Impacts of ERP Systems on Public Sector Organizations

Ms.Dahlia Fernandez, Zaini Zainol, Hawa Ahmad
International Islamic University Malaysia, 53100 Kuala Lumpur, Malaysia

The aim of this study is to investigate the impact of Enterprise Resource Planning (ERP) system on Public Sector Organizations (PSO) using two perspectives of the Balanced Scorecard (BSC) performance measurement framework; financial and customer. This study presents evidence based on questionnaires survey conducted with 52 local authorities in Malaysia which have implemented the system. Empirical evidence shows that the uses of ERP system in PSOs resulted in a positive financial performance and provide better services to the customer. The corresponding results from the survey signaling to the needs of an integrated system such as ERP to be implemented by other PSOs to enhance the financial and customer performance.

IT0019

Time:16:15-16:30

A Case Study in Visualizing Disruptions to Service Quality

Dr. Mark Chignell, Ryan Kealey, Chelsea Deguzman, Leon Zucherman and Jie Jiang
Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada

This study measured Session Quality of Experience (SQE) by letting people look at visual proxies of a video play bar without having to watch the actual video, with its associated impairments and/or failures. We supplemented a laboratory study of 10 participants with two further online samples of 14, and 20, participants respectively, obtained using online surveys. Cluster analysis was carried out on the entire data set of 44 participants and clusters were obtained representing differences in sensitivity to pricing and to types of disruption. Crucially, there was no significant dependency between samples and cluster demonstrating that visualization can be used in a crowdsourcing, as well as a laboratory, context. This study demonstrates the combined use of crowdsourcing, visualizations of service experience, and cluster analysis to create more efficient, and nuanced, interpretations of SQE.

IT0020

Time: 16:30-16:45

Measuring Performance of Facebook Advertising Based on Media Used: A Case Study on Online Shops in Indonesia

Mr. Tikno
Universitas Internasional Semen Indonesia, Indonesia

According to TechinAsia report in 2015, more than 72 million Indonesians are listed as active internet users. About 18% and 11% conduct research on the web via desktop and mobile device respectively before buying online. As much as 80% from those who did research on the internet make a real purchase. This indicates that people who does online research tend to buy online afterward. Facebook has 14% share of those internet users and unsurprisingly online shop owners use it to advertise their products online. Unlike conventional platforms, advertising on Facebook has no flat rate, but it depends on engagement rate, which measures how much the ads are liked by its target audiences. More engagement will be granted with low advertising cost. The advertisers need to know how to create ads which have more engagement rate potential and lead to minimal cost and high conversion. This research investigated performance measurement of media types used on Facebook advertising platforms such as photos and videos. The study used three control variables: gender, age group, and product type as the interest group. The findings of this study showed that Indonesians have higher engagement rate for ads in which videos are used instead of images.

IT0024

Time: 16:45-17:00

Efficient Visibility Analysis for Massive Observers

Mr. Wentao Wang, Bo Tang, Xiaopeng Fan, Haixia Mao, Hang Yang, Min Zhu

Sichuan University, China

Many applications in Geographic Information System (GIS) apply visibility analysis as a key subroutine, and thus the time spent on visibility analysis is the bottleneck for all these applications, such as navigation, aviation, landscape, and military etc. The new challenge to the scalability of visibility analysis for large datasets shows, most of academic works in GIS only consider a few thousands of observer objects, while many works in industry and science have to face on millions (even billions) of observer objects. In this paper, we devise a novel computation framework which consists of three components, i.e., optimized line-of-sight algorithm, R*-tree filter and MapReduce-based segmented computation. The proposed solution can support GIS systems to conduct efficient visibility analysis for massive observers. Finally, we demonstrate the efficiency and the scalability of our proposed solutions by synthetic datasets. The results show that our proposed solution achieves at least an order of magnitude speedup over existing solutions.
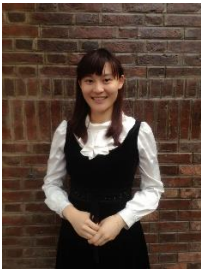
IT0083A

Time: 17:00-17:15

Intelligent REITs in the Information Age

Ms. Shimin Hu
University of Macau, China

As the advent of Internet and Information Technology (IT)) developments significantly affect our daily life economically, financially and socially. This paper will focus on examining the emergence of the latest powerful structure of the Intelligent Real Estate Investment Trust (iREIT) model: when real estate married technology online platform. First, we will have a brief introduction about the history of the Real Estate Investment Trust (REIT), and then we compare and contrast the REIT with the iREIT. Second, we will analyze the Fundrise company (USA) and the Property Partner Company (UK) to draw out the business model and find out how the Information Technology supporting the iREIT. They are the most popular iREIT companies in the world: according to the Forbes, Fundrise is the first and leading company invented the iREIT model; the PropertyPartner Company (UK) awarded as one of the world's top 100 emerging Fintechs in 2016 by KPMG. Finally, the originality and invaluable contributions of this paper: (a) Apply the Tread Following (TF) Mechanism to test the possibility and sustainability of 13% annual returns as the iREIT companies stated, unlike the other prediction tools such as neural networks that would predict a future trend, TF would give the insights on buying or selling decision based on the current trend pattern. (b) Assess the trend profitability from Top10 Asian countries, investigate the best combination of the diversified real estate investment portfolio for iREIT and explore the auto-investment possibility in future.

IT0084A

Time: 17:15-17:30

Modeling and Simulating an Information-based Real-Estate Online Platform

Ms. Shimin Hu, Qing Li and Simon Fong
University of Macau, China

In this paper, we propose and study a novel O2O business model for real-estate purchases, called Information-based Real-Estate Platform (iREOP in short). The new model leverages the power of Internet and mobile Apps for connecting directly the customers via a federation of human expert agents which work in a loosely coupled relation and on-demand basis. The unique features of this O2O model include: the use of mobile Apps in engaging customers together with selected agents, better resource sharing and allocation of the human agents, and relatively higher-speed of transactions by liberating the restrictions of agents. Unlike the traditional sales models where agents were dedicated to specific property agency companies, this one-stop model enables wider range of products to be marketed to all the potential buyers, leading to better matching between demands and supplies. iREOP is modelled using e3 value-based modeling tool for illustrating its model structure and the values that flow within the federation framework among the parties involved. Then the value model is subject to business process re-engineering simulation, for demonstrating how the dynamic processes are streamlined, thereby creating net values for both the developers and the end-consumers.

Session-8-< Genetic Engineering and Technology>

Venue: E4-1052
Chair: Prof. Shirley Siu
Time: 15:45-18:00

C017-A

Time:15:45-16:00

Identification of Novel Genetic Biomarkers from Differential Gene Expression Analysis for Alzheimer' s Disease

Ms. Keyu Liu, Pingzhang Wang
Kent School, USA

Alzheimer's Disease, the most common form of neurodegenerative disease that gives rise to dementia, leads to differentially expressed genes in host genome that may serve as genetic risk factors of the brain disease. In this study, microarray data from three series under platform Affymetrix Human Genome U133 Plus 2.0 Array (GPL570) were analyzed for differential gene expression: Alzheimer's Disease Dataset (GSE48350), Alzheimer's disease and the normal aged brain (steph-affy-human-433773) (GSE5281), and Alzheimer's disease: neurofibrillary tangles (Rogers-3U24NS043571-01S1) (GSE4757). Using NCBI's established GEO2R system, individual microarray results were categorized into AD groups and control groups, separated by brain regions (EC, HIP, PCG, SFG, VCX, MTG, PC) and subsequently analyzed to identify significant up-regulation and down-regulation genes. After 13 runs, 5 for GSE28350, 1 for GSE4757, and 7 for GSE5281, differentially expressed genes were listed by highest frequency of appearance among all 13 runs. DAVID Enrichment Functional Analysis was performed and identified down-regulation genes with functions such as acetylation and nucleotide-binding. Enrichment groups with FDR <=0.05 were listed in the article. Up-regulation genes had no significant enrichment groups. For further analysis with down-regulation genes, those with a frequency of >=7 were further researched (57 genes for down-regulation), and 15 genes (C19or30, SDR16C5, BEX5, NAP1L5, UBE2QL1, SYT13, DHRS7B, ATP6V1G2, COPG2IT1, INA, PREP, FHL2, CKMT1A///CKMT1B, MDH1, LOC158696) had no confirmed report on their correlation with Alzheimer's Disease. Their individual functions were further analyzed, with functions such as intracellular processing, intracellular support, and mitochondrial membrane transport. Their down-regulation in AD patients signified possible loss of efficient neuronal processing and networking, causing damaged cognitive functions characterized as a major AD symptom. These 15 identified genes could lead to future confirmations as new genetic biomarkers for Alzheimer's Disease.

C026

Dominant isoform in alternative splicing in HeLa S3 cell line revealed by single-cell RNA-seq

Ms. Zhikun Zhao, Jing Tu, Zuhong Lu, Shiping Liu
Southeast university, China

The alternative splicing (AS) is one of the most important contributions for increasing the gene's expression biodiversity. However, whether individual isoforms can exhibit substantial differences in gene expression is unclear. Here, we profiled the AS characteristics in the whole transcriptome of 20 HeLa cells at single-cell level. For the most of the AS, they show the pattern of stochasticity among different single cells, but the pattern of dominant isoform usages in a specific cell. The pathway analysis of the differential AS indicates that the cell cycle state might also have a major influence on the isoform usages. We also identify several cancer-related pathways, including WNT signaling and NOTCH signaling. Furthermore, by investigating the potential regulatory network under the AS, several disease-related transcription factors were identified, including FOS, YWHAZ, and STAT3, which might play important roles in cervical cancer. Together, we perform the comprehensive analysis of AS at single cell level and reveal the AS patterns and potential roles in both normal cellular process and tumor development.

C027

Noisy Nonlinear Gene Regulatory Networks Analysis Using Ensemble Kalman Filter Based Particle Filter without a Model

Assoc. Prof. Haixin Wang and Dawit Aberra
Fort Valley State University, USA

In this paper, we propose a novel ensemble Kalman filter based particle filter for gene regulatory networks (GRNs) analysis, which incorporates ensemble Kalman filter into particle filter. New particles generated by particle filter are sampled by ensemble Kalman filter, which can take current measurements into account to predict the system states. This will alleviate the sample degeneracy problem in particle filter. The proposed method is model-free algorithm. Both particle filter and ensemble Kalman filter can be applied when the model is unknown, noisy, and nonlinear. This combination of approaches results in comparable accuracy, efficiency, and robustness. In the GRNs analysis, simulation results show that the proposed ensemble Kalman filter based particle filter performs better than particle filter in identifying dynamics relations among genes.

C029

In Silico Analysis of Mucor Circinelloides Genome-Scale Model for Enhancing Lipid Production

Mrs. Amornpan Klanchui, Wanwipa Vongsangnak, Kobkul Laoteng, Asawin Meechai

King Mongkut's University of Technology Thonburi, Thailand

Mucor circinelloides is an attractive oleaginous filamentous fungi because it can produce high contents of γ-linolenic acid (GLA) and triacylglycerol (TAG). With the increasing attention demand in microbial oils, many experiments have been carried out in order to enhance storage lipid production in M. circinelloides. Availabilities of genome sequence, biotechnology, computational tools, and pathway databases have facilitated strain improvement through systems metabolic engineering. Genome-scale metabolic model (GEM) has become a useful tool for guiding the design of metabolic engineering strategies. In this study, the GEM of M. circinelloides, iWV1213, was used to investigate candidate genes and metabolites which could drive metabolic fluxes for lipid production. To evaluate the metabolic capabilities related to growth and lipid formation of iWV1213, the model was firstly simulated and validated with experimental data. Using FBA and MOMA, a single gene deletion together with FVA were performed to identify candidate essential genes for growth and lipid production. Moreover, a single reaction deletion and shadow price analysis were also applied to determine the candidate essential metabolites. The results showed that the top 20 essential genes were involved in amino acid metabolism, TCA cycle, oxidative phosphorylation, and fatty acid oxidation while the candidate metabolites were involved in lipid biosynthesis, such as malonyl-CoA and acetyl-CoA. These candidates could potentially be used as targets to guide future metabolic engineering strategies for enhancing TAG and GLA production in M. circinelloides.

C015

Time: 16:45-17:00

Utilization of Parallel Computing with Pearson's Correlation and Affinity Propagation Clustering in Identifying Sub-network Biomarker Genes of Lung Cancer

Jonathan Chan, Jaturong Kongmanee and **Ms. Thanyathorn Thanapattheerakul**
King Mongkut's University of Technology Thonburi, Thailand

Lung cancer is a complex disease. The identification of a disease biomarker is still challenging. Affinity Propagation (AP) is a clustering algorithm to cluster a set of data by identifying similar data points in an iterative process. By applying a microarray dataset, this leads to a scalability issue for large data points. In this work, Pearson's correlation was used for calculating a similarity matrix with subsequent pruning for further constructing a gene co-expression network. The AP has been applied to identify sub-network biomarkers of four lung cancer expression datasets based on two different microarray platforms. Parallel computing was applied to tackle high dimensionality and to reduce the time consumption of measuring similarity by Pearson's correlation and similarity matrix construction.

C004

Time: 17:00-17:15

Finding unknown disease-related genes by comparing Random Forest Results to Secondary Data in Medical Science Study

Mr. Takahiro Koiwa, Kazutaka Nishiwaki and Hayato Ohwada
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Finding a disease-related gene is important in drug discovery, for instance Alzheimer disease. In this disease, there are a lot of genes and doing experiment to find a disease-related gene is high cost. Therefore, machine learning on gene expression microarray data is suitable method to address this problem. However, sometimes the results are not fully correct. The present study aims to find a disease related-gene using random forest and compare the results with previous studies from medical sciences. In doing so, genes are determined to be related-gene by two methods are likely to be correct. In the Random Forest, we use the microarray data from GEO datasets. We feature a common gene in each of data, and combine them into data set. A gene that have high importance is chosen. The Random forest was found 51 genes. In contrast, from the previous study in medical science, the study found 6167 genes. The study used the square of the impact factor to rank the genes. The impact factor is gained from the average number of citations received per paper published in that journal during the two preceding years.

Based on the results from Random Forest and then compare them into previous studies, in this study we found 31 genes are the same. There are 4 genes that related to GENE database. And the remaining 27 genes are related potential genes or unknown genes found in this study. Those high-ranking among them is considered to be very likely related. A gene that have low ranking should be considered. Genes in which the first method has been extracted. However, in the second method, the genes have not extracted thought new related potential gene.
In conclusion, comparing random forest results to another related study in medical science is powerful method to find the unknown related-gene in Alzheimer disease.

C014

Time:17:15-17:30

PCA-based informative SNP selection for analyzing population structure

Assoc. Prof. Tulaya Limpiti, Apichart Intarapanich, and Sissades Tongsima
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Phenotypic differences among individuals of the same species are the result of a set of genetic variations which can be observed in the DNA sequence. To conduct a population genetic study, a high throughput genotyping platform such as Single Nucleotide Polymorphism (SNP) array is popularly used to obtain a large set of SNPs for each individual. However, analyzing today's genetypic data can be computationally expensive due to its large size and complexity. Faulty substructure may also be detected if the data is noisy from redundant or non-informative SNPs. Considerable efforts have been done to extract a smaller informative SNP subset that still represents the same intrinsic structure of populations within a data set as the full panel of SNPs. This work describes a foundation of a PCA-based informative marker selection technique. The proposed technique is simple and efficient. It improves upon another spectral analysis technique called PCA-correlated SNPs and alleviates several of its drawbacks. A new informativeness score based on a basis function expansion of the SNP variation patterns across individuals is introduced. Such score is computed for each SNP to select a subset of SNPs with the best scores. Using a bovine data set, we demonstrate that our technique is superior to the PCA-correlated SNPs method, which requires accurate rank estimation to perform well. In contrast, our method is robust to the assumed rank of the data. High data representation

accuracy is also achieved after a significant reduction of the number of SNPs while retaining information about the underlying population structure from the original data.

Poster Presentation and Abstract

Note:
* The certification of Oral/Poster presentations, listeners, will be signed by the chairman at the end of each session.
* For the Best Presentation of each session, it is encouraged to award it to student author prior.
*To show the respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session, the scheduled time for presentations might be changed due to unexpected situations, please come as early as you could.
* Session Photo will be taken and the end of each session and updated online.

C011-A

Analysis of structural changes in a prion protein with disease-associated mutations

Ms. Ji-Hae Lee, Myeongji Cho, Mikyung Je and Hyeon S. Son
Seoul National University, Korea

Protein folding must result in the correct tertiary structure if the protein is to perform necessary functions. Incorrect folding can lead to disease-associated misfolded proteins, which form amyloid fibril deposits. These deposits exhibit toxicity caused by accumulation of aggregates in multiple organs, inducing protein-misfolding diseases including prion disease. Proteins can have numerous conformations based on the rotation of each bond, but only exist in conformations with the most thermodynamic stability and lowest Gibbs free energy. In recent years, various studies on changes in conformational diversity and flexibility due to single amino acid substitution have been conducted using molecular dynamics. To analyze the effects of pathological point mutations (D178N, F198S, E200K, V210I, Q212P, and E219K) in the conformational conversion of prion proteins, the C-terminal domains of prion proteins were collected from Protein Data Bank. Amino acid substitutions in prions are related to human prion diseases such as Creutzfeldt–Jakob disease, Gerstmann–Sträussler–Scheinker syndrome, and Fatal Familial Insomnia. These mutations have been known to cause instability of the protein structure. We examined changes in dihedral angle, secondary structure, and stability based on prion protein structure information. A significant difference was observed in the dihedral angles of residues between groups that have mutations associated with disease and other groups. We found an increased average psi angle and decreased average phi angle in the group with disease-related substitutions. In addition, missense mutations led to an unstable structure, causing loss of secondary structure and an increase in coil or random coil, which are not defined as secondary structures or regular elements. Protein stability was reduced by the majority of disease-associated mutations. This study confirms that factors such as structural stability and dihedral angle of proteins may influence disease proteins, with mutations increasing the tendency toward

unfolding of the C-terminus of prion proteins and playing an important role in the initial conformation change to a β-rich structure.

C010-A

The role of viral spike glycoprotein in coronavirus infection

Assoc. Prof. Hayeon Kim, Mikyung Je, Myeongji Cho and Hyeon S. Son
Seoul National University, Korea

Coronaviruses (CoVs) belong to the subfamily Coronavirinae in the family Coronaviridae and are enveloped, single-stranded, positive-strand RNA viruses. Human coronaviruses usually cause mild to moderate upper respiratory and gastrointestinal tract infection, but can sometimes cause severe lower respiratory tract infection. Severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) cause much more severe respiratory infection and higher fatality in humans than other coronaviruses. We investigated the mechanism of severity in coronavirus infections, using spike glycoprotein sequence data from 14 coronaviruses (HCoV-OC43, HCoV-229E, HCoV-HKU1, HCoV-NL63, SARS-CoV, MERS-CoV, HECV-4408, BCoV, ECoV, FCoV, FRCoV, BatCoV HKU9-10-2, TGEV, PEDV) retrieved from the NCBI protein database (http://www.ncbi.nlm.nih.gov/protein). The spike glycoprotein in coronaviruses mediates membrane fusion and viral entry into the host cell. Thus, we predicted that changes in the viral spike glycoprotein sequence might result in more severe viral infections through interactions between viral spike glycoproteins and the host cell surface. First, we conducted phylogenetic analysis of spike glycoproteins from 14 coronaviruses using the MUSCLE and MEGA programs, building a phylogenetic tree based on the genotype of coronaviruses (alpha-coronavirus and beta-coronavirus). In the alpha-coronavirus group, classification was based on host range (human and mammal) and whether the virus was a human coronavirus (i.e., HCov-229E and HCoVNL63). In particular, we considered whether the classification of HCov-229E and HCoV-NL63 could be related to differences in viral infectivity, as HCoV-NL63 infection has more severe symptoms than HCov-229E. The beta-coronaviruses fell largely into two groups: one including SARS-CoV and MERS-CoV and one with other beta-coronavirus (HCoV-OC43, HCoV-HKU1, HECV-4408). The latter group causes relatively mild infection in humans compared to SARS-CoV and MERS-CoV. SARS-CoV and MERS-CoV, which cause serious infections, have highly similar spike glycoproteins compared to other coronaviruses. We also analyzed the degree of hydrophilicity of the spike glycoproteins in HCoV-OC43, HCoV-229E, HCoV-HKU1, HCoV-NL63, SARS-CoV and MERS-CoV based on the Hopp-Woods hydrophilicity scale. The hydrophilicity of the spike glycoproteins in SARS-CoV and MERS-CoV were higher than in other human coronaviruses. We suggest that these properties could lead to more active interactions with the host cell and thus increase infectivity.

C007-A

A comparative study of genetic and epigenetic markers in cancer

Ms. Mikyung Je, Yoonjung Kim, Ji-Hae Lee, Hayeon Kim and Hyeon S. Son
Seoul National University, Korea

This study was undertaken to investigate the features of genetic and epigenetic

markers of cancer at the systems level. Genetic and epigenetic markers were selected through literature review and grouped, then utilized in an analysis focusing on colorectal cancer. First, group-specific markers were analyzed. Among biological pathways, the genetic group was important in pathways controlled by signaling factors, such as EGFR and FGFR, whereas the epigenetic group was determinant in ATR and ATM pathways. These pathways are involved in serine/threonine protein kinase activation, detecting DNA damage caused by environmental stress via cellular signaling. In terms of gene ontology, the genetic and epigenetic groups were most abundant in the plasma membrane (GO:0005886) and nucleus (GO:0005634), respectively. Molecular function of the epigenetic group emphasized DNA repair (GO:0006281). Among biological processes, the groups shared signal transduction (GO:0007165) and cell communication (GO:0007154) functions. The genetic group was equally represented in the ARM, TyrKC, and FU domain, while the epigenetic group was mainly found in the C1 and RA domain category. Next, a list was created of 20 additional factors predicted to interact with each marker group and these factors were subjected to analysis as described above. Biological pathways were similar to the marker group; however, some epigenetic factors were present in signaling pathways associated with EGFR and FGFR. When analyzing protein domains against the list of additional factors in the epigenetic group, we found especially abundant MUTSd and MUTSac domains, which are involved in mismatch DNA repair. Thus, while genetic markers and factors were involved in signal transduction, epigenetic markers and factors were revealed to be important in stress response, stimulating the cell or nucleus, and in repair mechanisms. These results could be used to describe the characteristics of markers and find interaction factors based on marker type. Furthermore, this approach could be used to identify the ideal biomarker for various applications, such as diagnosis or observation of therapeutic effects of colorectal cancer treatment.

C008-A

A comparative study of genetic and epigenetic markers in cancer

Mikyung Je, **Ms. Yoonjung Kim**, Ji-Hae Lee, Hayeon Kim and Hyeon S. Son
Seoul National University, Korea

A computational pipeline was created for analysis of histone methylation in human disease, and its application for Kabuki syndrome was studied. Methylation of arginine (R), lysine (K) and histidine (H) residues is caused by histone methyltransferase enzymes, with lysine methylation being the most common. Lysine methylation can cause gene activation or repression, depending on its position. The residues located at the amino terminal of histone 3 (H3) and 4 (H4) are known to participate in activation when K4, K36, or K79 residues of H3 are modified, and to participate in repression when K9 or K27 residues of H3 and K20 residues of H4 are modified. Histone methylation and its modifying enzymes play key roles in human diseases, and this analysis pipeline was built to explore their relationships using a computational approach. The pipeline consists of BioGRID, IntAct, PANTHER, and other open source tools. Steps in the pipeline may be performed sequentially or selectively, extracting significant genes based on interactions, ontology, related diseases, and other details. Using this method, it is possible to extract useful information, as confirmed using key genes involved in Kabuki syndrome. A mutation in KMT2D, a modifier of H3K4 methylation, has been reported as the cause of this syndrome. Pipeline analysis identified WDR5, RBBP5, ASH2L, KDM6A, and PAXIP1 along with KMT2D as significant genes. These genes exhibit binding and catalytic activity, and also act as an enzyme

modulator and transcription factor. Specially, KDM6A has been reported to govern development of the heart, as a key factor involved in congenital cardiac abnormalities, which are typical clinical symptoms of this syndrome. Furthermore, KDM6A is included in the transcriptional misregulation pathway of cancer, thus, its associations with cancer should be investigated. The other four genes are currently not known to be associated with Kabuki syndrome, but they seem to have significance in developmental pathways. Histone methylation is related to a variety of human diseases, such as aging, cancer, and neurodegenerative disorders. Therefore, the study of methylation and modifying enzymes is a necessary contribution toward understanding these diseases.

C4002

Protein Secondary Structure Prediction based on Wavelets and 2D Convolutional Neural Network

Dr. Yihui Liu, Jiyong Cheng
Qilu University Of Technology ,China

In this paper we propose an approach to use wavelets and 2D convolutional neural network(CNN) to extract features for the prediction of protein secondary structure. A wavelet feature matrix extracted from PSSM profiles is input into convolutional neural network to extract the features. Wavelets extract changing information of PSSM evolutionary matrix, and convolutional neural networks catch the sequence interaction information of residue. The feature maps extracted from last convolutional layer are used to feed to Bayes classifier, in order to build prediction model. The Q3 accuracy 79.4% of Astral dataset is achieved based on 3 fold cross validation experiments using wavelet and CNN features. The performance based on wavelet and CNN features is better than 73.7% of astral dataset using the original features. Experimental results illustrate that wavelet and CNN features improve the prediction performance.

C009-A

Analysis of the coronavirus spike protein

Ms. Mi-Ran Kim, Ji-Hae Lee and Hyeon S. Son
Seoul National University, Korea

The largest outbreak of Middle East Respiratory Syndrome (MERS) occurred in the Republic of Korea in 2015, causing confusion for health authorities and the public and leading to severe social and economic impacts. Among coronaviruses, rates of infection and propagation vary by viral species. To understand the differences in infection, we analyzed the evolution of coronaviruses using spike protein interacting with host receptors. The sequences of human coronaviruses (HCOVOC43, HCOVHKU1, HCOVNL63, HCOV229E, MERS, and SARS) were compared. A phylogenetic tree was created using the maximum likelihood method with MEGA 7.0. The evolutionary distance between HCOVOC43 and HCOVHKU1 was 0.602. The evolutionary distance between HCOVNL63 and HCOV229E, HCOVOC43 and MERS, MERS and SARS, HCOVOC43 and SARS, and HCOVHKU1 and SARS were 0.641, 2.680, 2.902, 2.914 and 2.919, respectively. Additionally, the sequence identity between coronaviruses was 68.18%, 77.75%, 35.39%, 34.64%, 31.64% and 32.27%, following the same order as above. By performing structural analysis on a coronavirus, we confirmed that

the sequence differences reflect structural differences. First, we simulated the spike protein structure on the homology-modeling server SWISS-MODEL. Next, we aligned the structure using the structure alignment module MUSTANG in the YASARA program. Root-mean-square deviation (RMSD) values indicate the structural similarity. The RMSD values of HCOVOC43 and HCOVHKU1, HCOVNL63 and HCOV229E, HCOVOC43 and MERS, MERS and SARS, HCOVOC43 and SARS, and HCOVHKU1 and SARS were 0.282 angstrom (Å), 0.574 Å, 0.565 Å, 0.710 Å, 0.661 Å and 0.681 Å, respectively. Although HCOVOC43 and HCOVHKU1 belong to the same genus and are structurally similar, their RMSD value was 0.282 Å, showing that the evolutionary distance between spike proteins of coronaviruses did not represent structural similarity. The spike protein structure of the HCOV229E was most similar to those of SARS and MERS. Through this research, HCOVOC43 and HCOV229E were found to be similar to MERS and SARS evolutionarily or structurally. Therefore, continuous monitoring of these viruses is required in the future.
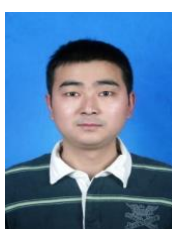
IT0051

The Design of Data Management System Oriented Experiment Scene Simulation Demonstration

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Directly using the original experiment data to demonstrate experiment scene has problems like difficult to locate data position, lacking of interactivity. Therefore, the data management system has been established. It contains data reception and process subsystem, digital archives management subsystem and demonstration script make subsystem, and also extends data send engine, experiment data assembly module and interactivity control module based on real-time simulation system. For building this system, the key technologies such as using double buffers and multistage caches to solve the data package loss problem, the data of multiple objects and tasks synchronously sending have been discussed. Through the application of this system, the whole process management of the experiment data has been realized, and the convenience of data using and interactivity of demonstration operation have been effectively promoted.

C012-A

Analysis of oligomerization of human prion protein using protein-protein docking

Ji-Hae Lee, Myeongji Cho, Mikyung Je and **Prof. Hyeon S. Son**
Seoul National University, Korea

Pathogenesis of prion diseases is associated with conformational conversion to the β-structure rich insoluble isoform, PrPSc, from the α-helix rich prion protein, PrPC. If a mutation is introduced into the prion, it can affect the stability of PrPC, making it easier to change to PrPSc, associated with human prion diseases. The structures of the PrPC monomers in many species of mammals are well known, but the mechanism of conversion from PrPC to PrPSc has not yet been elucidated. Various models have been proposed, including one stating that heterodimer interaction between PrPC to PrPSc can promote conversion from PrPC to PrPSc. The native state of human PrPC consists of two domains of an unstructured

N-terminal flexible tail and a C-terminal globular domain. If an amino acid substitution occurs, the propensity of aggregation can change, causing disease. The tertiary structure of human prion protein was collected from the Protein Data Bank, aligned using ClustalW, and repaired for minimal configuration using the FoldX program. The well-aligned C-terminal domain (residue 126-223) of prion monomers was used for analysis. To generate artificial prion dimers, two prion monomers were docked with the HEX protein-docking program. The effect of polymorphisms (M129V, M166V, M166C, S170N, D178N, E200K, V209M, V210I, Q212P, E219K, R220K, and E221C) on prion protein oligomerization was investigated through stability analysis of the protein structure. Stability was calculated based on Gibbs free energy using the FoldX force field function. The energy of the bound state of the protein complex was smaller, meaning the structure was more stable. Thus, we were able to confirm that some prion heterodimers with polymorphisms such as R220K, M129V, V209M, M166V and S170N were more stable than other dimers. This study is expected to be useful for understanding the pathogenesis of prion diseases.

IT0056

RMHC-MR: Instance Selection by Random Mutation Hill Climbing Algorithm with MapReduce in Big Data

Mr. Lu Si, Jie Yu, Wuyang Wu, Jun Ma, Qingbo Wu and Shasha Li
National University of Defense Technology, China

Instance selection is used to reduce the size of training set by removing redundant, erroneous and noisy instances and is an important pre-processing step in KDD (knowledge discovery in databases). Recently, to process very large data set, several methods divide the training set into disjoint subsets and apply instance selection algorithms to each subset independently. In this paper, we analyze the limitation of these methods and give our viewpoint about how to "divide and conquer" in instance selection procedure. Furthermore, we propose an instance selection method based on random mutation hill climbing (RMHC) algorithm with MapReduce framework, called RMHC-MR. The experimental result shows that RMHC-MR has a good performance in terms of classification accuracy and reduction rate.

C006-A

Bioinformatics analysis of evolutionary distances of selected receptor protein sequences with application to studies of virus-host interactions

Myeongji Cho, **Ms. Eunmi Kwon**, Hayeon Kim and Hyeon S. Son
Seoul National University, Korea

Receptor usage by viruses changes over time due to viral evolution and mutations, and has a significant effect on host-range restriction. Here, we conducted multiple sequence alignment and phylogenetic analysis on amino acid sequences of receptor proteins, isolated from various host species, to analyze and predict infectious properties of eight RNA viruses. We collected, processed, and organized a dataset of eight types of receptor proteins, 54 host species, and 103 amino acid sequences from NCBI. We also organized host-pair datasets between viruses' natural reservoirs and humans as sources of targeted receptor proteins to predict cross-species infectivity and zoonotic propensity. Next, we calculated

pairwise evolutionary distances for each pair to set criteria for hostrange classification, and then visualized predicted host ranges using phylogenetic trees. Computational analyses were conducted using MUSCLE and MEGA, and the maximum likelihood method was selected to identify pairwise phylogenetic relationships and classify sequences based on evolutionary distances. The small distances within each host pair for sialic acid synthase, angiotensin converting enzyme 2, vascular cell adhesion molecule 1, and dystrophin-associated glycoprotein 1 indicate a high potential for cross-species infectivity based on receptor usage in each host organism, and also imply a high zoonotic propensity when the dataset includes humans. In contrast, extremely low cross-species infectivity and zoonotic propensity were predicted for measles, hepatitis A, and Sendai viruses based on large distances for cluster of differentiation 46, hepatitis A virus cellular receptor 1, and asialoglycoprotein receptor 2 among host organisms. In the case of the nicotinic acetylcholine receptor used by the rabies virus, a distinctively low evolutionary distance in one host pair (Canis lupus familiaris – Homo sapiens) was obtained, implying a high risk of zoonotic propensity within these host species. We predicted and visualized viral host ranges based on topologies for a given set of taxa, and represented host-range restriction on phylogenetic trees according to the calculated evolutionary distances between each taxon and the reservoir host using a pairwise distance matrix.

IT0082

Daily Human Activities Recognition Using Heterogeneous Sensors from Smartphones

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On-line understanding human activities can contribute solutions to some problems existing in the smart-city schema such as health-care, urban mobility, or security. Wearable sensors, especially sensors embedded in smartphones, turn to be good data streams for human activity recognition (HAR) tasks. Unfortunately, most of the existing methods are evaluated on small and fixed-size datasets, and lack of data sharing as well as classifiers re-training functions. These issues will lead to the challenge of unadaptable learning when facing problems of volume and variety of data. In order to tackle these problems, this paper proposes a new method with adaptive, interactive, and general-personal-model training components, and data sharing on the cloud. The major advantage of the proposed method is very fast to detect human activities of a new user at the beginning (i.e. deploying a system to a new user) with an acceptable accuracy of detection using the general model. Then, the personal model will help to increase the accuracy of activities detection personally by interacting with users. Another advantage of the proposed method is to share data (e.g. sensory data, models, activities, and user's profiles) among users/apps joined the system. These data will help to increase the accuracy of models timely by re-training periodically. Besides, the method can be used as a human-activity sensor that streams detected human activities to related components of smart-city scheme. The proposed method is evaluated and compared to de-facto datasets as well as state-of-the-art of HAR using smartphones. The experimental results show that there is a significant improvement of HAR's accuracy when utilizing the proposed method.
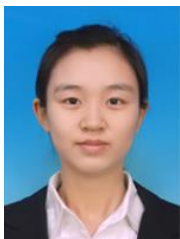
IT6014

Speech Behavior Analysis by Articulatory Observations

Ms. Yan Ji, Jianguo Wei, **Ms. Jingshu Zhang**, Qiang Fang, Wenhuan Lu, Kiyoshi Honda, Xugang Lu
School of Computer Science and Technology, Tianjin University, China

In articulatory phonetics, the place and manner of articulation indicate setting and action of the articulators during production of speech sounds. The place and manner are varied in pronouncing phonetic components such as vowel, bilabial, and alveolar. Moreover, the place and manner differ across individual speakers in realizing the same phoneme. Hence, our study attempts at analyzing those ways of articulation during speech production. To do so, the electromagnetic articulograph is used for recording the articulatory information so that the speaker-specific behavior of the articulators can be explored. In this study, the ways of articulation among different speakers was investigated by applying an articulatory recognition technique, and the contribution of each sensor's location to articulation was evaluated. In the results, two different production behaviors were observed, suggesting different behavioral rules for producing varied phonemes, and the contribution of the tongue surface regions were larger than other articulators among the subjects.
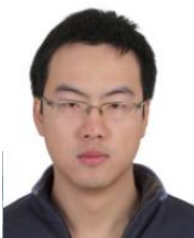
IT6008

Spark-based distributed multi-features hybrid IPTV viewing implicit feedback scoring model

Mr. YUE Jin, GU Junhua, ZHANG Suqi, ZHANG Jian
Hebei University of Technology, China

In this paper, in order to improve IPTV recommendation system, a Spark-based IPTV implicit feedback scoring model is proposed based on the characteristics of user viewing behaviors. First of all, this paper analyzes the data types and characteristics of IPTV user viewing behaviors. Secondly, this paper presents a new multi-features hybrid implicit feedback scoring model framework based on viewing duration and viewing ratio. Then, we design and implement the distributed multi-features hybrid implicit feedback scoring model on Spark cluster. Finally, we figure out reasonable weights of different features of implicit feedback through experiment. And the experiment shows that the Spark-based model performs better in time efficiency.

IT6001

CNN for Situations Understanding based on Sentiment Analysis of Twitter Data

Mr. Shiyang Liao, Junbo Wang , Ruiyun Yu , Koichi Sato and Zixue Cheng
Software College, Northeastern University, Shenyang, China

In this paper, we propose an approach to understand situations in the real world with the sentiment analysis of Twitter data base on deep learning techniques. With the proposed method, it is possible to predict user satisfaction of a product, happiness with some particular environment or destroy situation after disasters. Recently, deep learning is able to solve problems in computer vision or voice

recognition, and convolutional neural network (CNN) works good for image analysis and image classification. The biggest reason to adopt CNN in image analysis and classification is due to CNN can extract an area of features from global information, and it is able to consider the relationship among these features. The above solution can achieve a higher accuracy in analysis and classification. For natural language processing, texts data features also can be extracted piece by piece and to consider the relationship among these features, but without the consideration of context or whole sentence. And currently, convolutional neural network is one of the most effective methods to do image classification, CNN has a convolutional layer to extract information by a larger piece of text, so we work for sentiment analysis with convolutional neural network, and we design a simple convolutional neural network model and test it on benchmark, the result shows that it achieves better accuracy performance in twitter sentiment classification than some of traditional method such as the SVM and Naive Bayes methods.

IT5008

Application of dynamic program slicing technique in test data generation

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The core and key of software testing is test data generation. In the process of generating test data automatically, if the dynamic program slicing technique is used, the efficiency of generating test data can be improved. for generating test data, The main algorithm is as follows：First, in the program, we calculate the dynamic slice of the interest point's variable, and get the current value of the interest point's variable; Then In the branch function, we use the method of minimization, and guide the adjustment of program input. Through practical examples verify that, it is feasible for us to use dynamic program slicing technique in test data generation.

IT0077

Infrared small target detection based on relevance vector regression

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It is the core task of space combat operations to detect and track targets, and the infrared target detection technology has an immediate impact on the performance of combat systems. So, the infrared target detection has been one of the emphases in military research. With the accelerated development of modern high-tech, combat systems are required more in their abilities of long-range target detection and tracking. It needs us to explore much more precise infrared target detection methods to achieve better target detection performance. To complete this challenging task, an infrared small target detection method based on Relevance Vector Regression (RVR) is proposed in this paper according to the characteristics of infrared target and related theories of RVR. Firstly, the basic theories and related techniques of RVR are introduced. Secondly, the specific method of infrared target detection based on RVR and nonlinear kernel correlation coefficient is reviewed. Thirdly, we proposed the new detection method based on

RVR. In the last part, the experiment results which compared the new method with other methods are shown. The final experiment results prove that the proposed method has validity and better performance than the classical compared methods.

IT0076

The simulation analysis for a kind of fractional order Kalman estimator

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A kind of Kalman estimation algorithm will be presented based on model conversion. With the heating furnace system as a application background, the simulation analysis is made applying the MATLAB/Simulink toolbox. Compared with the fractional order Kalman estimation algorithm based on the fractional order state-space model, the proposed method is more easily to be realized. Moreover, the estimation accuracy of the proposed fractional order Kalman estimator is higher than that of the integer order Kalman estimator.

IT0060

Quartermaster supplier's pricing problems in dual channel strategy of VMI & TPL mode

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Under the background of civil-military integration, with the rapid development of electronic commerce, many military suppliers are trying to open a direct channel to change its traditional channel structure. The opening of electronic direct marketing channels has a vital role on preempting and expanding market share, and increasing military suppliers' bargaining power in the channel. Internet sales channel is becoming increasingly popular, relying solely on traditional retailers is not conducive to product promotion. This article is to consider in VMI &TPL model, quartermaster supplier to open a direct channel to market, and examine suppliers and retailers' pricing strategy from two angles -centralized decision and decentralized decision.

IT0055

Segmentation-based Euler Number with Multi-levels for Image Feature Description

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This paper proposes a new and efficient image feature descriptor using Euler Number with the help of segmentation according to given number of levelsets. The proposed Segmentation-based Euler Number for image description algorithm (SENA) works as the following steps. First, transforming the image into gray image if the image is color image; then, dividing the gray image into different sets using the given number of levelsets; next, decomposing the gray image into binary images with multi-thresh using the otsu algorithm; following, computing the Euler

Number of each binary image; finally, combining the Euler Numbers, mean and variance to form the feature vector for an input image. The proposed SENA was employed to the image classification on three public available dataset (Stanford Dogs Dataset, 17 flower dataset, and Caltech 256 dataset). We compute SENA with LBP and Gabor on the Stanford Dogs Dataset, the detail classification results on 17 flower dataset is given as confusion matrix, and the result of SENA on the Caltech 256 dataset is compared with those of the recently reported. The experiments demonstrate a competitive performance of SENA for classification task.

IT0052

A Research on Defect Image Enhancement Based on Partial Differential Equation of Quantum Mechanics

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The image enhancement of aviation material defect is vital for the defect quantitative and qualitative properties. In this paper, a novel defect image enhancement algorithm is presented, which adopts partial differential Equation of quantum mechanics. The algorithm is mainly divided into two steps: according to the quantum mechanics theory, the image edge quantum probability is computed; subsequently, the partial differential equation fusing anisotropic quantum probability is formed to enhance the defect image. Compared with other methods, the experimental results indicate that the proposed method can effectively highlight the defect in aviation material image.

IT0044

Research on Fog Computing Based Active Anti-theft Technology

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Fog computing is a new kind of deception-based active prevention technology, detecting and tracing effectively against internal threat or external attack. The technology establishes the foundation of further active security defense. The article expounds the key technology of fog computing technology system, proposes three security challenges: generation and deployment of decoy document, unidirectional transparent detection, and presents corresponded improving measures.

IT0031

Bandwidth Analysis of IEEE 802.11AC Protocol On ARM Platforms: Potential Influencing Factors

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This paper measures the actual bandwidth of wireless devices on ARM platforms

supporting the IEEE 802.11ac standard as the data transmission protocol under the condition that there is no occlusion in the transmission path. The influences of the transmission distance, the data transmission duration, and the driving devices on the transmission terminal on the data transmission rate are investigated in several experiments. The results indicate that the maximum bandwidth can reach 251.63 Mbps when ARM platforms are used on the transmission terminal and the transmission distance and duration do not influence the data transmission rate significantly (p-values are 0.3 and 0.07, respectively). We conclude that the actual data transmission rate of devices supporting the IEEE 802.11ac protocol may not reach the nominal level (~ 1Gbps), and the actual data transmission rate depends on the hardware configuration and other set up parameters.

IT0030

Estimating Bayesian Networks Parameters Using EM and Gibbs Sampling

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A method based on Expectation Maximization (EM) algorithm and Gibbs sampling is proposed to estimate Bayesian networks (BNs) parameters. We employ the Gibbs sampling to approximate the E-step of EM algorithm. According to transition probability, Gibbs sampling is utilized in data completion of E-step, which can reduce the computational complexity of EM algorithm. The experiments for comparison between the proposed method and EM algorithm are made. For the proposed method, the consumed time and the number of iterations are all less than those of EM algorithm. However, the KL divergence is higher than that of EM algorithm, which is a limitation for the proposed method.

IT5013

A Course Control System of Unmanned Surface Vehicle (USV) using Back-propagation Neural Network (BPNN) and Artificial Bee Colony (ABC) Algorithm

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Course control is the basis of Unmanned Surface Vehicle (USV) control system, largely determines the performance of USV. Because of some uncontrollable factors such as wind, wave and other random disturbances, the course control of an Unmanned Surface Vehicle (USV) is always difficult. In recent years, there have been some studies of adaptive course control system for USV, but they are not precise enough for engineering practice. In this paper, we propose a novel adaptive course control method based on Back-propagation Neural Network (BPNN) and Artificial Bee Colony (ABC) algorithm. We use classic PID algorithm as the main course control algorithm, and back-propagation neural network (BPNN) is also utilized to achieve more effective self-adaptive PID control. At the same time, in order to improve the convergence speed and precision of BPNN, we bring in Artificial Bee Colony (ABC) algorithm to minimize the error of system and adjust the weight of BPNN. The system has been proven in simulation that it can accurately output the rudder angle according to the input course angle and can perform better than that without ABC algorithm optimization. The error of parameters obtained by this method is within the acceptable range, which can provide reference for engineering practice.

IT0050

Performance Comparison between Hadoop and HAMR under Laboratory Environment

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With the development of the Internet technology, data explosion is about to take place. To handle such enormous amount of data, including storing, organizing and analyzing, the capability of a single machine is far from sufficient. Therefore, it is meaningful to build a distributed computing platform for not only academic purpose, but also industrial usage. Hadoop is one of the most popular and developed solutions to Big Data. It provides reliable, scalable, fault-tolerance and efficient service for large scale data processing based on HDFS and MapReduce. HAMR is another new technology which is said that runs faster than Hadoop with less memory and CPU consumptions. This paper makes a performance comparison between Hadoop and HAMR based on running PageRank by measuring running time, maximum and average memory and CPU usage. The result can be helpful for constructing distributed computer platform.

C005-A

Comparative analysis of genomic patterns and protein sequence motifs in selected viral strains

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The oncolytic effects of Newcastle disease virus operate directly through cytolysis or by induction of apoptosis in the infected cell. It is possible to develop or select highly oncolytic strains without adverse effects in humans as its virulence- and attenuation-related factors can be explained using molecular mechanisms. Here, we investigated the functional significance of fusion protein cleavage sites, and of hemagglutinin–neuraminidase protein length, in virulent (velogenic and mesogenic) and avirulent (lentogenic) Newcastle disease viruses in terms of their oncolytic ability. The aim was to classify viruses and identify candidate viral strains with different oncolytic strategies. We collected genetic data including amino acid sequences for fusion and hemagglutinin– neuraminidase proteins of all Newcastle disease virus strains from NCBI. The 1,714 protein sequences thus obtained were processed and analyzed through a newly-developed program for extracting consensus sequence motifs in fusion proteins and scanning the sizes of open reading frames of hemagglutinin–neuraminidase proteins using JAVA programming. The consensus sequences of fusion cleavage sites 112(R/K)RQ(R/K)RF117 and 112(G/E)(K/R)Q(G/E)RL117 and lengths of hemagglutinin–neuraminidase protein, with typical values of 616 aa, 571 aa, or 577 aa, were obtained for all viral strains, then grouped into three categories: velogenic or mesogenic (virulent), lentogenic (avirulent), and unclassified. Similarity analyses for amino acid sequences were performed using multiple sequence alignment with a representative oncolytic Newcastle disease virus, Ulster (chicken/N. Ireland/Ulster/67). In addition, the functional significance of conserved sequence motifs and open reading frame size of each protein were

investigated by constructing phylogenetic trees based on our classification criteria, which showed that functional significance of sequence motifs in the fusion protein is independent of phylogeny. The amino acid lengths of hemagglutinin–neuraminidase proteins showed a high correlation with pairwise distance from the Ulster strain, but host and isolated year showed no effect on phylogenetic relationships with the Ulster strain. Although further refinement of our method and analysis of other molecular factors are needed, this general approach may be useful for studying oncolytic mechanisms and strategies in diverse viruses.

Listener

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One Day Tour in Macau D4

✧ **Date：Dec.22**

✧ **Place：Macau**

✧ **Time：9：00-16：00**

✧ **Route：Golden Lotus Square-Kun Iam Ecumenical Centre view on bus- 'Leal Senado' Building - Senado Square- Ruins of St. Paul's- A-Ma Temple- Chapel of Our Lady of Penha view on bus- Kwun Ya Kai-Taipa Houses**

✧ **Notice:**

This trip will charge 80 USD for each one. The fees including: Traveling route, guide, lunch and traveling bus service.

1. Golden Lotus Square 金蓮花廣場

The Lotus Square or Golden Lotus Square (Chinese: 金蓮花廣場; Portuguese: A Praça Flor de Lodão) is an open square in Sé, Macau, China. The area features the large bronze sculpture Lotus Flower In Full Bloom (Chinese: 盛世蓮花) and is somewhat akin to the Golden Bauhinia of neighboring Hong Kong.

2. Kun Iam Ecumenical Centre view on bus 車觀望海觀音

Kun Iam Ecumenical Centre is located on an artificial island connected to Av. Dr. Sun Yat-sen, NAPE, by a 60-meter long causeway, the total height being 32 meters. Symbol of the Centre, Kun Iam statue is made up of approximately 50 bronze castings, weighs 50 tons and measures 20 meters high. This sculpture's face was specifically designed to show the Universality expressed in the concept of "Ecumenic" - without any distinctive ethnicity.

3. 'Leal Senado' Building-Senado Square 民政總署-議事亭前地

It is a paved area in the center of the former Portuguese colony of Macau, enclosed by the buildings of the Leal Senado, the General Post Office, and St. Dominic's Church. The square is paved in the traditional Portuguese pavement. The main road of Macau's historic center, Avenida de Almeida Ribeiro passes through the square.

4. Ruins of St. Paul's 大三巴

The Ruins of St. Paul's refers to the ruins of a 16th-century complex in Macau including of what was originally St. Paul's College and the Cathedral of St. Paul also known as "Mater Dei", a 17th-century Portuguese cathedral dedicated to Saint Paul the Apostle. Today, the ruins are one of Macau's most famous landmarks. It is listed as one of the 29 sites that form the Historic Centre of Macau, a UNESCO World Heritage Site.

5. A-Ma Temple 媽閣廟

The A-Ma Temple is a temple to the Chinese sea-goddess Mazu located in São Lourenço, Macau, China. Built in 1488, the temple is one of the oldest in Macau and thought to be the settlement's namesake.

6. Chapel of Our Lady of Penha view on bus 車觀主教山教堂

The first chapel was founded in 1622 by the crew and passengers of a ship which had narrowly escaped capture by the Dutch. The chapel served as a point of pilgrimage for sailors embarking on a hazardous voyage.

7. Kwun Ya Kai-Taipa Houses 官也街-龍 環葡韻葡式博物館

The museum complex consists of five houses, of which four display various artefacts and exhibits on life during Macau's colonial era while another serves as an event venue.   The houses were built in 1921. These colonial residences were restored to recreate houses of well-off Portuguese families living in Macau during the first half of the 20th century. The last house was restored in 1999. The Taipa Houses–Museum opened on 5 December 1999 and is administered by the Macau Civil and Municipal Affairs Bureau.

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