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RECENT ADVANCES IN EDUCATION and EDUCATIONAL TECHNOLOGY

Recent Advances in Computer Engineering
A Series of Reference Books and Textbooks

Proceedings of the 7th WSEAS International Conference
on EDUCATION and EDUCATIONAL TECHNOLOGY (EDU'08)

VENICE, ITALY, NOVEMBER 21-23, 2008

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Preface

This book contains the proceedings of the 7th WSEAS International Conference on EDUCATION and EDUCATIONAL TECHNOLOGY (EDU'08) which was held in Venice, Italy, November 21-23, 2008. This conference aims to disseminate the latest research and applications in Educational Software and Development, Web-based Education, nternet for Education, Multimedia for Education, Globalization in education, Challenges and problems and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: **www.worldses.org/indexes**

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

Table of Contents

Keynote Lecture: Multivariate Data Completion or Addition on a Single Curve Representation of a Hyperrectangulargrid via Fluctuation Suppression **11**
Metin Demiralp

Plenary Lecture I: International Trends and the Profiles of Malaysian Engineers **13**
Azami Zaharim

Improvement of Delivery Methods in Teaching Materials Technology **15**
R. Hamid, K.. M. Yusof and S.A. Osman

Practical Implementations in Advancing Laboratory Courses for Control Engineering Education **18**
Zhengmao ye, Habib mohamadian, Hang yin and Guoping Zhang and Su-Seng Pang

Developing Interactive Laboratories in Liberal Arts Math **24**
Frederick Butler and Melanie Butler

Technical Practice on Virtual Reality and Augmented Reality for Electrical and Mechanical Engineering Education **30**
Zhengmao ye, Habib Mohamadian, Michael Stubblefield,Su-Seng Pang and Sitharama Iyengar

Relationship of Addressing Term and Personal Privacy **35**
Iail Acikalin

A Project Suggestion for Reconstruction of Internet Cafes: Blue Flag **39**
H. Ferhan Odabasi and Serkan Sendag

Models in Science - Teaching for Developing Formal Reasoning **44**
Laura-Iulia Anita

Challenges for IT Education at Sofia University **50**
Elissaveta Gourova, Maria Nisheva and Albena Antonova

Professional Development for Teachers Using Technology **55**
Melanie Butler

Teachers' Intercultural Competence: Effects of Intercultural Training and Experience **59**
Nicoleta Laura Popa, Simona Butnaru and Teodor Cozma

Design of a Learning Management System on LTSA Framework **65**
S. Sengupta, N. Chaki and R. Dasgupta

Learning Mathematics through Utilization of Technology: Use of Autograph Technology vs Handheld Graphing Calculator **71**
Rohani Ahmad Tarmizi, Ahmad Fauzi Mohd. Ayub, kamariah Abu Bakar and Aida Suraya M.D. Yunus

Perceived Ease of Use and Usefulness of Dynamic Mathematical Software : Experiences of Malaysian Secondary Students **77**
Ahmad Fauzi Mohd Ayub, Rohani Ahmad Tarmizi, Kamariah Abu Bakar and Aida Suraya Mohd Yunus

Framework and Culture of Proactive Competencies Learning Learning by Developing (LbD) **83**
Rauno Pirinen and Maarit Frδnti

Integrative Action and Process Model **89**
Rauno Pirinen

Motivation in Web Based Learning Lessons Learned from Volunteer Web Communities **95**
Matti Koivisto

The Views of Candidate Teachers of Information Technologies about Information Pollution on the Internet **100**
Mehmet Firat and Adile Askim Kurt

Learning and Teaching in the Digital Age **106**
Brandusa Prepelita-Raileanu

Capacity Building: e-Learning for Consecutive Steps from Overcoming Computer Illiteracy to Wide Use of ICT in Education **112**
Inna Maliukova And Liudmila Rusina

Parents' Views about Internet Use of Their Children: A Case from A Private School in Turkey **115**
Isil Kabakci,Hatice Ferhan Odabasi and Ahmet Naci Coklar

The Importance of Industrial Training: Students' Perception in Civil Engineering Sector **121**
S.A. Osman, M.Z. Omar, N.T. Kofli, K. Mat, Z.M. Darus and M.N.A. Rahman

Computer Assisted Education: Pre-service Teachers' Ideas about Learning and Teaching Physics **126**
Ali Azar, Nilufer Didis and Ozgur Ozcan

Socio-Cultural Models Implemented through Multi-agent Architecture **129**
Iulian Pah, Daniel Hunyadi and Dan Chiribuca

The Development of the E-learning Course "Sociology" **135**
Karmela Aleksic-Maslac ,Masa Magzan and Ilena Maslac

A Proposal for Ethics Training in Internet Cafes **141**
H. Ferhan Odabasi and Elif Bugra Kuzu

SOA Services in Higher Education **145**
Shanshan Yang and Mike Joy

Globalization and the Transition from the Age of Information to the Age of Consciousness **151**
Brandusa Prepelita-Raileanu

Continuing Professional Development, Training and Education as Part of Technology for Learning Process in built Environment **157**
Zuhairuse M.D. Darus, Fadzil Hassan, Zaidi Omar, Masran Saruwono, Noraziah Mohammad and Zulkifli Abdul Salam

Form Editor Used to Define Shapes in GENMMX Application **163**
Gheorghe Marian, Nicolae Iulian Enescu and Eugen Dumitrascu

A Hands-on Process Control Laboratory for Undergraduate Students:Using Low Cost Experiment Kits **167**
I. I. Siller-ALcalα, J. Jaimes-Ponce, R. Alcαntara-Ramvrez and J. J. Rubioavila

System Approach and Education Reflect Environmental Care **173**
Davorin Kralj

An Experiment on Using Patents as a Tool for Reinforcing Constructivist Learning Approach in Engineering Education **178**
Tarik Ozkul

Social and Cultural Challenges of the New Communication Technology Used in Education Oriented Activities **185**
Dan Chiribuca, Iulian Pah and Daniel Hunyadi

Didactic Tool Assisting Visually Impaired Students During Laboratory Sessions **190**
B. Ando, A. Beninato, S. La malfa and N. Pitrone

The Virtual Simulation of New Technical Design by GENMMX Software **194**
Mircea i. Mihaiu and Marius Marian

The Social and Interactional Dimensions of Internet Utilization **198**
Ancuta Plaesu and Ana-Maria Dalu

Some Aspects Regarding Efficiency and Meaning of Indicators used in Romanian Educational System **203**
Liviu Mihaescu, Diana Mihaescu, Olivia Andrei and Lia Ilie-Bologa

The Analyses of the Teacher's Activities Facing with Efficiency **207**
Liviu Mihaescu, Diana Mihaescu, Olivia Andrei and Lia Ilie-Bologa

A Decision Support System Model in Evaluating Travel Agency **212**
Huay Chang

Implementing Continual Review of Programme Educational Objectives and Outcomes for OBE Curriculum Based on Stakeholders' Input **218**
Shahrir Abdullah, Riza Atiq Abdullah O.K. Rahmat,Azami Zaharim, Norhamidi Muhamad, Baba M.D. Deros,Noorhisham Tan Kofli, Mardina Abdullah, Mazlan Mohd. Tahir,Andanastuti Muchtar and Che Husna Azhari

A Case Study on Metacognitive Strategies in an Engaging Multimedia Experience **224**
Normahdiah Sheikh Said

Web based Learning through Mobile Technology for Architectural Education **231**
Mohd Arif Ismail,Saemah Rahman,Isham Shah Hassan and Rosnaini Mahmud

Pedagogical Usability of the Geometer's Sketchpad (GSP) Digital Module in the Mathematics Teaching **240**
Norazah Nordin, Effandi Zakaria, Mohamed Amin Embi and Ruhizan Mohd Yassin

Learner Autonomy Among Malaysian Adult Learners via Asynchronous Computermediated Communication **246**
Ranjit Kaur A/P Gurdial Singh, Mohamed Amin B. Embi and Norazah Mohamed Nordin

Employers' Evaluation on Attributes Obtained During Industrial Training **259**
M.z.omar, N.T. Kofli, k. Mat, Z.M.Darus, S.A. Osman, M.N.A. Rahman and S. Abdullah

Improvement of Students' Soft-Skills Through University-Industry Collaborations **264**
Aminuddin Baki , Mohd Azman Yahaya , Siti Hawa Hamzah , Che Maznah Mat Isa , Raenah Md Sem , Roslina Abdul Rahim D, Azizan Hawa Hassan and Shahinaz Abd Rahim

Research on the Construction of Network Culture of University **273**
He Lixin, Li Huai and Wang Peng

The Promotion Strategies of Core Competitiveness of China's Independent Colleges under SWOT **278**
He Lixin and Li Huai Liuyanli

eLearning as an Information Process **283**
Ivan Pogarcic, Sabrina Suman and Ivana Ziljak

Developing Online Self-Training Information Security Program for Web Hosting Administrators Using Virtual System **289**
Kiho Lee, Wansoo Lee and Sangsoo Jang

A Shift in Learning Culture; Rethinking the Teacher-Learner Relationship in the Digital Era **294**
Georgeta Marghescu and Ion Marghescu

Aspects Concerning the Implementation of a Virtual Laboratory for Stepper Servomotors Using the Internet **300**
Gheorghe Baluta and Margareta Coteata

Author Index **307**

Keynote Lecture

Multivariate Data Completion or Addition on a Single Curve Representation of a Hyperrectangulargrid via Fluctuation Suppression

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Abstract: This work is somehow about multivariate interpolation. If an N–variate function is given at certain points of the cartesian space of the N independent variables and its value at a point which is outside the data given points is sought then various methods available in the literature can be used to find this value. However, there is almost no unique universal way to do so and each method has its own capability, efficiencies, deficiencies and pitfalls. Data completion and data mining techniques can also be considered amongst them.

The work focuses on a finite hypergrid in N–dimensional cartesian space first and then a multivariate function's values are assumed to be given at certain nodes (we call them full nodes) of this grid. The next step is the dimension reduction. To this end we construct a single continuous curve passing through all nodes of the grid with respect to an appropriately chosen ordering. Curve construction is not unique and depends on the ordering of the nodes. It is better to choose the curves whose mathematical definitons are rather simple. This construction leaves us to use just a single parameter to specify any location on the curve. Although the nodes are defined as N tuples in the N–dimensional cartesian space their locations can also be given in terms of the curve parameter. Hence, the data completion or addition problem is converted to a univariate interpolation which is rather simple.

The full nodes are now represented by ordered pairs whose first elements are the position parameter values on the constructed curve while the second elements are the multivariate function's values at those points. Data completion (to inject one or a few missing data to a data set which is almost full everywhere) or data addition (to evaluate the function's value at an empty node within a sparsely data given hypergrid) then becomes to seek the multivariate function's value at a specified node which corresponds to a unique position on the curve.

There are a lot of univariate interpolation methods, each of which can be used for the interpolation on the curve defined above depending on the nature of the demands and produces some unavoidable errors. Quite recently a new method of interpolation is developed by Demiralp. It uses the Fluctuationlessness Theorem (conjectured and proven by Demiralp recently). Theorem dictates us that the matrix representation of a function over a subspace of the Hilbert space for analytic and square integrable functions is equal to the image of the independent variable's matrix representation on the same subspace under the same function as long as the fluctuation terms (differences between the means of specified powers of the independent variable and the same specified power of the mean of the independent variable). This fact can be used to approximate an integral and a quadrature like formula (the linear combination of the function values at certain points with positive linear combination coefficients (we call weights) can be obtained. The quality of the approximation depends on the dimension of the subspace mentioned above and becomes better as the dimension increases. Hence the two sufficiently high consecutive dimension will give the same value for the integration under consideration within a prescribed accuracy.

The integrand of the abovementioned integral is chosen in such a way that it becomes a linear combination of given values of the multivariate function for, say, n dimensional subspace while the same value is expressed as another linear combination of the given function values and the single sought values of the same function for the (n + 1) dimensional subspace. Since these two expressions should produce the same value it is possible to extract the sought value of the function under consideration. Presentation will focus on these topics and certain remarks.

Acknowledgment:
Author is grateful to Turkish Academy of Sciences for its support.

Brief Biography of the Speaker: Metin Demiralp was born in Turkey on 4 May 1948. His education from elementary school to university was all 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 is working on methodology for computational sciences. 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. H. 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 same group in 1979--1980.

Metin Demiralp has roughly 70 papers in well known scientific journals and is the full member of Turkish Academy of Sciences ince 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.

Plenary Lecture I

International Trends and the Profiles of Malaysian Engineers

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Abstract: Engineering has always played a major role in wealth creation. In the fast developing economy of Malaysia, the central role of the engineering community is unquestionable. This is precisely why engineering is the nation's largest profession, and engineering education is the biggest sector in tertiary education. Being the biggest warrants that it is done right, especially in the context of the unique conditions of the nation and region. Engineering education in Malaysia is rapidly expanding and its direction needs to be charted. The study on The Future of Engineering Education in Malaysia, commissioned by the Ministry of Higher Education Malaysia in 2005 were covers the specific issues of engineer profiles, curricula and competencies, industrial training, demand and supply of engineers, accreditation, international benchmarking, outcome-based education, and human resource development. This paper discusses the international trends and the profiles of Malaysian professional engineers. A total of 422 companies from various industries in Malaysia were chosen for the face-to-face interview sessions using a set of questionnaires. The respondents were mainly from high ranking personnel in their firm. The outcomes of this study will later be considered as a revision guideline for the engineering education curricula of Malaysian Institutions of Higher Learning.

Brief Biography of the Speaker: Azami Zaharim worked first 13 years as a lecturer in the Universiti Teknologi MARA (University of MARA Technology - UiTM) before joining the Universiti Kebangsaan Malaysia (National University of Malaysia - UKM) in the year 2003. He is Associate Professor at the Faculty of Engineering and Built Environment UKM, and is currently Coordinator for the Unit Fundamental Engineering Studies. He obtained his BSc(Statistics and Computing) with Honours from North London University, UK in 1988 and PhD (Statistics) in 1996 from University of Newcastle Upon Tyne, UK. He specialize in statistics, public opinion, engineering education and renewable energy resources.

He has until now published over 80 research papers in Journals and conferences, conducted more than 15 public opinion consultancies and delivered 3 keynotes/invited speeches at national and international meetings. He is currently the head of Renewable Energy Resources and Social Impact Research Group under the Solar Energy Research Institute (SERI). In the year 2007, he headed the Engineering Mathematics Research Group. At the same time, he is currently active involve in outcome based education (OBE) approach at the national level and the chairman of the Engineering Education Research Group since 2005. He is also involved actively in the research for the future of engineering education in Malaysia 2006 under the Ministry of Higher Education of Malaysia.