

Special Issue on Novel Techniques and Applications of Data Analytics

Guest Editorial

Statistical techniques and data analytics methods are the corner-stones for enabling many useful IT (Information Technology) applications for enhancing our lives. Some fields where such applications find their uses include but not limited to business, finance, engineering, health sciences, psychology and bioinformatics. Traditionally, statistics played a very essential role in decision support and decision making at all levels: departmental, enterprise-wide, societal and global. While the underlying statistical data are widely used as ingredient for deriving insights, the algorithms and techniques have evolved and ever improved, since the times of the Father of Statistics, Sir Ronald Aylmer Fisher, 1890 - 1962.

Though standard statistics methods are relatively mature over the years, new challenges do arise. They range from issues of big data, techniques required for analyzing unstructured data from disparate sources, and special application domains that are found beyond those of the mainstreams where analysts have seldom attempted before. Momentum is needed to fuel on-going research in the areas of inventing, innovating and extending standard analytics techniques to further improve applications that are based on statistics. Novelty in algorithmic design as well as application design is called for, researchers around the world, in snowballing the research momentum for the advancement of knowledge and progress of mankind.

In alignment of this research thrust, the 2012 International Conference on Statistics in Business, Science and Engineering (ICSSBE2012) was organized by the Centre of Statistical and Decision Science Studies in Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA with co-organizer EduXplore and co-technical sponsors IEEE Computer Society, Data Analytics and Collaborative Computing Group, University of Macau, Management Science/Operation Research Society of Malaysia (MSORSM), and Society of Digital Information and Wireless Communication (SDIWC).

This first international conference organized by the Centre of Statistical and Decision Science Studies has proceeded very successfully with the participation of more than 175 participants from many countries across the world. By continuing this research momentum, some selected papers from ICSSBE 2012 were invited to be extended with at least 30% additional contents for submitting to this special issue. A total of 9 quality papers are eventually included in this special issue, whose aim is in parallel with that of ICSSBE 2012 in promoting research in statistics and data analytics in both academic and industrial fields. The papers cover a nice variety of applications where novel methods of data analytics came into effect. The papers were selected on the basis of technical contributions as well as their novelty and importance in application domain. The papers are introduced as follows.

Dimension reduction techniques are some solutions to the "curse of high-dimensional data", but they often require fixing the intrinsic dimension of the low-dimensional subspace in advance. The paper by Jochen Einbeck and Zakiah Kalantan, on "Intrinsic Dimensionality estimation for high-dimensional data sets: New approaches for the computation of correlation dimension" proposed a novel and effective method that has been verified by computer simulation. This would serve as a useful data pre-processing tool for data mining high-dimensional data with ease; the method potentially will have wide applications especially those that deal with a large number of multi-variables.

The second paper titled "Ranking the Multiple Intelligences of People with Epilepsy Using Analytical Hierarchy Process and Data Envelopment Analysis" contributed to psychology, in particular, assessment of person's intelligence who suffers from Epilepsy. Analytic Hierarchy Process and related methods are applied. The authors, V. Rezaie, T. Ahmad, N. Maan, S. R. Awang, M. Khanmohammadi, demonstrated enhanced results in their paper.

The third paper is by researchers Mohd Iqbal Ridwan, Bahisham Yunus, Aminuddin Musa, who utilized specialized analytics in checking the reliability of a power transmission line. This paper, called "Transmission Line Fault Clearing System Reliability Assessment: Application of Life Data Analysis with Weibull Distribution and Reliability Block Diagram", exemplified how statistics are being useful in a typical engineering problem.

The next several papers are related to finance, public safety and economics, where special analytics are being applied that showed better results. Researchers, Shamsul Rijal and Muhammad Sabri, whose paper titled "The Willingness of the Musharakah Mutanaqisah Partnership in Bearing the Loss – An Actuarial Approach to Evaluate the Bank's Investment Income by the Case of Abandoned", suggested a new policy over the controversial housing financing scheme; the authors justified their new approach via statistics means in the paper. The authors found out that the higher the rate of failure due to the abandoned housing project, the less the bank in earning the profit. This was shown to be reflected by the size of debtors committing into this facility and the tenure, in their paper.

The fifth paper by Simon Fong and Yap Bee Wah, titled "A Prediction Model for Forecasting the Trend of Macau Property Price Movements and Understanding the Influential Factors", shows how the influential factors affecting a property market during a specific period of time can be inferred from the data. The practice of the analytics can be used by government policy-makers, for reviewing their current policies and certain aspects that affect the property (real-estate) market prices.

The next paper by Mohadeseh Khalili and Alireza Pakgozar, named "Logistic Regression Approach in Road Defects Impact on Accident Severity", studied the relations between road defects and accident severity. The nature of the paper concerns about public safety. The study potentially can reveal important insights for improving public facility that eventually lead to saving lives.

Carol Hargreaves and Yi Hao, with their paper "Prediction of Stock Performance Using Analytical Techniques", applied data mining techniques in predicting stock performances. Their findings justify the use of analytical techniques for classification and prediction purposes. In their paper, it was shown that their trading strategy consistently produced results that outperformed the Australian Ordinary Index, regardless of what trading strategies were used (personal strategy, pricing strategy, growth strategy, growth value strategy or the all mixed strategy). As long as their new analytical trading strategy was employed, they found that it can consistently outperform the Australian stock market.

The eighth paper, by Izni Syamsina Saari, Zamalia Mahmud and Nik Nairan Abdullah, titled "Validation of Urban Community Survey Regarding Pandemic Flu Influenza (H1N1) Using Rasch Measurement Tools" proposed an important study pertaining to statistics survey on pandemic disease. This paper contributes to health science by showing how a Rasch measurement model could be used to validate the response behavioural patterns of local urban community regarding the risk of Pandemic Flu, Influenza A (H1N1). In the ninth paper, "Effects of Substrate Material and Dielectric Properties on Electromagnetic Energy Absorption", contributed again to health science with elements of electrical & electronic engineering and statistics. The authors, Nur Aisyah Husni, Mohammad Rashed Iqbal Faruque, Mohammad Tariqul Islam and Norbahiah Misran, showed the effects of electromagnetic absorption towards human head with variations of human head dielectric properties. They found out via empirical experiments and statistics that conductivity was directly proportional to specific absorption rate (SAR) values while permittivity was inversely proportional with SAR values. In all frequency exposures, helical antenna with substrate of FR4 resulted in the highest SAR values. It was found that, helical antenna with substrate of Rogers RO3006 (loss free) had contributed the lowest SAR values in all operational frequencies exposed. The findings will likely impact multiple fields of health science as well as electronic goods product design.

It is hoped that the papers published in this special issue contribute to intellectual knowledge, create ripple effects to research in multiple disciplines, and encourage fellow researchers to continue rolling forward the research "momentum" of statistics and data analytics. All would be for the betterment of human lives and advancement in human knowledge.

Guest Editors

Yap Bee Wah (Email: yapbeewah@salam.uitm.edu.my)
Faculty Computer and Mathematical Sciences
Universiti Teknologi MARA
40450 Shah Alam, Selangor, Malaysia

Simon Fong (Email: ccfong@umac.mo)
Department of Computer and Information Science
University of Macau
Macau SAR

Sabah Mohammed (Email: mohammed@lakeheadu.ca)
Department of Computer Science
Lakehead University
Thunder Bay, Ontario P7B 5E1, Canada



Professor Yap Bee Wah Yap Bee Wah graduated with a Bachelor of Science (Education), majoring in Mathematics from Universiti Sains Malaysia (USM), Master in Statistics from University of California, Riverside and PhD in Statistics from Universiti Malaya. She is now an Associate Professor in the Centre of Statistical and Decision Science Studies in Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA (UiTM). Besides teaching research, training and consultancy works, she is an active reviewer for the International Journal of Bank Marketing and an Associate Editor of Journal of Statistical Modeling and Analytics (JOSMA). She is a member of the International Statistics Society (ISI), International Statistical Society in Business & Industry (ISBIS), IEEE member, and Malaysia Institute of Statistics. Dr Yap Bee Wah continues to be a referred and resource person in statistical analysis and modeling. Her research interests are in the applications of multivariate analysis and data mining in finance, business and medical

research. Her research papers has been published in indexed and refereed journals such as Expert Systems with Applications, Journal of Statistical Computation and Simulation, Applied Stochastic Models in Business and Industry, International Journal of Business and Social Science, Journal of Applied Sciences, Journal of Statistical Modeling and Analytics and Journal of Department of Statistics in Malaysia. She also actively participates in local and international conferences. Together with her colleagues she has managed to secure several research grants. Her current research interests are in big data analytics and high-dimensional data.



Professor Simon Fong graduated from La Trobe University, Australia, with a 1st Class Honours BEng. Computer Systems degree and a PhD. Computer Science degree in 1993 and 1998 respectively. Simon is now working as an Assistant Professor at the Computer and Information Science Department of the University of Macau. He is also one of the founding members of the Data Analytics and Collaborative Computing Research Group in the Faculty of Science and Technology. Prior to joining the University of Macau, he worked as an Assistant Professor in the School of Computer Engineering, Nanyang Technological University, Singapore. Prior to his academic career, Simon took up various managerial and technical posts, such as systems engineer, IT consultant and e-commerce director in Melbourne, Hong Kong and Singapore. Some companies that he worked before include Hong Kong Telecom, Singapore Network Services, AES Pro-Data and United Oversea Bank, Singapore. Dr. Fong has published over 180 international conference and journal papers, mostly in the

area of E-Commerce technology, Business Intelligence and Data-mining. Recently he has been appointed to be the Editor-in-Chief for Journal of Emerging Technologies in Web Intelligence (JETWI).



Professor Sabah Mohammed started his career during 1977 as a Multimedia Maintenance Engineer working for Canon and Sony following his hobby in Electronics, although he completed his bachelor degree in Mathematics (HBSoc 1977). From July 1979 he started his graduate studies where he received his degrees in Computer Science from Glasgow University-UK (PgD 1980, MPhil 1981) and from Brunel University-UK (PhD 1986). Since late 2001, Dr. Mohammed is a full Professor of Computer Science at Lakehead University. Formerly, from 1986-1995, Dr. Mohammed was an Assistant/Associate Professor of Computer Science at various universities including (BU, Amman University, Philadelphia University, Applied Science University and HCT). Sabah is interested in intelligent systems that have to operate in large, nondeterministic, cooperative, survivable, adaptive or partially known domains. Although his research is inspired by his PhD work on the employment of some Brain Activity-Structures based techniques for decision making (planning

and learning) that enable processes (e.g. agents, mobile objects) and collaborative processes to act intelligently in their environments to timely achieve the required goals, Sabah extended his research vision to include constructivism and focus more on the nature of knowledge. Since knowledge is created by people and influenced by their values and culture, Sabah research stated to shift more towards net centric systems (e.g. Cloud Computing, Social Networking and Enterprise Systems, Web-Based Systems). During the last nine years, Sabah research is focused on developing ubiquitous healthcare systems that enable sharing securely knowledge and data in an effective way. In particular sharing Electronic Health Record (EHRs) over the Web is one of the very challenging problems that Sabah tries to solve. Sabah believes that finding good solutions for sharing EHRs requires approaches that cut across many different fields (e.g. Semantic Web, Web 2.0, Web 3.0, Ubiquitous Computing, Medical Informatics, XML Security and Artificial Intelligence).. He published several research articles in an attempt to promote EHRs interoperability and sharing. Recently he edited and authored a notable book on "Ubiquitous Health and Medical Informatics: The Ubiquity 2.0 and Beyond" by IGI Global that will be published during April 2010. Dr. Mohammed professional career includes many achievements. He is the Honorary Editor of Journal of Emerging Technologies in Web Intelligence (JETWI), Editor-in-Chief of International Journal of Education and Learning (IJEL) and International Journal of Multimedia & Ubiquitous Engineering (IJMUE). He was a Visiting Scholar at the Math and Computer Science, Laurentian University-Canada. Also he is a Professional Software Engineer of Ontario (P.Eng.) and Canada Information Processing Professional (ISP). Dr. Mohammed is an active member of Canada's e-Health Interoperability group and the coordinator on Northern Ontario Web Intelligence Research Group. Besides being an active member of the Department of Computer Science at Lakehead University, Dr. Mohammed is among the core faculty members of both the Lakehead University Bioinformatics and BioTechnology programs. Dr. Mohammed is an Adjunct Research Professor with the University of Western Ontario. Moreover, Dr. Mohammed is a core faculty member of the BioTechnology PhD program at Lakehead University.