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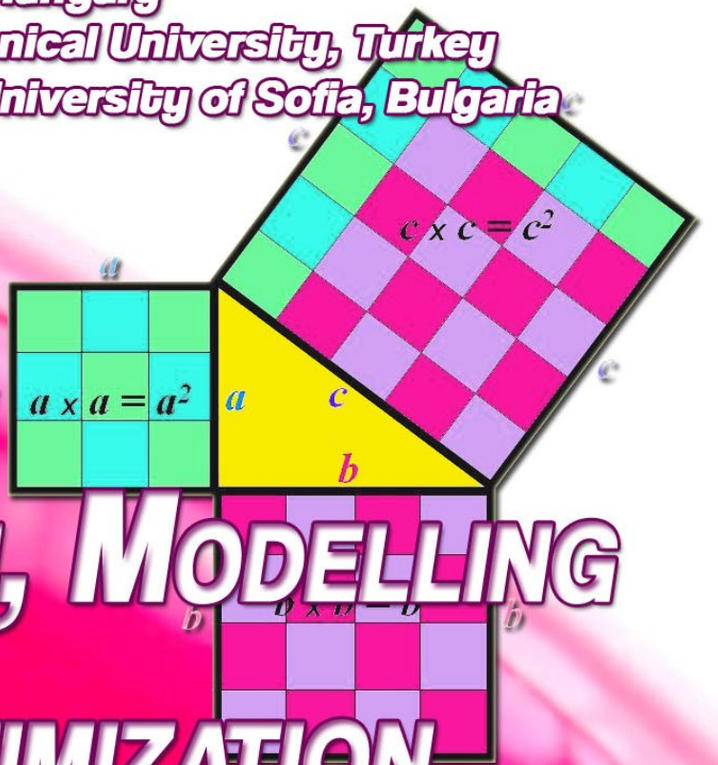

SIMULATION, MODELLING & OPTIMIZATION

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Proceedings of the 9th WSEAS International Conference on SIMULATION, MODELLING AND OPTIMIZATION (SMO'09)

Includes:
Proceedings of the 5th WSEAS International Symposium on GRID COMPUTING
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Proceedings of the 5th WSEAS International Symposium on
DATA MINING and INTELLIGENT INFORMATION PROCESSING

Budapest Tech, Budapest, Hungary, September 3-5, 2009

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Preface

This year the 9th WSEAS International Conference on SIMULATION, MODELLING AND OPTIMIZATION (SMO '09) this included: the 5th WSEAS International Symposium on GRID COMPUTING, the 5th WSEAS International Symposium on DIGITAL LIBRARIES, and the 5th WSEAS International Symposium on DATA MINING and INTELLIGENT INFORMATION PROCESSING was held in Budapest, Hungary, September 3-5, 2009. The Conference remains faithful to its original idea of providing a platform to discuss Matrix Theory, Tensor Analysis, Linear and Multi-linear Algebra, Simulation via Computational Linear Algebra techniques, Iterative methods, Error Estimation in Iterative Methods etc. with participants from all over the world, both from academia and from industry.

Its 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 this conference 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.

A Conference such as this 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

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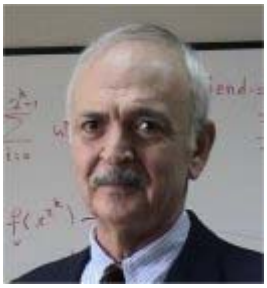
Keynote Lecture

Optimization Based Matrix Decomposition Methods and their Utilization in Applications



Professor Metin Demiralp
Informatics Institute
Istanbul Technical University
ITU Bilisim Enstitusu Ayazaga Yerleskesi
Maslak, 34469, Istanbul, Turkey
E-mail: metin.demiralp@gmail.com

Abstract: Matrix decomposition methods play important roles in the theoretical aspects of the matrix theory beside their utilization in approximations. The main purpose is to represent a matrix in terms of the rather simple matrices. The linear combination type representations are mostly preferred to get the benefits of the linearity. The simple matrices in the linear combination are chosen in as lower ranks as possible. The one-rank matrices or in other words outer products are mostly preferred ones. For example, spectral decompositions use outer products constructed as the product of each normalized eigenvector of the considered matrix by its transpose or hermitian conjugate and the linear combination coefficients are the corresponding eigenvalues when the symmetry or the hermiticity exists in the matrix under consideration. If the symmetry or hermiticity does not exist then the cases should be investigated separately for two different categories first of which involves the matrices with eigenvalues whose algebraic and geometric multiplicities are same while the second one covers the matrices at least one of whose eigenvalues has different algebraic and geometric multiplicities. The first group matrices have spectral decompositions almost same as the symmetric or hermitian matrices with the only difference in the construction of the outer products which are now constructed as the product of the right eigenvectors by their companion transposed left ones. Although the individual normalizations of the left and right eigenvectors are not necessary the mutual normalizations are required to give unit norm to each outer product. The second group matrices can not be expressed in the abovementioned form of spectral decompositions because they can not be diagonalized. Hence, their reducibility to Jordan canonical form must be reflected to the decomposition. What we have stated above is for square matrices. The similar decomposition for the rectangular matrices is based on the idea of the forward and backward transitions between two different dimensional Euclidean spaces. The result is called singular value decomposition where the outer products are constructed from the left and right singular vectors while the linear combination coefficients of the decomposition are the singular values of the matrices which are in fact the square root of the eigenvalues of the product of the transposed form of the matrix by itself. All these decompositions can be connected to the optimization theory by defining appropriate cost functionals and constraints. The cost functional has quadratic natures in general. The constraints may also be quadratic although the bilinear forms are encountered as well. The structure of the cost functional uniquely defines the characters of decomposition. It is possible to define new and more general decompositions by changing the structures of the cost functional and the constraints. There have been certain efforts to do so in recent years. The author and his colleagues are attempting to construct new schemes to decompose matrices and to use them in modern applications related to data processing. The talk will focus on the issue in a more general perspective and try to adress to the works by emphasizing on the recent ones from and outside the group of the author.

Brief Biography of the Speaker: Metin Demiralp was born in Turkey on 4 May 1948. His education from elementary school to university was entirely in Turkey. He got his BS, MS, and PhD from the same institution, Istanbul Technical University. He was originally chemical engineer, however, through theoretical chemistry, applied mathematics, and computational science years he was mostly working on methodology for computational sciences and he is continuing to do so. He has a group (Group for Science and Methods of Computing) in Informatics Institute of Istanbul Technical University (he is the founder of this institute). He collaborated with the Prof. Herschel A. Rabitz's group at Princeton University (NJ, USA) at summer and winter semester breaks during the period 1985–2003 after his 14 months long postdoctoral visit to the same group in 1979–1980.

Metin Demiralp has more than 70 papers in well known and prestigious scientific journals, and, more than 110 contributions to the proceedings of various international conferences. He has given many invited talks in various

prestigious scientific meetings and academic institutions. He has a good scientific reputation in his country and he is the full member of Turkish Academy of Sciences since 1994. He is also a member of European Mathematical Society and the chief–editor of WSEAS Transactions on Mathematics currently. He has also two important awards of Turkish scientific establishments.

The important recent focii in research areas of Metin Demiralp can be roughly listed as follows: Fluctuation Free Matrix Representations, High Dimensional Model Representations, Space Extension Methods, Data Processing via Multivariate Analytical Tools, Multivariate Numerical Integration via New Efficient Approaches, Matrix Decompositions, Quantum Optimal Control.

Plenary Lecture 1

Scheduling Availability of Discrete Event Systems

Associate Professor Calin I. Ciufudean
Informatics Institute
Istanb "Stefan Cel Mare" Universtity of Suceava
Faculty of Electrical Engineering and Computer Science
Department of Automatics and Computers
9, University str., RO720225, Suceava
ROMANIA
E-mail: ciufudean.calin@yahoo.com

Abstract: Fault detection is a crucial and challenging task in the automatic control of complex systems, e.g. in flexible manufacturing systems (FMS's) as a representative class of discrete event systems (DES's).
A discrete event system approach to the problem of failure diagnosis is presented. The property of diagnosability is introduced in the context of the failure diagnosis problem, e.g. in the context of the availability of the DES. We bring a DES approach to the problem of failure diagnosis of FMS's because most of them are modelled by DES's, and because continuous variable dynamic systems can often be viewed as DES's at a higher level of abstraction, respectively when their trajectories are determined by meaningful accumulations of dynamics e.g., are determined by events. The states of the discrete event model reflect the normal and the failed status of the system components, while the failure events form part of the event set.
We propose a systematic procedure for detection of failure events using diagnoses implemented with stochastic coloured Petri nets (SCPN). The diagnoser is a SCPN which models the FSM. This model performs detection and isolation of failures (failure information and occurrences of failures can be detected by inspecting the states of the SCPN model), and it also permits the verification of the diagnosability properties of the system (e.g., permits the estimation of the availability of the system). In our assumption the availability of a production cell j (j=1.2….,n, where n is the total number of part cells in the FMS) is calculated with a Markov chain that includes the failure rates, repair rates, and coverability of the respective devices in the production cell j.
An analytical approach for the availability evaluation of cellular manufacturing systems (as basic components of FMS's) is presented, where a FMS is considered operational as long as its production capacity requirements are satisfied.
The approach is used to evaluate transient and steady-state performance of alternative designs based on an industrial

Brief Biography of the Speaker:
• Honorary Member of the Romanian Society of Electrical & Control Engineering - Member of the Romanian Technical Experts Corp.
• Technical Expert of the Romanian Ministry of Justice.
• President of the Romanian Society of Electrical & Control Engineering, Suceava Branch.
• Academic Positions: Assoc. Professor, Dept. of Automatics and Computers, Faculty of Electrical Engineering and Computer Science, "Stefan cel Mare" University of Suceava, Romania.
• Fields of Scientific Activities: Discrete Event Systems, Complex Measurement Systems, Reliability and Diagnosis of Control Systems, Environmental Management.
• He published 6 books and over 120 scientific papers in conference proceedings and journals.

Plenary Lecture 2

Identification of Distributed Parameter Systems Based on Sensor Networks and Multivariable Estimation Techniques

Professor Constantin Volosencu
Department of Automatics and Applied Informatics
Faculty of Automatics and Computers
"Politehnica" University of Timisoara
Bd. V. Parvan nr. 2
Timisoara, 300223
Romania
E-mail: constantin.volosencu@aut.upt.ro

Abstract: In the last years sensor networks have proved their huge viability in the real world, even if their resources in terms of energy, memory, computational power and bandwidth are strictly limited. One of the important problems related to the usage of wireless sensor networks in harsh environments is the identification of the states of the physical variables in the field, based on the measurements provided by the sensors. The sensor networks allow the usage of the multivariable estimation techniques in distributed systems. The paper presents a short survey of some characteristics of the sensor networks, distributed parameters systems and identification techniques. An examples of application of modeling of distributed systems in sensor networks and identification based on multivariable identification with auto-regression is presented. Some results of practical implementation of this method using a sensor network for temperature and humidity measurements are presented.

Brief Biography of the Speaker:
Prof. Constantin Volosencu graduated in 1981 the Faculty of Electrotechnics, "Traian Vuia" Polytechnic Institute of Timisoara, Romania, as an engineer in automatics and computers and he is doctor in control systems at "Politehnica" University of Timisoara. In present he is professor at "Politehnica" University of Timisoara, Faculty of Automatics and Computers, Department of Automatics and Applied Informatics. His research interest is in linear control systems, fuzzy control, neural networks, control of electrical drives, modelling, simulation, identification and sensor networks. He is author of 9 books and more then 100 scientific papers, published at international conferences and journals. He was manager of over 30 national an international research projects.
Constantin Volosencu worked from 1981 to 1990 at "Electrotimis" Enterprise Timisoara, in the field of the control systems for industrial machines, where he developed control equipments for a large scale of machineries, which are the objects of 27 patents.

Plenary Lecture 3

Advanced Simulation and Modelling Techniques for Mobile Radio Channels

Professor Matthias Patzold
Mobile Communications Group
Faculty of Engineering and Science
University of Agder
Grimstad, Norway
E-mail: matthias.paetzold@uia.no

Abstract: From the beginnings of mobile communication, there is a high demand for realistic models for mobile fading channels. The reason for the demand is that channel models are essential for the performance evaluation, parameter optimisation, and test of mobile communication systems. Design methods for mobile fading channels are therefore of great importance for system engineers who are involved in the development of present and future mobile communication systems.
In this presentation, an overview will be given about several design methodologies commonly used for the design of mobile radio channel models in present and future wireless communication systems. All presented channel models have in common that they are derived from a superposition of a finite number of complex sinusoids. However, the design methodologies differ in the way of computing the model parameters determining the statistical behaviour of the channel model. It will be shown that the proposed channel models are widely flexible, which allows an excellent fitting of their principal statistical properties against measurement data of real-world channels or against the statistics of any given reference channel model. Special interest will be paid to the state-of-the-art in modelling and simulation of mobile-to-mobile MIMO channel models as well as fading channel models for relay-based cooperative networks. The statistical properties of these channel models will be investigated analytically with emphasis on the distribution of the received envelope and with respect to the channels' correlation properties in the space, time, and frequency domain. The obtained results show that the statistical properties of the channel models required for future mobile communication systems are quite different from the statistics of the channel models used in present mobile communication systems.

Brief Biography of the Speaker:
Matthias Patzold received the Dipl.-Ing. and Dr.-Ing. degrees in electrical engineering from Ruhr-University Bochum, Bochum, Germany, in 1985 and 1989, respectively, and the habil. degree in communications engineering from the Technical University of Hamburg-Harburg, Hamburg, Germany, in 1998. From 1990 to 1992, he was with ANT Nachrichtentechnik GmbH, Backnang, Germany, where he was engaged in digital satellite communications. From 1992 to 2001, he was with the Department of Digital Networks at the Technical University Hamburg-Harburg. Since 2001, he has been a full professor of mobile communications with the University of Agder, Grimstad, Norway. He authored four books and published more than 150 technical papers. His publications received eight best paper awards. He has been actively participating in numerous conferences serving as TPC chair and TPC member for more than 10 conferences within the last two years.
His current research interests include mobile radio communications, especially multipath fading channel modelling, multiple-input multiple-output (MIMO) systems, MIMO-OFDM systems, cooperative systems, and space-time coding techniques for fading channels.

Plenary Lecture 4

Flow-based Economic Operations Representations

Professor Lucian Patrascu
Department of Economics,
"George Baritiu" University
Brasov
ROMANIA
E-mail: patrasculuccian@yahoo.com

Abstract: The profit and loss account shows whether a company is operating or not, as far as obtaining a positive result out of its activity is concerned, but does not allow the provision of information related to actual flows conferring trust from non-specialists point of view: entry and exit of cash availabilities as a result of the activity development.
The result contoured by the profit and loss account relies on standardized principles and methods, on conventions originating from the accrual accounting and therefore, we can face one case in which two companies with the same availabilities and similar employment thereof, may obtain different results, because of various methods of evaluation of revenues and charges.
The variety and complexity of issues related to the good management of the company's treasury create a wide field of analysis and debate for specialists in the field, especially because this topic practically relates to the activities conducted by all economic agents. Most of the users of accounting information are interested in the fluidity of the company's business and especially in its ability to provide a suitable rotation speed for liquidities.
The accounting information provided by accrual accounting and focused mainly on profit is unable to provide a suitable response to such request.
This is how the need to operate the accounting information is necessary, which provides the treasury flow knowledge as correspondent of patrimonial flow transiting the company and with immediate impact on liquidities.
The cash flow statement discloses the flow statement which, as a difference from the profit and loss account, provides a projection over the actual possibilities of the company to financially support and face the payment of debts with actually available resources and not with future resources.

Brief Biography of the Speaker:
Academic Positions:
•Assistant Professor, Department of Economics, „George Baritiu" University of Brasov, Romania.
Scientific activity:
•He has published a total of 2 books. Has participated in 3 national research projects, has published 25 various papers in conference proceedings or refereed journals (7 papers have been published abroad), has participated with 3 papers at the WSEAS Conferences.
Studies:
•Ph.D. in Economy, Academy of Economic Studies of Bucharest, (2008);
•Licensed in Economy, Faculty Economic Sciences, specialization Accounting and Management Information Systems, at the „George Baritiu" University of Brasov, Romania (2004);
•Licensed in Law, Faculty of Law, specialization Law, at the „George Baritiu" University of Brasov, Romania(2007);
Experience:
•Assistant Professor, Department of Economics at „George Baritiu" University of Brasov, Romania;
•Financial accounting manager at „George Baritiu" University of Brasov, Romania (2004-2006)

Plenary Lecture 5

Modelling the Performance Behavior of a Web Server using Statistical Factor Analysis

Assistant Professor Livia Sangeorzan
Transilvania University of Brasov
Member of the Applied Computer Science Department,
Research Laboratory Coordinator
Romania
E-mail: livia.sangeorzan@gmail.com

Abstract: In studying the time in executing the programs on the Web server, on can made the analysis of variance technique in a more complex design, on can made a factorial design.
On can fixed the following tuple: (architecture, no. of processes, JVM state, application, heap size, no threads, execution time).
Analysis of variance does not ignore interaction. In more complex statistical designs estimations of variance due to interaction are made.
In the analysis of variance techniques all of the data are treated at once and a general null hypothesis of no difference among the means of the various groups is tested.
It is desirable to describe the joint relationship of a single Y variable to several X variables. If the Y variable is well described by the other variables we will want to know the existent of this dependence and the actual multiple regression equation. On can determinate some correlations between the fixed tuple.
Using the multiple regression equation determinate, on can modelling the performance of a Web server behavior.

Plenary Lecture 6

Models for Virtual Education Systems

Associate Professor Dana Simian
Faculty of Sciences
University Lucian Blaga of Sibiu
Romania
E-mail: dana.simian@ulbsibiu.ro

Abstract: The e-learning systems have gained increasing attention in recent years. A complex e-learning system is composed of several interacting autonomous agents. Our aim is to provide many models based on ant and wasp bahaviour for different components of a virtual learning environment where students interact through their computers and with the software agents in order to achieve a common educational goal. A Multi-Agent System consisting of autonomous, cognitive and social agents communicating by messages is used to provide a group decision support system for the learning environment. Learning objects are distributed in a network and have different weights in function of their relevance to a specific educational goal. The relevance of a learning object can change in time; it is affected by students', agents' and teachers' evaluation. We have used an ant colony behavior model for the agents that play the role of a tutor and organizing the group-work activities for the students. Another component of the learning environment is an adaptive multiagent system for dynamic routing of the activities of students' grants. The model we have introduced allows the assignment of activities in a grant, taking into account the specialization of students, their experience and the complexity of activities already taken. An adaptive method allows students to enter in this system for the first time. The system is changing dynamic, because both the type of activities and the students involved in the system change. The agents use wasp task allocation behavior, combined with a model of dominance hierarchy formation, to determine which activity of a set of grants should be accepted into a student's queue, such that the execution time of every grant be respected and the number of students involved in these grants be maximized.

Brief Biography of the Speaker:
Dana Simian received the diploma. in engineering from the University of Sibiu, Romania, the diploma. in Mathematics - Informatics from the University Babes-Bolyai of Cluj-Napoca, Romania and the Ph.D. from Babes-Bolyai University of Cluj- Napoca, Romania. She graduated many courses in Computer Science. She is the head of the Department of Computer Science from the Faculty of Sciences, University Lucian Blaga of Sibiu, Romania. She has a great experience in algorithms and numerical methods for modelling and optimization. She published 15 books, more than 60 articles and participated in the editorial board of 22 scientific publications (proceedings of international conferences).
She organized 5 special sessions within WSEAS conferences and 2 international workshops on topics related to algorithms and computational techniques in modeling, approximation and optimization. She was a member of many scientific committees of international conferences.. She was plenary speakers in 3 international conferences. She is reviewer of many scientific publications. She was involved as director of many research grants. She has been included in "Who is Who in the World" in 2006 and in the "IBC Foremost Engineers of the World", 2008.

Plenary Lecture 7

Developing a Custom Cluster Workflow for Shape Optimization with Finite Element Analysis

Professor Damir Vucina
FESB, University of Split
Croatia
E-mail: vucina@fesb.hr

Brief Biography of the Speaker:

• Born on June 13th, 1962, in Split, Croatia.

• Univ. degree in mechanical engineering at the "Department of Electrical and Mechanical Engineering and Naval Architecture (FESB)" of the University of Split

• "Master of Science" (M.Sci.) degree in 1987 at the "Columbia University in the City of New York, School of Engineering and Applied Science", in New York, U.S.A., as a grantee of the "Fulbright Grant". Master's thesis "Application of Graph Theory and Nonlinear Programming in the Computer-Aided Type- and Dimensional Synthesis of Mechanisms"

• Doctoral Degree in Technical Sciences in 1993, dissertation titled "A Contribution to Modelling of Viscoplastic Material Flow with the Finite Elements Method", FSB, University of Zagreb, Croatia.

• Full professor at FESB. Courses: Application of Computers- Computer Aided Analysis, Optimization Methods, Operations Research, Neural Networks and Genetic Algorithms, Appraisal of Technology Projects, within university study programmes of Mechanical engineering, Industrial engineering and Computer science.

• Author of university-level books in engineering: (1) 'Methods of Engineering Numerical Optimization', (2) 'Application of Computers in Engineering Analysis'

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