Editor

Kleanthis Psarris

Recent Advances in Computer Science

Proceedings of the 6th WSEAS World Congress: Applied Computing Conference (ACC '13)

Proceedings of the 12th WSEAS International Conference on Information Security and Privacy (ISP '13)

Nanjing, China, November 17-19, 2013

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Preface

This year the 6th WSEAS World Congress: Applied Computing Conference (ACC '13) and the 12th WSEAS International Conference on Information Security and Privacy (ISP '13) were held in Nanjing, China, November 17-19, 2013. The conferences provided a platform to discuss programming languages, software engineering, computer networks, quantum computing, telecommunication systems, signal processing, speech processing, image processing, application security, authentication, malware, network security, e-commerce, hardware implementation, quantum cryptography 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 sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to 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

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Plenary Lecture 1

Evolutionary Multiobjective Optimization Algorithms to Environmental Management and Planning

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Abstract: Environmental management and planning problems cover important real lifeareas. These problems may includethe scarcity of groundwater resource, the optimality of a multireservoirsystem,the management of forestresources, the air quality monitoring networks, the municipal solid wastepolicies. Management and planning targets by authorities consist in allocations at appropriate places and times, protection from disasters, .maintenance of quality (e.g. water quality, water pollution control, nitrate concentration diminishing), sustainable development of the groundwater resources.
The formalization of such optimization problems includes multiple objectives and constraints. The multiple objectives consist in maximizing/minimizing of various aspects of environmental management, e.g. .maximizing of irrigation releases, maximizing the hydropower production, maximizing net returns, minimizing costs, minimizing the investment in water development, minimizing groundwater quality deterioration, etc.. Physical, biological, economic and environmental constraints are e. g; constraint of surface water balance, water supply constraints, water quality constraints, economic constraints (demand, resource costs, etc.) reservoir storage constraints.The eco-environmental objectivesare often conflicting (e.g. the optimum use of water resources under conflicting demands):The use of multiobjective optimization allows a simultaneous treatment of all the objectives and constraints. The solutions take the form of non-dominated Pareto solutions, which enable the decision makers to study the tradeoffs between the objectives(e.g. between profitability and risks).
Most of the environmental domains are faced to uncertainties due to variability (e.g. climate, rainfalls, hydrologic variability, environmental policy, markets, etc.), imprecision and lack of data, vagueness of judgments by decision makers. These uncertaintiesleadto extendedthe analysis to fuzzy environments. This presentation is then concerned with decision-making methods in environmental management and planning, where multiple objectives may be conflicting . Evolutionary multiobjective optimization techniques (e.g. niched Pareto genetic algorithm) are used under a fuzzy environment.

Brief Biography of the Speaker: Andre A. Keller (Prof.) is at present an associate researcher from the “Multi-agent Systems and Behaviors” division of LIFL (Lille Fundamental Computer Science Laboratory), a research unit UMR8022 of the French Centre National de la Recherche Scientifique (CNRS) by the Universite de Lille 1, Sciences et Technologies. He received a PhD in Economics (Operations Research) in 1977 from the Universite de Paris Pantheon-Sorbonne. He is a WSEAS Member since 2010 and a Reviewer for the ELSEVIER journal Ecological Modelling, the Journal Mathematical Analysis and Applications (jmaa) and WSEAS Transactions on Information Science and Applications. He taught applied mathematics (optimization techniques) and econometric modeling, microeconomics, theory of games and dynamic macroeconomic analysis. His experience centers are on building and analyzing large scale macro-economic models, as well as simulating economic policies, and forecasting. His research interest has concentrated on: high frequency time-series modeling with application to the foreign exchange market, on discrete mathematics (graph theory), stochastic differential games and tournaments, circuit analysis, optimal control in a fuzzy context. His publications consist in writing articles, books and book chapters. The book chapters are e.g. on semi-reduced forms (Martinus Nijhoff, 1984), econometrics of technical change (Springer and IIASA, 1989), advanced time-series analysis (Woodhead Faulkner, 1989), circuits enumeration (Springer, 2008), stochastic differential games (Nova Science, 2009), optimal fuzzy control (InTech, 2009), fuzzy games (Nova Science, 2010). One book is on “Time-Delay Systems:with Applications to Economic Dynamics & Control” (LAP, 2010). One another book is on “Nonconvex Optimization in Practice: Theory, Algorithms and Applications” (WSEAS Press, under review).

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Plenary Lecture 2

Algorithm Complexity in Theory and Practice

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Abstract: Data structures and algorithm design is the key issue in all computational systems. Fundamental questions are the computational complexity, memory requirements and in the case of distributed processing also data transmission between nodes etc. There are several algorithms known solving the same computational problem, but they have different properties with different numerical robustness.
Algorithms are usually evaluated by their computational complexity, however the computational complexity in the "rigid sense" as it is used within the Computational geometry field may lead, in the practical applications, to improper conclusion resulting into incorrect decision in the algorithms design. In some cases the algorithm acceleration also leads to instability and non-reliability of the final program due to low numerical robustness issues etc.
In the talk we will present a methodology for computational algorithms design, evaluation and their assessment with simple and illustrative examples. Also, we present a methodology how to decrease algorithm complexity, i.e. fundamental steps from the "brute force" algorithm design to an efficient, robust and fast algorithm. This methodology is based on 30 years teaching algorithms and programming of non-trivial computational problems.

Brief Biography of the Speaker: Prof. Vaclav Skala is a Full professor of Computer Science at the University of West Bohemia, Plzen and VSB-Technical University Ostrava, Czech Republic. He received his Ing. (equivalent of MSc.) degree in 1975 from the Institute of Technology in Plzen and CSc. (equivalent of Ph.D.) degree from the Czech Technical University in Prague in 1981. In 1996 he became a full professor in Computer Science. In 1997 the Center of Computer Graphics and Visualization (CCGV) was formally established and since then he is the Head of the CCGV in Plzen (http://Graphics.zcu.cz).
Prof.Vaclav Skala is a member of editorial of The Visual Computer (Springer), Computers and Graphics (Elsevier), Machine Graphics and Vision (Polish Academy of Sciences) and the Editor in Chief of the Journal of WSCG. He is a member of several international program committees of prestigious conferences and workshops. He is a member of ACM SIGGRAPH, IEEE and Eurographics Association.
Prof.Vaclav Skala has published over 200 research papers in scientific journal and at international conferences. His current research interests are computer graphics, visualization and mathematics, especially geometrical algebra, algorithms and data structures.
Details can be found at http://www.VaclavSkala.eu

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Plenary Lecture 3

Simulation and Statistical Analysis of Financial Dynamical Systems by Statistical Physics Systems

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Abstract: Behaviors of stock price changes in financial markets have long been a focus of economic research for a more clear understanding of mechanism and characteristics of financial markets. In the empirical research of financial markets, some statistical properties for the market fluctuations are uncovered by the high frequency financial time series, such as fat tails distribution of price changes, the power-law of logarithmic return and volume, volatility clustering which is described as on-off intermittency in literature of nonlinear dynamics, and multifractality of volatility, etc. For modeling, any model aiming at understanding price fluctuations needs to define a mechanism for the formation of the price. Recently, applying statistical physics systems to study statistical behaviors of fluctuations of financial market dynamics is a subject that has attracted more and more attentions of researchers, in an attempt to reproduce and explain this set of empirical facts. In the present work, the statistical physics systems are employed to explore the behaviors of price changes in the financial markets. Economic systems such as financial markets are similar to physical systems in that they are comprised of a large number of interacting “agents”. Most research approaches to finance view financial markets as complex evolving system, since these economic agents interact in complicated ways. Through the comparative analysis of statistical properties of logarithmic returns for the real market and the price model, the empirical research shows that the proposed financial model in the present work is rational for the real stock market to a certain extent.

Brief Biography of the Speaker: Professor and Dr. Jun Wang is a Full Professor at School of Science in Beijing Jiaotong University, P.R. China. He is also the Director of Institute of Financial Mathematics and Financial Engineering. He received his B.Sc. degree in Mathematics from Beijing Normal University, and received his Ph.D. degree in Probability and Statistics from Kobe University of Japan, and continued his research work in Kobe University as a researcher supported by Japan Society for the Promotion of Science. Professor Wang has wide research interests, which include: Large Scale Interacting Systems, Stochastic Systems, Dynamical Systems, Statistical Physics Systems, Non-linear Systems, Stochastic Control, Artificial Intelligence, Neural Networks, Modeling and Computer Simulation, Probability Theory and Statistics, Financial Mathematics, Financial Engineering, and Financial Statistics.

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