

Introduction

Decades of research on user modeling, personalization and recommender systems have led to a solid body of general approaches, principles, algorithms and tools. Personalization has become a core functionality in search engines, online stores and social media feeds.

In the area of Human-Computer Interaction (HCI), personalization plays a prominent role as well. For instance, interaction with computer-based devices requires users to exhibit a wide range of physical and cognitive abilities, which differ from person to person. Further, most users have their own preferred interaction styles, modalities, devices and user interfaces, which raises the need for personalization in all aspects of HCI. Even though personalization is a commonly adopted technology, many principles and insights from the research community have not yet sufficiently been applied.

User modeling refers to the process of collecting data about users, inferring a user model in order to apply this model to customize and personalize systems. Personalized systems use this model to adapt the interaction with the users to their requirements, preferences, background knowledge, restrictions, usage contexts and/or goals. The adaptation can be carried out in different manners, e. g., modifying a user interface according to the user's capabilities or knowledge about the system, or proposing interesting and relevant items to a user in a recommender system to reduce information overload. In this book, core researchers present the state-of-the-art in research and practice on adaptation and personalization from the perspective of HCI in a wide range of areas.

The book chapters of the first edition were elicited via a public call for chapters. We received 24 abstracts and accepted 11 full-chapter submissions after a thorough selection and reviewing process. For the second edition, we invited experts to write four additional chapters on current and emerging topics in personalized human-computer interaction. Existing chapters have been revised to reflect developments in the years in between both editions. We have grouped the chapters into the following parts: (1) Foundations of personalization, (2) User input and feedback, (3) Personalization purposes and goals and (4) Personalization domains.

Foundations of personalization (Chapters 1–3)

The first chapter, “*Theory-driven user models for personalization*” by Mark P. Graus and Bruce Ferwerda presents a literature overview of models from psychological theory that can be used in personalization. The motivation is to leverage the theoretical understanding between behavior and user traits that can be used to characterize individual users. They propose a step-by-step approach on how to design personalized systems that take users' traits into account.

The second chapter focuses on principles for “*User-centered recommender systems*.” It has been recognized that optimizing recommender systems in terms of algorithm ac-

curacy often does not result in corresponding levels of user satisfaction. Jürgen Ziegler discusses the use of visualizing and explaining recommendations, as well as methods for eliciting preferences and critiquing. Also in the chapter quality factors are discussed that are important from a user point of view, including novelty, serendipity, diversity and trustworthiness.

Finally, Markus Schedl and Elisabeth Lex introduce principles of “*Fairness of Information Access Systems*.” They discuss various sources of bias and methods to measure this. Further, the chapter gives an overview on methods to mitigate harmful bias during pre-processing, in-processing and post-processing. The chapter ends with conclusions and open challenges.

User input and feedback (Chapters 4–7)

The second part of the book focuses on user input and feedback options in adaptive systems.

Mirjam Augstein and Thomas Neumayr discuss personalized interaction in their chapter “*Personalization and user modeling for interaction processes*.” They provide a concise overview of literature on personalized interaction and the underlying user modeling activities, and domains that have been in the focus of related research. Further, they describe the developments in this field throughout the past decades based on their targeted literature review.

Tobias Moebert, Jan Schneider, Dietmar Zoerner and Ulrike Lucke look at cause-and-effect models behind adaptive training systems in the chapter “*How to use socio-emotional signals for adaptive training*.” They explain mechanisms for implementing the models and also empirical results from a study on the training of emotion recognition by people with autism as an example. They present two approaches; one is to extend the algorithm regarding dimensions of difficulty in social cognition. The second approach is to make use of socio-emotional signals of the learners in order to further adapt the training system.

“*Explanations and user control in personalized systems*” by Dietmar Jannach, Michael Jugovac and Ingrid Nunes review explanations and feedback mechanisms in recommender systems. Often, these systems are black boxes for users and do not provide information on why items were recommended. In addition, users frequently have very limited means to control the recommendations, which may lead to limited trust and acceptance.

Building upon insights in the previous chapters, Eelco Herder and Claus Atzenbeck describe “*Feedback loops and mutual reinforcement in personalized interaction*.” The chapter focuses on how computers support human decision-making and the role that persuasive techniques play in this process. It is shown how human-system feedback loops lead to short-term as well as long-term mutual reinforcement, with several negative effects that can be observed in current commercial recommender systems and

social media. The authors discuss several techniques to stimulate active, conscious decision making to overcome these issues.

Personalization purposes and goals (Chapters 8–10)

Following the foundations of personalization and the principles of user input and feedback, the third part of this book is dedicated to selected purposes and goals for personalized human-computer interaction.

The chapter “*Personalizing the user interface to people with disabilities*” by Julio Abascal, Olatz Arbelaitz, Xabier Gardeazabal, Javier Muguerza, Juan E. Pérez, Xabier Valencia and Ainhoa Yera deals with user interface personalization for people with disabilities. The authors present methods and techniques that are being applied to research and practice in this important application area for personalized human-computer interaction. They outline possible approaches for diverse application fields where personalization is required, for example, accessibility to the web using transcoding or personalized eGovernment.

In “*Personalized persuasion for behavior change*,” Judith Masthoff and Julita Vasileva give a comprehensive introduction to persuasive technology. The chapter provides theory on behavioral economics and behavioral determinants, followed by frameworks and techniques for personalization for behavior change. Further, the authors introduce selected application domains, including healthy living, sustainability and participation in communities. The chapter concludes with evaluation techniques and ethical issues in the domain of persuasion.

Chiara Luisa Schleu and Mirjam Augstein further focus on “*Personalization approaches for remote collaborative interaction*.” The chapter starts with an overview of systems and approaches for Computer-Supported Collaborative Work (CSCW). The authors continue with an empirical study in which they identify critical situations, support measures and design implications for personalized interaction support in collaborative settings. The results are wrapped up in a taxonomy that is extensively discussed in the final part of this chapter.

Personalization domains (Chapters 11–13)

The fourth part of the book is about the application of adaptation and personalization in interactive systems in the domains of music recommendation and tourism.

Music recommender systems represent a widely adopted application area for personalized systems and interfaces. In their chapter, “*User awareness in music recommender systems*,” Peter Knees, Markus Schedl, Bruce Ferwerda and Audrey Laplante focus on the listener’s aspects of music recommender systems. The authors review different factors that influence relevance for music recommendation, for example, the individual listener’s background and context. This is complemented by a discussion on user-centric evaluation strategies for music recommender systems and a reflection on current barriers as well as on strategies to overcome them.

“Tourist trip recommendations – foundations, state-of-the-art and challenges” by Daniel Herzog, Linus W. Dietz and Wolfgang Wörndl surveys the field of Tourist Trip Design Problems (TTDP). TTDP deals with the task of supporting tourists in creating personalized trips with sets or sequences of points of interest or other travel-related items. The authors present trip recommender systems with a focus on recommendation techniques, data analysis and user interfaces.

Continuing the tourism domain, Wilfried Grossmann, Julia Neidhardt and Hannes Werthner present their chapter *“Pictures as a tool for matching tourist preferences with destinations.”* They introduce a so-called Seven Factor Model for characterizing the preferences of tourists by assigning values in this model with a picture-based approach. For this purpose, users select pictures that represent various personality aspects and destination descriptions. The authors evaluated their profile acquisition method with a study using data from a travel agency.