Human–Computer Interaction Series

HCI is a multidisciplinary field focused on human aspects of the development of computer technology. As computer-based technology becomes increasingly pervasive—not just in developed countries, but worldwide—the need to take a human-centered approach in the design and development of this technology becomes ever more important. For roughly 30 years now, researchers and practitioners in computational and behavioral sciences have worked to identify theory and practice that influences the direction of these technologies, and this diverse work makes up the field of human-computer interaction. Broadly speaking it includes the study of what technology might be able to do for people and how people might interact with the technology. The HCI series publishes books that advance the science and technology of developing systems which are both effective and satisfying for people in a wide variety of contexts. Titles focus on theoretical perspectives (such as formal approaches drawn from a variety of behavioral sciences), practical approaches (such as the techniques for effectively integrating user needs in system development), and social issues (such as the determinants of utility, usability and acceptability).

Titles published within the Human–Computer Interaction Series are included in Thomson Reuters' Book Citation Index, The DBLP Computer Science Bibliography and The HCI Bibliography.

Marko Tkalčič · Berardina De Carolis
Marco de Gemmis · Ante Odić
Andrej Košir
Editors

Emotions and Personality in Personalized Services

Models, Evaluation and Applications

Springer

Editors
Marko Tkalčič
Department of Computational Perception
Johannes Kepler University
Linz
Austria

Berardina De Carolis
Department of Computer Science
University of Bari Aldo Moro
Bari
Italy

Marco de Gemmis
Department of Computer Science
University of Bari Aldo Moro
Bari
Italy

Ante Odić
Preserje, Ljubljana
Slovenia

Andrej Košir
Faculty of Electrical Engineering
University of Ljubljana
Ljubljana
Slovenia

To our families, for their patience and support. To our colleagues, for their critical and constructive comments

Marko Tkalčič
Berardina De Carolis
Marco de Gemmis
Ante Odić
Andrej Košir

Preface

Personalized systems aim at adapting the content, the interface or the services in general to each user. As an integral part of our daily interactions on the web in various forms, from search engines to online shopping websites, they help us find contents more efficiently. The technologies that drive the adaptation to end users are based on the inference of user's preferences and characteristics from the traces that the user leaves while interacting with the applications. Traditionally, explicit and implicit user feedback has been used to model the users.

Personalized services can now take advantage of more detailed user profiles that include highly descriptive features, such as emotions and personality. This has become possible with the advent of robust methods for an unobtrusive detection of personality, emotions and sentiments from different modalities, such as social media traces, mobile devices and sensors.

This book brings in a single volume the basic bricks needed to understand and build personalized systems based on emotions and personality along with more advanced topics. It bridges personalization algorithms, such as recommender systems, with psychologically motivated user-centric concepts, such as emotions and personality. It translates psychological theories of emotions and personality into computational models for use in personalization algorithms. It surveys techniques for the implicit and explicit acquisition of personality, emotions, sentiments and social signals from sensors, mobile devices and social media. It provides design hints to develop emotion- and personality-aware systems as well as examples of personalized applications that make good use of personality. This book will help researchers and practitioners develop and evaluate user-centric personalization systems that take into account the factors that have a tremendous impact on our decision-making emotions and personality.

In the first part of the book, the theoretical background for the psychological constructs of emotions and personality is given. The second part covers the state-of-the-art methods for the unobtrusive acquisitions of emotions, personality, social signals and sentiments. The third part describes the concrete applications of personalized systems working in a wide range of domains (from music

recommendation to e-learning) with different aims, such as improving algorithms for context-aware recommendation or diversification of suggested items. Ethical issues are discussed as well.

We would like to thank all of the authors for their contributions to this book. Also, special thanks go to the reviewers that assured the high quality of the chapters. We are grateful to the Springer staff, especially Beverley Ford and James Robinson for their support throughout the production of this book. Last but not least, we are thankful to many of our colleagues that supported this effort through critical and constructive discussions.

Linz, Austria   Marko Tkalčič
Bari, Italy   Berardina De Carolis
Bari, Italy   Marco de Gemmis
Ljubljana, Slovenia   Ante Odić
Ljubljana, Slovenia   Andrej Košir
April 2016

Contents

Part III   Applications

Part IV   Evaluation and Privacy

Contributors

Elisabeth André Human Centered Multimedia, Augsburg University, Augsburg, Germany

Tobias Baur Human Centered Multimedia, Augsburg University, Augsburg, Germany

Gordon Briggs Human-Robot Interaction Laboratory, Tufts University, Medford, MA, USA

Robin Burke College of Computing and Digital Media, DePaul University, Chicago, IL, USA

Iván Cantador Universidad Autónoma de Madrid, Madrid, Spain

Berardina De Carolis Department of Computer Science, University of Bari Aldo Moro, Bari, Italy

Yin Wah Fiona Chan University of Cambridge, Cambridge, UK

Li Chen Hong Kong Baptist University, Kowloon Tong, Kowloon, Hong Kong

Francesca D'Errico Psychology Faculty Roma, Uninettuno University, Rome, Italy

Miriam Fernández Knowledge Media Institute, Milton Keynes, UK

Ailbhe N. Finnerty Fondazione Bruno Kessler, Povo-Trento, Italy

Marco de Gemmis Department of Computer Science, University of Bari Aldo Moro, Bari, Italy

Liang He East China Normal University, Minhang District, Shanghai, China

Marius Kaminskas Insight Centre for Data Analytics, University College Cork, Cork, Ireland

Michal Kosinski Stanford Graduate School of Business, Stanford, CA, USA

Andrej Košir Faculty of Electrical Engineering, University of Ljubljana, Ljubljana, Slovenia

Neal Lathia Computer Laboratory, University of Cambridge, Cambridge, UK

Bruno Lepri Fondazione Bruno Kessler, Povo-Trento, Italy

Pasquale Lops Department of Computer Science, University of Bari Aldo Moro, Bari, Italy

Matija Marolt University of Ljubljana, Faculty of Computer and Information Science, Ljubljana, Slovenia

Cecilia Mascolo Computer Laboratory, University of Cambridge, Cambridge, UK

Sandra Matz University of Cambridge, Cambridge, UK

Bamshad Mobasher College of Computing and Digital Media, DePaul University, Chicago, IL, USA

Mirco Musolesi Department of Geography, University College London, London, UK

Ante Odić Outfit7 (Slovenian Subsidiary Ekipa2 D.o.o.), Ljubljana, Slovenia

F. Javier Ortega Universidad de Sevilla, Seville, Spain

Veljko Pejovic Faculty of Computer and Information Science, University of Ljubljana, Ljubljana, Slovenia

Matevž Pesek University of Ljubljana, Faculty of Computer and Information Science, Ljubljana, Slovenia

Fabio Pianesi Fondazione Bruno Kessler and EIT-Digital, Povo-Trento, Italy

Isabella Poggi Dipartimento di Filosofia Comunicazione Spettacolo, Roma Tre University, Roma, Italy

Francesco Ricci Faculty of Computer Science, Free University of Bozen-Bolzano, Bozen-Bolzano, Italy

Hassan Saif Knowledge Media Institute, Milton Keynes, UK

Olga C. Santos aDeNu Research Group, Artificial Intelligence Department, Computer Science School, UNED, Madrid, Spain

Matthias Scheutz Human-Robot Interaction Laboratory, Tufts University, Medford, MA, USA

Dominik Schiller Human Centered Multimedia, Augsburg University, Augsburg, Germany

Björn W. Schuller Complex and Intelligent Systems, University of Passau, Passau, Germany; Department of Computing, Imperial College London, London, UK

Giovanni Semeraro Department of Computer Science, University of Bari Aldo Moro, Bari, Italy

Gregor Strle Scientific Research Centre, Institute of Ethnomusicology, Slovenian Academy of Sciences and Arts, Ljubljana, Slovenia

Marko Tkalčič Department of Computational Perception, Johannes Kepler University, Linz, Austria

Alessandro Vinciarelli University of Glasgow, Glasgow, UK

Hsin-Min Wang Institute of Information Science, Academia Sinica, Taipei, Taiwan

Ju-Chiang Wang Institute of Information Science, Academia Sinica, Taipei, Taiwan

Jason R. Wilson Human-Robot Interaction Laboratory, Tufts University, Medford, MA, USA

Wen Wu Hong Kong Baptist University, Kowloon Tong, Kowloon, Hong Kong

Yi-Hsuan Yang Research Center for IT Innovation, Academia Sinica, Taipei, Taiwan

Yong Zheng College of Computing and Digital Media, DePaul University, Chicago, IL, USA