An Introduction to the Special Focus Issue "Decision Analytics"

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Nowadays information systems allow the use of large amounts of digital, structured data for decision making. The power and ability of hardware and software has been significantly increased. Related information and communication technology (ICT) provides a competitive advantage in various fields, such as supply chain management, logistics, marketing, and telecommunications, to name just a few. It incorporates and links to information systems, planning tools for decision support as well as supporting devices. While modern ICT systems are vital components in decision making, their successful management rests on coordinated decision making using analytical methods.

Decision analytics is the research and application area comprising theory, methodology, and practice to analyze and support important managerial decisions in a formal manner. The methods include models for optimization of one or more goals, decision-making under conditions of uncertainty, techniques of risk analysis and risk assessment, techniques for facilitating group decision making, as well as software and expert systems for decision support. Special tools can be used for representing and formally assessing important aspects of decisions, so that they help decision makers to leverage the knowledge hidden within organizational data. Tools implemented with ICT involve data mining, optimization, simulation, pattern recognition, prescriptive methods, predictive modeling, and performance management.

This special focus issue strives to explore the synergies between decision analytics and information systems. The call for papers published in Issue 1/2013 led to a high amount of more than 30 submissions. After a reviewing process with several revisions for most submissions, four papers were finally selected for publication in this special focus issue. Furthermore, the special focus issue contains an interview with Dan Dolk and Christer Carlsson, both of whom are since many years well-known experts in decision analytics and information systems.

The authors Köpp, von Mettenheim, and Breitner of the first article, study the research question "How can an adequate visualization enable decision analytics for today's ensemble forecast methods?" and present research results showing how heatmaps can be used to visualize multi-stage forecasts that have been computed with Historically Consistent Neural Networks (HCNN). The forecast information can be intuitively presented to a decision maker, simultaneously exploiting all distribution information. Through visualization of distributions with all possible outcomes the forecast output is made much easier to interpret for the human decision maker than with traditional presentation techniques.

In the paper "Robust Multi-criteria Service Decomposition in Information Systems" the authors Ramacher and Mönch discuss software service compositions to implement business processes in an environment with service-oriented architecture. The services to be composed are selected based on functional requirements and their quality. The approach can be described as Quality-of-Software-aware service selection and can be modeled as an NP-hard multi-criteria optimization problem. The article presents a multi-criteria, metaheuristic-based solution approach for the service selection problem, where the algorithm is designed to determine a Pareto frontier of alternative service selections in a reasonable amount of time.

The article by Cleophas and Ehmke examines decision analytics for logistics networks, especially for last-mile deliveries within a city. Due to the ongoing growth of e-business, online retailing is a fast growing sector and needs new planning methods for last-mile deliveries that are often considered to be expensive and inefficient. The authors argue that in order to be profitable, e-commerce businesses need to maximize the overall value of fulfilled orders, rather than their number, simultaneously limiting the costs of delivery. The paper presents an iterative solution approach that combines methods from revenue management and cost-minimizing routing. Actual delivery requests are accepted or rejected, aiming to maximize the overall value of orders given the computed transport capacity.

The fourth paper written by Santos-Arteaga, Di Caprio, and Tavana, focuses on the information acquisition strategy of individual decision makers. The aim is to select information in such a way that it prevents the decision maker from regretting his or her current decision. The authors introduce a new idea of value of information that relates to the regret that may arise from the potential choices made by a decision maker. Information will be considered valuable if it prevents the decision maker from making the choice that he or she would be willing to make given the information that is currently available. Numerical simulations illustrate the behavior of decision makers when considering the value of information within the information acquisition process.

We would like to express our sincerest gratitude to all the authors and numerous reviewers for their valuable contributions that have led to an interesting, high-quality special focus issue. The selected articles give an idea of how rich and multifaceted research in decision analytics and information systems can be. There were further high-quality contributions among the submissions, and we expect to be able to publish more articles from this research field in subsequent issues of the BISE journal.