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Preface

Welcome to the booklet of the abstracts of papers to be presented at the 10th International Conference on Information and Intelligent Systems (IIS'99). All submitted abstracts have been reviewed by A. Lovrenčić (member of the Organizing Committee), Mirko Maleković (chairman of the International Program Committee), and M. Čubrilo, B. Divjak and T. Hunjak (members of the International Program Committee). The booklet contains 49 accepted abstracts from 9 countries. We have classified the abstracts into invited lectures [5 abstracts] and nine topics: Information and Intelligent Systems [2 abstracts], Strategic Planning of Information Systems [2 abstracts], The Role of Information Systems in Planning and Decision Support [8 abstracts], Information Systems in Manufacturing [7 abstracts], Information and Communication Technologies [4 abstracts], Intelligent Systems Techniques and Methods [7 abstracts], Data and Knowledge Bases [8 abstracts], Multimedia Systems [3 abstracts], and Informatics Education [3 abstracts]. This booklet is an integral part of our Conference Kit that also includes a CD-ROM with the full versions of accepted papers which have also been reviewed by the people mentioned above. After the Conference all presented papers will be reviewed by at least two independent referees, where one referee must be international. Accepted papers will be published in a special issue of the international journal 'Zbornik radova' published by the Faculty of Organization and Informatics in Varaždin.

At the end of this preface, we wish to thank all those who have contributed to this Conference. Our special thanks go to the authors of the papers and to the cooperating institutions and sponsors who have helped us. We are thankful to professor Boris Aurer (former chairman of the Conference, 1995-1998) who has been doing his best in order to improve the quality of the Conference.

Finally, we hope that you will attend many good lectures and presentations during the Conference. We also hope that you will enjoy your stay with us here in Varaždin.

Varaždin, September 1999

Editors: Mirko Maleković
Alen Lovrenčić

Contents

Invited Lectures

Intelligent Systems in the Information Age

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Basic laws and properties of intelligent systems and the information age are introduced. It is argued that information overload in the information age introduces a new generation of computer systems: intelligent systems, and intelligent agents in particular. We analyse why and how the information age provides background and motives for the introduction of these systems in every-day activities.

Goals and Technologies for the 21st Century Company

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The success of the 21st Century Company will depend on a complex variety of factors, several of them relying very much on the immediate availability of the right information on the right moment in time. We can easily point to some of those success factors. In the first place the company should continuously scan the environment to discover changes in the conditions or behavior of customers, suppliers, the government or the competitors that might require an immediate reaction. The company should also be a learning company that tries to draw lessons from experiences, failures and successes. In this respect it should build and maintain a rich knowledge base about all its processes and about the environment. The awareness of changes and the knowledge base will make it possible to react quickly on changing situations in customer behavior and market situation. The company should also be aware of the globalization of the market that goes together with a diversity of products in different markets and cultures.

The company has to use its knowledge assets to learn from the variety of inputs and will have to innovate products, services and processes more rapidly. It will have to mutate rapidly to bring innovations to market in order to stay ahead of the competition. This will be enabled by information knowledge of customers, products and processes.

The competition will not only be based on the products and the marketing but also on added values like access to information or immediacy of service that go together with the product. Immediate reaction on all events will be a requirement. The "Gartner Group" calls this the "Zero Latency Company". The tendency of moving to very client-oriented organizational structures, based on the availability of information, leads to a situation where a company consists of highly independent cells, acting as separate small companies, using each-other as service suppliers for non-core activities. This concept, highly based on telecommunications, is known as the "virtual company".

All this should be done while the company is constantly monitoring the value-chain cost. The continuous evolution of a reliable and performant information system environment will be one of the major critical success factors to achieve these goals. It is something that should be managed carefully by a leader that understands the concept of service, and that can combine business problems and state-of-the art technology into a working information environment. The corporate information manager should have a clear vision on the communication needs and he should build partnerships with users and with ICT-service suppliers to promote and initiate changes.

Interior-point Methods and Modern Optimization Codes

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Last fifteen years we have witnessed an explosive development in the area of optimization theory due to the introduction and development of interior-point methods. This development has soon been transferred into the development of new and more efficient optimization codes. In the first part of the talk, the basic elements of interior-point methods for linear programming will be discussed as well as extensions to nonlinear programming, complementary problems, and semidefinite programming. Interior-point methods are polynomial and effective algorithms based on Newton's method. With their introduction, the classical distinction between linear programming methods, based on simplex algorithm and methods of nonlinear programming has largely disappeared. In the second part of the talk, a brief overview of some modern optimization codes based on interior-point methods will be presented. By now there are no doubts that for the large-scale linear programming problems this new optimization codes are more efficient than classical optimization codes based on simplex method.

Towards the Generalization of T-Operators: a Distance Based Approach

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Aggregation is one of the key issues in the development of intelligent systems, like neural networks, fuzzy knowledge based systems, vision systems, decision making systems. From the point of view of a particular application the choice of the most appropriate operator is an important part of system design. This paper gives a brief summary of the most well known operators, such as t-norms, t-conorms, uninorms, averaging- and compensative operators, and outlines their most important properties. Starting from a fuzzy entropy approach two new pairs of distance based binary operations, their generalization are introduced and the properties are outlined.

Growing Intelligent Information Systems from the Bottom Up – The Role of Autonomous Agents and Multi-Agent Systems

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The future of networking will be shaped by open, heterogeneous and complex networks. Information systems and applications in this environment will have to cope with a structural problem of being unable to get full information and control over their processes and outcomes. Intelligent agents and multi agent systems propose a better way to work in an unknown and changing environment, but the software design of information systems with a multitude of autonomous entities is a very complex task. In this article, we propose an information systems design that is derived from economics, and that is characterised by autonomous, negotiating software agents and evolutionary learning mechanisms to adapt to changing environmental conditions. Starting with the development of a software prototype, a research agenda for further investigation in so-called Catallactic Information Systems is set up.

Information and Intelligent Systems: Theory, State, Develoment

An Algorithm for the Recognition of Handwritten Symbols

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The paper presents an algorithm for the recognition of handwritten symbols in a case when the lines drawn by the user can be presented as a well defined data structure (e.g. an array). This typically occurs when writing with mouse or writing pen. Symbols have to be predefined in a learning process that precedes the recognition. The algorithm of recogni-tion can be subdivided into three phases: i) scanning of the entered symbols, ii) adjoining of separate lines into shapes, iii) recognition of the shapes. The last phase of recognition consists of the formatting of the shapes into standardized forms, and of comparison of the standardized form bitmap to bitmaps in the pattern database. By providing more than one sample pattern for each symbol, the percentage of successful recognition can be significantly improved. The algorithm is tested in various ways, and compared to some other known solutions of the problem. It can be considered as producing good recognition results, while being relatively simple to implement. Some limitations of the algorithm in its present state are discussed, as well as possibilities for its further improvement. The program is implemented as a self-standing application, and as a Web-based application accessible via Internet.

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