Preface

Human-computer interaction (HCI) is a multi-disciplinary subject that involves information technology, computer science, psychology, library science, education, business and management, human factors, industrial engineering and ergonomics. As more and more peoples’ life relate to interactions with computer systems, researchers, designers, managers and users have ever-stronger desires to understand the complexity, current situation and future development of HCI. This book will present a broad view of theoretical and practical issues in HCI to serve such desires. The goal of this book is to reflect most current, primary issues regarding human-computer interactive systems. It emphasizes effective design, use and evaluation on computer interactive systems. It also intends to highlight the trend of HCI research, design and management at the turn of the century.

The effective HCI has been recognized as a very promising and challenging area for both research and applications. The objective of an interface is to adapt system responses to the user effectively in a complex computer-based task. In the context of human computer interaction, the relationship between a human and a computer involves many factors such as the computing environment, the nature of the tasks to be performed, as well as various characteristics of the users. The effectiveness of a human-computer interface system is influenced greatly by its ability to adapt to these factors.

This book contains fifteen chapters. They covered variety issues such as interface design and evaluation methodology, cognitive models and user models, health and ergonomic studies, empirical studies of user factors, intelligent agents, user interface prototyping, hypertext and virtual reality, and managerial issues in interface design.

The chapter by Drommi addresses the methodology that incorporates human behavior factors into the process of interface design. It emphasizes that the embedded process of interface design for human interactivity is essential for products that meet social and functional standards. The author discusses how the traditional process of software engineering embeds interface design as a task component. It shows that the interface design process has grown as a discipline and is beyond the single process within a larger scheme that may be lost on the priority list.

The chapter by Ambler describes the importance and the methodology of interface development that should be implemented within an organization’s software development lifecycle. The author discusses overviews a collection of techniques for each phase of software development, showing how user interface development can easily be integrated into the overall software process.
The chapter by Lowgren argues that an appropriate design perspective is better suited to meet the challenge than the traditional foundations of experimental psychology and information systems development. The author discusses the idea of interaction design and the issues of interactive systems with particular emphasis on their use qualities. The author also discusses a number of foundational concepts from contemporary design studies and interaction design perspective as well as their implications to software development and higher education.

There are four chapters in this book addressing the issues of applying agent technology to facilitate interactive systems. The chapter by Ayala addresses modeling of intelligent agent to support a learning environment through collaborative social interaction. The collaboration is based on the social construction of knowledge. The chapter includes a discussion on the requirements for modeling software agents for learning environments, as well as the use of AI techniques for their implementation. The HCI issues of group configuration and awareness based on learner modeling in web-based environments are also discussed.

The chapter by Park and Sugumaran focuses on the modeling phase of agent-oriented software life cycle. The authors present an approach for agent modeling consisting of Agent Elicitation, Intra, and Inter Agent modeling methods. Agent Elicitation deals with identifying and extracting agents from “classes” in the real world. Intra Agent modeling involves expressing agent characteristics such as goal, belief, plan and capability. Inter Agent modeling incorporates agent mobility and communication.

The chapter by Darbyshire and Lowry explores the application of agent technology to evolve an information system. In particular, the use of agents to evolve an educational subject management application is viewed in relation to an ongoing project. The authors discuss the potential of agent technology to advance Web-based subject management courseware to a further evolutionary stage.

The chapter by Raisinghani, Klassen and Schkade provides an analytical review on software agents from a socio-technical viewpoint. This chapter presents some of the challenges of the current state of intelligent agent software technology. They include issues such as lack of standardization in mobile agents that may cause lack of ability of tracing identity and the security concerns related to limiting agent access rights.

The chapter by Chen and Norcio discusses the issues of user modeling and its role in adaptive human-computer interface. Particularly, it focuses on knowledge acquisition and representation in user modeling. The authors present several problems in traditional user modeling systems and suggest using neural network technology to address those problems.

The chapter by Sillince and Duska addresses the issue of how, in com-
puter-mediated communication, an individual keeps in touch with what everybody else is doing. This issue is important to ensure team-workers to act proactively rather than to spend too much time on watching and listening passively. This chapter presents a cognitive model that provides a number of practical advantages for supporting the process of teamwork in computer-mediated environment.

The chapter by Chang and Jin presents a design to support the content-based information retrieval. A high-dimensional index structure based on the X-tree is developed to store and retrieve both color and shape feature vectors efficiently in an XML document retrieval system. The performance is evaluated in terms of system efficiency, such as retrieval time, insertion time, storage overhead, as well as system effectiveness, such as recall and precision measures.

The chapter by Lemahieu presents a hypermedia framework that is a structured approach to both data modeling and navigation, so as to overcome the problems of maintainability and user disorientation. The data model provides a hyperbase structure and an abundance of meta-information that facilitates implementation of an enhanced navigation paradigm. The author discusses this context-based navigation paradigm that builds upon the data model to reconcile navigational freedom with nested, dynamically created guided tours. The intended navigation mechanism functions as an “intelligent book” to provide a disoriented user with a sequential path as guidance.

The chapter by Lazar and Norcio presents a case study of user considerations in e-commerce transactions. The authors discuss the users’ needs for functionality and usability of an interactive system for e-commerce transaction. Results of a study of over 150 users and the factors that influence their decision of purchase are presented and analyzed. This chapter is an example of current research on user satisfaction for e-commerce transactions.

The chapter by Ogata, Yano and Furugori describes an interactive system, PeCo-Mediator-II, to seek for capable cooperators with the chain of personal connections in a networked organization. It shows that this system helps gathering, exploring, and visualizing social networks in an organization. The experimental results show that the system facilitates users encounter cooperators and develop a new helpful relationship with the cooperators.

The chapter by Ron Purser discusses the possible social impact that Virtual Reality technology may have on society. This chapter examines two possible future scenarios for Virtual Reality technology, “VR1” versus “VR2.” VR1 is shown to lead to further cultural fragmentation and pathologies of perception, whereas VR2 could evoke a cultural renaissance that stimulates social creativity and the evolution of consciousness.

The chapter by Lapeer, Chios, Linney and Alusi discusses the concepts of human-computer interaction in the context of computer assisted surgical
interventions, training and planning (CASPIT). This chapter presents some examples in commercial and academic applications in CASPIT. It also provides a case study on the ergonomic issues of computer assisted ENT surgery using augmented reality (CAESAR).

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