

The 5th International Conference on Science & Engineering in Mathematics, Chemistry and Physics 2017 (ScieTech 2017), The Ramada Bintang Hotel, Kuta, Bali, Indonesia 21 - 22 January 2017

Keynote Speakers

1.



Prof. Dr Igor Kotenko, St. Petersburg Institute for Informatics and Automation of Russian Academy of Sciences (SPIIRAS), Russian Federation

Title: Visual Analytics for Cyber Security: Mathematical Models, Techniques and Practical Solutions

In this talk visual analytics models, techniques and practical solutions for visualization and subsequent analysis in critical operational domains on the example of cyber security situation assessment will be considered. Methods of visual analytics can significantly improve efficiency when working with big data, as they combine the power of intelligent data processing methods, and particularities of the human visual perception of the information. In this talk we analyze existing methods of visual data analysis to solve various problems of protection against cyber attacks. The effectiveness of visual analysis is demonstrated by the example of existing and developed by the authors techniques and tools of visual analytics, including areas of network perimeter monitoring, policy assessment, vulnerability assessment, traffic analysis, attack detection, security metrics representation, fraud investigation, etc. We consider different visual models such as matrices, graphs, histograms, treemaps, spiral view, starburst, clock view, 3D scatter plots, 3D visualization, metaphoric host behavior, etc. The talk discusses a visual analytics technique implemented for displaying a set of security metrics used to assess overall computer network security status and evaluate the efficiency of protection mechanisms. The technique can assist in solving such security tasks which are important for security information and event management systems. The approach suggested is suitable for displaying security metrics of large networks and support historical analysis of the data. To demonstrate and evaluate the usefulness of the proposed technique we implemented a use case corresponding to the Olympic Games scenario and different ways of cyber attack and defense realization. The techniques are based on attack graphs and service dependencies, apply a set of different assessment levels (topological, attack graph, attacker, events, countermeasures and system) and analyze several important aspects (basic, zero day attacks, cost-efficiency characteristics). Such approach allows understanding the current security situation, including defining the vulnerable characteristics and weaknesses of the system under protection, dangerous events, current and possible cyber attack parameters, attacker intentions, integral cyber situation metrics and



necessary countermeasures. This research is based on the latest results of the research fulfilled in St. Petersburg Institute for Informatics and Automation of Russian Academy of Sciences (SPIIRAS) by support of the grant of Russian Science Foundation #15-11-30029.

Keywords: applied mathematics and statistics, visual analytics, cyber situational awareness

Short Bio:

Igor Kotenko is a professor of computer science and Head of Research Laboratory of Computer Security Problems of the St. Petersburg Institute for Informatics and Automation of the Russian Academy of Science. He graduated with honors from St. Petersburg Academy of Space Engineering and St. Petersburg Signal Academy, obtained the Ph.D. degree and the National degree of Doctor of Engineering Science. He is the author of more than 350 refereed publications, including several study books and monographs. Igor Kotenko has a high experience in the research on computer network security and participated in several projects on developing new security technologies. For example, he was a project leader in the research projects from the US Air Force research department, via its EOARD (European Office of Aerospace Research and Development) branch, EU FP7 and FP6 Projects, HP, Intel, F-Secure, etc. The research results of Igor Kotenko were tested and implemented in multitude of Russian research and development projects. The research performed under these contracts was concerned with innovative methods for network intrusion detection, simulation of network attacks, vulnerability assessment, security protocols design, verification and validation of security policy, etc. Igor V. Kotenko is a laureate of the St. Petersburg Government award for outstanding scientific achievements in the field of science and technology, a laureate of the program “Outstanding Scientists. Doctors of Sciences of the Russian Academy of Sciences”, and a winner of many grants of the Russian Foundation of Basic Research, Russian Science Foundation and several State contracts. He has chaired several conferences and workshops, and serves as editor on several editorial boards.



**2. Prof. Drs. Koentjoro Soeparno, MBSc. PhD. Psikolog
Fakultas Psikologi - Universitas Gadjah Mada
Yogyakarta – Indonesia**

Title : Social Change and its Impact on Education and Culture

This article will explain how social change effects education and culture. The method used in this paper is a literature review, observation and contemplation. Basically, humans beings seek comfort in their life, therefore any change will be followed by efforts of adjustment. Change is painful As such, change will always produce other changes. There are two (2) sources of social change, namely the industrial revolution in Britain and ideological consciousness of independence. The Industrial Revolution in England led to various innovations and findings in the fields of engineering, computer and information technology.

Discoveries in the field of engineering made industrialization grow which consequently divided society into groups of proletarian class and the bourgeoisie. Industrialization also resulted in the exploitation of natural resources which ultimately caused global climate change. Innovation in the field of computer technology and informatics help generate global acceleration. Globalization is considered a revolution of 4T which is a revolution in telecommunications, transportation, tourism and transparency. Computer innovation and informatics create various types of social media that influence education and culture.

The second source of change is the rise of ideological consciousness of independence. History shows that many countries in the world gained its independence between 1900-1999. Gender struggles in the USA in 1907 and 1960, in Indonesia from 1870 to 1928. Anti-slavery struggle that ended in 1974. These events raise awareness of human rights and gender awareness as a counter culture. When both the source of this social change, the industrial revolution in Britain and ideological consciousness of independence interact, making the world a growing and increasingly rapid and global.

Conclusion Social change is rapidly increasing. Globalization mediated by social media leads to change in lifestyle, culture and finally the educational system. Industrialization interacts with other lifestyles, raises the issue of the exploitation of Natural Resources. The impact is the rise of new style colonization and climate change.

Keywords: social change, the industrial revolution, ideological consciousness of independence, globalization and social media.

Short Bio

Prof. Drs. Koentjoro, MBS., Ph. D, Psikolog is The Head of Social Psychology Department Faculty of Psychology, Gadjah Mada University.

He is also The Head of Drug Abuse Prevention. Gadjah Mada University Professor in Social Psychology at the Faculty of Psychology, Gadjah Mada University.

His research Interest

Sexuality, Social and Family Psychology, Social Change and Social Policy, Qualitative Research, Social Change and Problems; Grassroots & Prostitution, Poverty, Community Planning and Interventions.



3. AP Dr Norma Alias

Center for Sustainable Nanomaterials,

Ibnu Sina Institute for Scientific and Industrial Research,

Universiti Teknologi Malaysia

Title : Conceptual Framework for Big Data Emerging on Nanotechnology Theory, Model, Simulation using HPC System

This paper presents six variations to meet the contexts of a conceptual framework for modeling the complex systems involve nanotechnology theory, modeling, large scale numerical simulation in

the real world problem. Integrated mathematical modeling and large scale numerical simulations are the tools to solve the complex systems. The conceptual framework is a comprehensive concept in theory, modeling and simulation based on high performance computing (HPC). The main objective is to improve the process of huge computation of the big data modeling and to increase the performance evaluation of parallel programming on HPC platform. The set of concepts contains the revised standard for guiding the scientific algorithm provider to model, discretize and simulate the integration of big data emerging based on parallel computing strategies. The six variations are identifying the parameter and governing the mathematical modeling for large scale complex system, transferring the continuous model, function and equation into discrete counterparts, developing the parallel algorithm and communication model, implementing the parallel program on HPC platforms, converting the discrete solution into continuous feature's existence of exact solutions in any natural phenomenon of complex systems. Last but not least is verifying and validating the numerical approximation and parallel performance evaluations. The framework organizes the idea and step to be considered for solving the integrated theory, mathematical modeling with fast numerical simulation, specific parallel computing strategy, communication software and HPC hardware system which are applicable for solving large scale nanotechnology applications. The matching skills between the numerical simulation of complex system and the computational tool such as communication model, message passing protocol, parallel programming language, memory and processor performance on HPC platform were framed for data scientist and scientific algorithm provider. This framework employs some case study approaches to provide an adaptation of the conceptual framework and satisfy the variation requirements. The examples for variations are presented, the performance evaluations are analyzed and the predictions of the large scale complex system are provided. As a conclusion, the conceptual framework performs more comprehensive perspective based on future software system design dealing with the next-generation of HPC architecture system.

Short Biography

A.P Dr. Norma Alias is Research Fellow at Center for Sustainable Nanomaterials, Ibnu Sina Institute for Scientific and Industrial Research, Technology University of Malaysia. Currently, she is also Associate Professor at Mathematics Science Department, Faculty of Science, Technology University of Malaysia. She received her M.S. degree and PhD from National University of Malaysia, in Computer Science and Industrial Computing. Area of research interest includes mathematical modeling and simulation, big data computing, large scale image processing, and computational nanotechnology on high performance computing system. She has published more than 160 research papers in ISI, SCOPUS, index and non-index journals. She won 9 international and local innovation medals. She has awarded as 40 active researchers in Malaysia and completed 30 research grants.



4. Pramila. Goyal

Distinguished Professor Emeritus

The NorthCap University, Gurgaon-122017, India, E-mail*- pramila@cas.iitd.ernet.in

Formerly Professor at Centre for Atmospheric Sciences, Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India – 110016,

Title : Assessment of Air Quality of Delhi Through Mathematical

This article presents a review of the different Mathematical models based on analytical solution of advection diffusion equation for dispersion of Air pollutants to determine their concentration at different locations in Delhi, which is always used for studying the air quality of Delhi.

Different mathematical techniques have been developed and used for an emission inventory of air pollutants, used as one of the input parameter in dispersion models. The major air pollutants emitted from various sources in Delhi are sulphur dioxide (SO_2), particulate matter of size 10 micron (PM_{10}) and oxides of nitrogen (NO_x). The recent study of Air Quality Index (AQI) of Delhi, based on combined effect of SO_2 , SPM and NO_x is obtained by two different formulations, which defines the status of air Quality and has limits in numbers to represent different classes between good and severe of air quality.

Finally, Air quality, determined by air quality dispersion models in terms of concentration of air pollutants and AQI based on the same are compared and assessed for Delhi atmosphere. It has been observed that most of the Delhi's AQI was bad and severe.

Key Words: Air Quality, Models, Source Inventory, Air Quality Index. Delhi

Short Bio

Dr. Pramila Goyal joined NCU, Gurugram on 20th August, 2015 as Distinguished Professor Emeritus in the Department of Applied Sciences & Department of Civil & Environmental Engineering. Her broad areas of research interests include: Air Pollution Modeling, Environmental Impact Assessment, Emission Inventories, Carrying / Assimilative Capacity of Urban Cities, and Environmental Management Studies.

With a total professional experience of 38 years in teaching and research, she has 55 Publications to her credit – 44 Papers in International and 11 Papers in National Journals, besides, 65 International / National Conference Papers published in the peer reviewed Conference Proceedings. She has mentored 14 Ph.D. and 17 M.Tech students, developed / taught many Courses to B.Tech, M.Tech, M.B.A. and Pre Ph.D

students during her stint at IIT Delhi. She has visited numerous countries as Invited Scientist/Speaker / under Collaborative Scientific Research Projects.

Area of Expertise: Air Pollution Mathematical Modelling and Air Quality Monitoring. Air Pollution & Health.