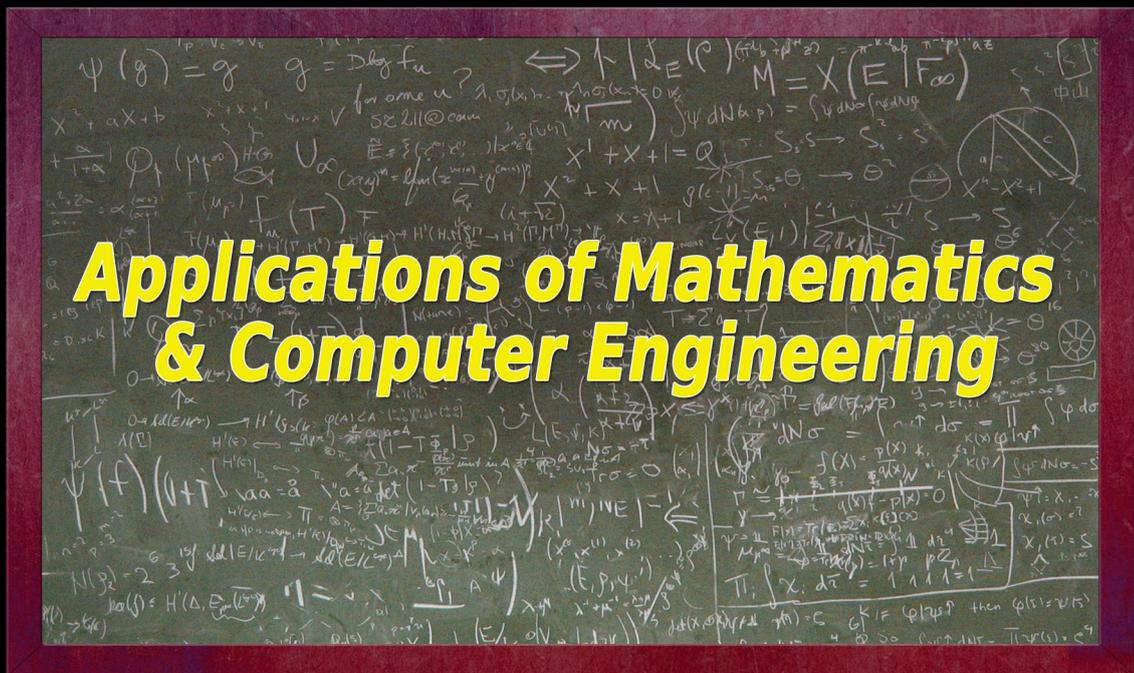




Editors: Alexander Zemliak, Nikos Mastorakis



Applications of Mathematics & Computer Engineering



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Puerto Morelos, Mexico, January 29-31, 2011

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Preface

This year the American Conference on APPLIED MATHEMATICS (AMERICAN-MATH '11) and the 5th WSEAS International Conference on COMPUTER ENGINEERING and APPLICATIONS (CEA '11) were held in Puerto Morelos, Mexico, January 29-31, 2011. The conferences remain faithful to their original idea of providing a platform to discuss linear algebra, numerical analysis, differential equations, probabilities, statistics, operational research, optimization, algorithms, discrete mathematics, systems, communications, control, network design, data mining, intelligent networks, privacy enhancing technologies,, anonymity techniques,, system integration, distributed multimedia, microprocessors, microcomputers, mobile computing, cyber-science and cyber-space, web-based education etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

Table of Contents

Plenary Lecture 1: Information Criteria and Detection of Change	14
<i>Arjun K. Gupta</i>	
Plenary Lecture 2: Local Surface Approximation for Edge Structure Preserving 3-D Image Denoising	15
<i>Peihua Qiu</i>	
Plenary Lecture 3: Technology Environment for Leaving Labs and Open Innovation	16
<i>Elissaveta Gourova</i>	
A New Approach for Prediction by using Integrated Neural Networks	17
<i>Hazem M. El-Bakry, Nikos Mastorakis</i>	
Fuzzy Goal Programming Approach to Multiobjective Linear Plus Linear Fractional Programming Problem	29
<i>Pitam Singh, Shiv Datt Kumar, R. K. Singh</i>	
A Predication Survival Model for Colorectal Cancer	36
<i>Sherif Kassem Fathy</i>	
ID-based Multi-Proxy Multi-Signature Scheme from Bilinear Pairing	43
<i>Rajeev Anand Sahu, Sahadeo Padhye</i>	
An Unsupervised Learning based LSTM Model: A New Architecture	49
<i>Sajjad Mohsin, Fatima Zaka</i>	
Langevin Equations for Pedestrian Motion Modeling	54
<i>Robert A. Kosinski, Andrzej Grabowski</i>	
Intelligent Techniques for Fed-Batch Bioprocess Control	58
<i>Mihai Caramihai, Irina Severin</i>	
A Mathematical Programming Model for Suppliers Selection	61
<i>A. Hadi-Vencheh, N. Shayesteh Moghadam</i>	
A New Method for Solving Nonlinear Equations by Taylor Expansion	65
<i>Masoud Allame, Nafiseh Azad</i>	
Regularization of the Hypersingular Integrals in 3-D Fracture Mechanics. Rectangular BE and Piecewise Linear Approximations	68
<i>V. V. Zozulya</i>	
Solutions of Two-Dimensional Integral Equation Systems by Using Differential Transform Method	74
<i>M. Tavassoli Kajani, N. Akbari Shehni</i>	

Analysis of Static Properties of Complex Dynamic Systems Using the Data Mining Technology Proposal of the Multidimensional Scheme <i>Michaela Horalova Kalinova, Stanislav Horal, German F. Michalconok</i>	78
Privacy Concept of Slovak National eID-Model <i>Ladislav Huraj, German F. Michalconok</i>	82
A Correlation based Detection System for Keys Reuse in SSH/SSL <i>Nabil El Kadhi</i>	87
Artificial Vision based Inspection of Marbled Fabric <i>Rocco Furferi, Lapo Governi, Matteo Palai, Yary Volpe</i>	93
"3D Reconstruction Problem": An Automated Procedure <i>Monica Carfagni, Rocco Furferi, Lapo Governi, Matteo Palai, Yary Volpe</i>	99
On the Modeling and Control of Coupled Multi-Loop Thermosyphons <i>Yan Wu</i>	105
Edge Structure Preserving 3-D Image Denoising <i>Peihua Qiu, Partha Sarathi Mukherjee</i>	111
Comparison of Maturity Levels in CMMI-DEV and ISO/IEC 15504 <i>Stasys Peldzius, Saulius Ragaisis</i>	117
Explicit Image Detection using YCbCr Space Color Model as a Skin Detector <i>Jorge Alberto Marcial Basilio, Gualberto Aguilar Torres, Gabriel Sanchez Perez, L. Karina Toscano Medina, Hector M. Perez Meana</i>	123
Evaluation of Dynamic Simulation Software's to Meet the Minimum Requirements of Energy Efficiency in Estonia <i>Hendrik Voll, Erkki Seinre, Teet Tark</i>	129
Ladybird: Debugging Support in the Sequencer <i>Tomaz Kos, Tomaz Kosar, Marjan Mernik, Jure Knez</i>	135
Elastic Plastic Bending of Stepped Annular Plates <i>Jaan Lellep, Julia Polikarpus</i>	140
From Unordered Point Cloud to Weighted B-Spline - A Novel Pca-Based Method - <i>Rocco Furferi, Lapo Governi, Matteo Palai, Yary Volpe</i>	146
Stochastic Approach to Perform Optimal Low Thrust Spacecraft Maneuvers to Escape from Collisions <i>Vivivan M. Gomes, Antonio F. B. A. Prado</i>	152
A Comparison of Internal and External Cluster Validation Indexes <i>Erendira Rendon, Itzel M. Abundez, Citlalih Gutierrez, Sergio Diaz Zagal, Alejandra Arizmendi, Elvia M. Quiroz, Elsa Arzate H.</i>	158
HOSVD Based Data Representation and LPV Model Complexity Reduction <i>Andras Rovid, Peter Varlaki, Laszlo Szeidl</i>	164
Developing a CRM Platform: A Bulgarian Case <i>Sofiya Vachkova, Elissaveta Gourova</i>	170

Some Information Technologies to Improve the Performance of an ERP System <i>Daniela Litan, Anca Apostu, Larisa Copcea Teohari, Mihai Teohari</i>	175
Using Semantic Web Technologies and Non-Procedural Programming Language for Selecting Team members <i>Vili Podgorelec, Bostjan Grasic</i>	181
A Mathematical Approach for Wind Turbine Noise Propagation <i>Claudio Guarnaccia, Nikos E. Mastorakis, Joseph Quartieri</i>	187
Distance Monitoring of the Power Quality <i>Nikolay Gourov, Plamen Tzvetkov, George Milushev, Elissaveta Gourova</i>	195
Analysis on Effects of Galvanic Vestibular Stimulation on Postural Stability using 3D Motion Analysis <i>Jung-Ja Kim, Ah Reum Lee, Yonggwan Won</i>	201
Developing Knowledge Management Systems: Approaches, Technologies and Methods <i>Bostjan Grasic, Vili Podgorelec</i>	207
Using Nonlinear Mixed Integer Optimization in Printed Circuit Board Assembly <i>Stefan Emet, Olli S. Nevalainen, Timo Knuutila</i>	213
Authors Index	217

Plenary Lecture 1

Information Criteria and Detection of Change



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Abstract: Change-point problem primarily arose from the process of quality control in which one concerns about the outputs of a production line and wishes to find any departure from an acceptable standard of the product. The problem of abrupt changed is often encountered in various experimental and mathematical sciences. From a statistical point of view, we wish to infer (detect) whether there is a statistically significant change-point in a sequence of chronologically ordered date. In the case that there is a statistically significant change-point, we also will locate (estimate) the change-point.

In particular, the testing and estimation of multiple covariance change point for a sequence of m -dimensional ($m > 1$) Gaussian random vectors by using Schwarz information criterion (SIC) have been studied. We will estimate the number of change points as well as their locations. The unbiased SIC is also obtained. Then asymptotic null distribution of the test statistic is derived. The result is applied to the weekly prices of Exxon and General Dynamics stocks ($m=2$) from 1990 to 1991, and changed are successfully detected.

Brief Biography of the Speaker: Arjun K. Gupta is Distinguished University Professor and former Chairman, Department of Mathematics and Statistics, Bowling Green State University, Bowling Green, Ohio. He has made wide-ranging and far-reaching contributions to multivariate statistics. His fundamental contributions in multivariate statistics include: multivariate distribution theory; elliptically contoured distributions; matrix valued multivariate statistics; skew-multivariate distributions and modeling to mention a few which are key for the underlying developments and tools for high-dimensional data mining.

Prior to coming to Bowling Green he had been a faculty member of the University of Michigan and the University of Arizona. He has also been a Visiting Professor at the Universities of Campinas (Brazil), Ohio State, Ghana (West Africa), Windsor (Canada), Antioquia (Colombia), Technical University of Warsaw (Poland), Toledo, Michigan (Biostatistics), CIMAT (Mexico) ,National Sun-Yat Sen University , and Tsing-Hua University (Taiwan). During the Fall 1981 he served as the United Nation's Statistical Consultant in Ghana. He visited the University of Rajasthan during the Fall 1983 as the University Grants Commission Senior Fellow. Dr. Gupta has served on many editorial boards of several scientific journals including the J of Statistical Planning and Inference, Ohio J. of Science, Communications in Statistics, Test, Random Operators and Stochastic Equations and others. He also serves as the Series Editor for the Statistics Books and Monographs from Chapman and Hall/CRC. He has organized many conferences including the Research Conference on Jackknife and Bootstrap Methods in Statistics in 1980 , which was funded by the National Science Foundation . He is a prolific author and researcher ,having authored six books and edited eight books .In addition he has published more than three hundred research papers in reputed journals making significant contributions to the Multivariate Statistical Analysis ,Distribution Theory,Asymptotic Inference ,Robustness,Statistical Inference ,Change-Point Analysis,Modeling and Model Selection. In 1990 he was honored with the Olscamp Research Award by the Bowling Green State University for his outstanding research accomplishments. He has been a Visiting Lecturer, SIAM, 1981-83, and COPSS, 1988-90.

Dr. Gupta is a member of a large number of scientific societies and a frequent speaker on his areas of interest both in the U.S.A. and abroad. He is a Fellow of the American Statistical Association, the Institute of Statisticians, Royal Statistical Society, Ohio Academy of Science, and an elected Member of the International Statistical Institute. He has consulted for many organizations in the U.S.A. and abroad .He served in Ghana as Statistical Consultant for the United Nations.

Plenary Lecture 2

Local Surface Approximation for Edge Structure Preserving 3-D Image Denoising



Professor Peihua Qiu

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Abstract: In various applications, including magnetic resonance imaging (MRI) and functional MRI (fMRI), 3-D images get increasingly popular. To improve reliability of subsequent image analyses, 3-D image denoising is often a necessary pre-processing step, which is the focus of the current paper. In the literature, most existing image denoising procedures are for 2-D images. Their direct extensions to 3-D cases generally can not handle 3-D images efficiently, because the structure of a typical 3-D image is substantially more complicated than that of a typical 2-D image. For instance, edge locations are surfaces in 3-D cases, which would be much more challenging to handle, compared to edge curves in 2-D cases. In this paper, we propose a novel 3-D image denoising procedure, by approximating the edge surfaces properly, using local smoothing and nonparametric regression methods. One important feature of this method is its ability to preserve edges and major edge structures (e.g., intersections of two edge surfaces and pointed corners). Numerical studies show that it works well in various applications.

Brief Biography of the Speaker: Peihua Qiu got his Ph.D. in statistics from the Statistics Department at the University of Wisconsin at Madison in 1996. He worked as a senior research consulting statistician of the Biostatistics Center at the Ohio State University during 1996-1998. Then, he worked as an assistant professor (1998-2002), an associate professor (2002-2007), and a full professor (2007-present) of the School of Statistics at the University of Minnesota. He is an elected fellow of the American Statistical Association, an elected fellow of the Institute of Mathematical Statistics, an elected member of the International Statistical Institute, and a lifetime member of the International Chinese Statistical Association. His major research interests include nonparametric regression, jump curve and surface estimation, image processing, quality control, reliability and survival analysis, and various statistical applications. So far, he has published over 50 research papers in refereed journals. His research monograph titled *Image Processing and Jump Regression Analysis* (2005, Wiley) won the inaugural Ziegel prize in 2007, for its contribution in bridging the gap between jump regression analysis in statistics and image processing in computer sciences. He is the current associate editor of the *Journal of the American Statistical Association* and *Technometrics*, and the guest co-editor of *Multimedia Tools and Applications*. In 2010, he is the plenary speaker of the annual meeting of the German Statistical Society, and the featured speaker with discussions of the *Technometrics* invited session during the Joint Summer Meeting of the American Statistical Association.

Plenary Lecture 3

Technology Environment for Leaving Labs and Open Innovation



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Abstract: The paper presents the concepts of open innovation and living labs. In the framework of knowledge management, it considers how recent technologies could support the creativity and innovation, and an open collaboration of different stakeholders in this process. Some examples of technology solutions are presented. A special focus is made on the Web 2.0 technologies for support of open innovation and knowledge management.

Brief Biography of the Speaker: Dr. Elissaveta Gourova is currently Associate Professor at the Department of Software Engineering at the Faculty of Mathematics and Informatics of Sofia University. She works since 2006 as a guest lecturer on Project management at New Bulgarian University, and on Knowledge Management at Technical University-Sofia. She holds a PhD degree from the Technical University – Sofia. She has professional experience as research fellow and project manager at the Centre for Information Society Technologies of Sofia University, where she took part at coordination and expert level in 6 FP7 projects, 3 FP6 projects, etc. Presently, Dr. Gourova is National Contact Point for FP7 program People. In the time 2000-2003 she was research fellow at the Institute for prospective technological studies (IPTS) - Seville, Spain. Her primary research is cross-disciplinary focused on Knowledge management, ICT impact, and digital divide. Her research interests further focus on e-skills, mobility and career of researchers. She has more than 60 publications, some of which are at ECKM and WSEAS conferences.

Authors Index

Abundez, I. M.	158	Knez, J.	135	Quartieri, J.	187
Allame, M.	65	Knuutila, T.	213	Quiroz, E. M.	158
Apostu, A.	175	Kos, T.	135	Ragaisis, S.	117
Arizmendi, A.	158	Kosar, T.	135	Rendon, E.	158
Arzate H., E. H.	158	Kosinski, R. A.	54	Rovid, A.	164
Azad, N.	65	Kumar, S. D.	29	Sahu, R. A.	43
Caramihai, M.	58	Lee, A. R.	201	Seinre, E.	129
Carfagni, M.	99	Lellep, J.	140	Severin, I.	58
El Kadhi, N.	87	Litan, D.	175	Shehni, N. A.	74
El-Bakry, H. M.	17	Marcial Basilio, J. A.	123	Singh, P.	29
Emet, S.	213	Mastorakis, N. E.	17, 187	Singh, R. K.	29
Fathy, S. K.	36	Mernik, M.	135	Szeidl, L.	164
Furferi, R.	93, 99, 146	Michalconok, G. F.	78, 82	Tark, T.	129
Gomes, V. M.	152	Milushev, G.	195	Teohari, L. C.	175
Gourov, N.	195	Moghadam, N. S.	61	Teohari, M.	175
Gourova, E.	170, 195	Mohsin, S.	49	Torres, G. A.	123
Governi, L.	93, 99, 146	Mukherjee, P. S.	111	Toscano Medina, L. K.	123
Grabowski, A.	54	Nevalainen, O. S.	213	Tzvetkov, P.	195
Grasic, B.	181, 207	Padhye, S.	43	Vachkova, S.	170
Guarnaccia, C.	187	Palai, M.	93, 99, 146	Varlaki, P.	164
Gutierrez, C.	158	Peldzius, S.	117	Voll, H.	129
Hadi-Vencheh, A.	61	Perez Meana, H. M.	123	Volpe, Y.	93, 99, 146
Horal, S.	78	Perez, G. S.	123	Won, Y.	201
Huraj, L.	82	Podgorelec, V.	181, 207	Wu, Y.	105
Kajani, M. T.	74	Polikarpus, J.	140	Zagal, S. D.	158
Kalinova, M. H.	78	Prado, A. F. B. A.	152	Zaka, F.	49
Kim, J.-J.	201	Qiu, P.	111	Zozulya, V. V.	68