

Preface

The objective of the book is to give a selection from the papers that summarize several important results obtained within the framework of the József Hatvany Doctoral School operating at the University of Miskolc, Hungary. In accordance with the three main research areas of the Doctoral School established for Information Science, Engineering and Technology, the papers can be classified into three groups. They are as follows: (1) Applied Computational Science; (2) Production Information Engineering (IT for Manufacturing included); (3) Material Stream Systems and IT for Logistics. The volume contains 12 papers in all.

As regards the first area, some papers deal with special issues of algorithm theory and its applications, with computing algorithms for engineering tasks, as well as certain issues of database systems and knowledge intensive systems. In the following we attempt to give a brief summary of each paper.

Csendes, Cs. and Fegyverneki S.: *Parameter Estimation for Symmetric Stable Distribution by Probability Integral Transformation*. In this paper a new parameter estimation method for symmetric stable distributions is presented, which is a variation of maximum likelihood type M-estimators. A simulation study is performed to compare the proposed estimator with other methods based on performance properties and assessing convergence of the estimators.

Johanyák, Zs. Cs. and Kovács, Sz.: *Prediction of the Network Administration Course Results Based on Fuzzy Inference*. In the paper, the authors report on the development of a fuzzy model that is based on the previous performance of currently enrolled students, and gives a prediction for the number of students who will fail the exams of the Network Administration course at the end of the autumn semester (Least Squares-based Fuzzy Rule Interpolation).

Barabás, P. and Kovács, L.: *Optimization Tasks in the Conversion of Natural Language Texts into Function Calls*. Natural language processing (NLP) is a well known and an increasingly more important area in human-computer interaction. The goal of this paper is to develop a natural language framework, which will be used to extend existing systems with a natural language controlling capability.

Tóth, Zs. and Kovács, L.: *Pattern Distillation in Grammar Induction Methods*. The rule extraction phase plays a very important role in Context-Free Grammar induction systems. In the paper two novel methods are presented for pattern mining. The first is based on extended regular expressions and a multiplicity approach. The second method is based on the theory of concept lattices.

Mileff, P. and Dudra, J.: *Advanced 2D Rasterization on Modern CPUs*. This paper aims to investigate how effectively multi-core architecture can be applied in the two-dimensional rasterization process and what the benefits and bottlenecks of this rendering are. The authors answer the question of whether it would be possible to design a software rendering engine to meet the requirements of today's computer games.

Hriczó, K. and Bognár, G.: *Numerical Analysis of Free Convection from a Vertical Surface Embedded in a Porous Medium*. In this paper, the numerical solutions for free convective heat transfer in a viscous fluid flow over a vertical flat plate embedded in a porous medium under mixed thermal boundary conditions are examined. Applying a similarity transformation the transformed system of ordinary differential equations is investigated numerically.

Related to the second research area, except for the last paper dealing with a special measuring method, the focus is on Production Information Engineering with special regard to discrete production processes. As regards the Unhauzer paper, the author describes a new, complex IT solution suitable for measuring the relevant flicker parameters. In the following we give a brief summary of the papers.

Bikfalvi, P., Erdélyi, F., Kulcsár, Gy., Tóth, T. and Kulcsárné Forrai, M.: *On Some Functions of the MES Applications Supporting Production Operations Management*. As is known, the model-based decision support functions of business and manufacturing processes can be classified into different hierarchical levels, in accordance with their functions, objects, and time horizons. In this paper two methods for improving the quality of Production Operations Management (POM) are presented: a proactive one, using simulation-based fine scheduling, and a reactive one, based on evaluation of some Key Performance Indices (KPIs) determined from an efficient analysis of shop-floor production data. Both methods exploit the advantages of software applications used in different Manufacturing Execution System (MES) components.

Dudás, L.: *New Theory and Application for Generating Enveloping Surfaces without Undercuts*. The design and improvement of kinematical motion transfer surfaces (gear surfaces) require the modeling of surface–surface enveloping process and visualization of contact characteristics. To analyze the quality of mesh in respect of undercut, this study uses the special visualization capability of the Surface Constructor (SC) system developed by the author. The paper shows not only the theoretical background of the software but also gives a brief summary of a practical application.

Paniti, I.: *New Solutions in Online Sheet Thickness Measurements in Incremental Sheet Forming*. This paper discusses an approved analytical framework of Single Point Incremental Forming (SPIF) of sheet metals, which is capable of modeling the state of stress in the small localized deformation zone in case of corners, flat, and rotationally symmetric surfaces. The discussion focuses on the investigation of the sheet thickness prediction in the shell element used in the framework. Novel solutions are introduced in terms of online sheet thickness measurement and adaptive control in SPIF. A brief summary of a recently patented solution in Incremental Sheet Forming is also given in the paper.

Unhauzer, A.: *New Online Flicker Measuring Method and Module*. Flicker is a sequence of flashing lamp pulses which imperceptibly influences the human body and the environment. This paper describes a new online flicker measurement method and a multiple-tested software module based on multithreading technology that has been developed for the objective and exact analysis of electrical networks. The necessary theoretical background and the main development steps will also be shown.

The papers connecting with the third research field deal with different issues of materials stream systems and logistics. In the following we outline their content briefly.

Skapinyecz, R. and Illés, B.: *Presenting a Logistic Oriented Research Project in the Field of E-marketplace Integrated Virtual Enterprises*. The aim of the paper is to present an ongoing research project in the field of Virtual Enterprises, focusing mainly on perspectives of logistics (with special regard to freight transport) and e-commerce. In addition, the paper also gives a practical overview of the utilization of e-marketplaces in the logistics industry, supplemented by some practical examples.

Illés, B. and Illés, B.: *Agribusiness Clusters and Logistic Processes Through the Example of Hungary*. This paper shows a basic summary of the logistic processes that should be considered when decision-makers are to establish a hub-and-spoke type business network. Tools for creating a hub-and-spoke network for waste management can be implemented for different types of wastes as well. The reason for choosing this area is the commitment of the authors to the agricultural development of Hungary.

The book makes an effort to ensure an equilibrium between theory and practice and to show some new approaches from the theoretical modeling aspect, as well as experimental and practical points of view.

Gabriella Bognár
Tibor Tóth

Applied Information Science, Engineering and
Technology

Selected Topics from the Field of Production
Information Engineering and IT for Manufacturing:
Theory and Practice

Bognár, G.; Tóth, T. (Eds.)

2014, X, 227 p. 115 illus., Hardcover

ISBN: 978-3-319-01918-5