

# Preface

‘Behavior’ is an increasingly important concept in the scientific, societal, economic, cultural, political, military, living and virtual world. In dictionaries, ‘Behavior’ refers to manner of behaving or acting, and the action or reaction of any material under given circumstances. In Wikipedia, ‘behavior’ refers to the actions and mannerisms made by organisms, systems or artificial entities in conjunction with its environment, which includes the other systems or organisms around as well as the physical environment. It is the response of the system or organism to various stimuli or inputs, whether internal or external, conscious or subconscious, overt or covert, and voluntary or involuntary.

Behavior is ubiquitous. Besides the common terms such as consumer behaviors, human behaviors, animal behaviors, and organizational behaviors, behaviors appear everywhere at any time. Behaviors in the physical world are explicit, and have been studied from many different aspects. With the fast development and deep engagement of social and digitalized life, family, city and planet with advanced computing technology, in particular, virtual reality, multimedia information processing, visualization, machine learning, pattern recognition, behaviors in the virtual and social world are emerging increasingly. In addition, behaviors in the traditional spheres are becoming more and more complex with the involvement and marriage with the virtual and social world.

In different applications and scenarios, behaviors present respective characteristics and features. For instance, in stock markets, trader’s behaviors are embodied through trading actions and action properties, such as placing a buy quote at a certain time, price and volume on a target security. The action, response or presentation associated with the corresponding properties forms a concrete and rich object—behavior.

The representation, modeling, analysis, data mining and decision-making of behaviors are becoming increasingly *useful*, *essential*, and *challenging* in ubiquitous behavioral applications and problem-solving. They form into a new computing opportunity, necessity and technology innovation, we refer to it as *behavior computing* or *behavior informatics*.

Behavior computing, or behavior informatics, consists of methodologies, techniques and practical tools for representing, modeling, analyzing, understanding and utilizing human, organismal, organizational, societal, artificial and virtual behaviors, behavioral interactions and relationships, behavioral networks, behavioral patterns, behavioral impacts, the formation and decomposition of behavior-oriented groups and collective intelligence, and the emergence of behavioral intelligence. Behavior computing contributes to the in-depth understanding, discovery, applications and management of behavior intelligence.

The above observations and discussions motivate the editing of this book *Behavior Computing: Modeling, Analysis, Mining and Decision*. The edited book reports state-of-the-art advances in methodologies, techniques, systems and applications of behavior computing. Although there are some newly established conferences and workshops, as well as special issues on behavior modeling and analysis of social networks, this edited book creates an important opportunity to broaden current research to areas that consist of behaviors. It aims to serve as the first dedicated source of references for the theory and applications of behavior informatics and behavior computing, establishing state of the art research, disseminating the latest research discoveries, and providing a ground-breaking textbook to senior undergraduate and postgraduate students.

The book is composed of 23 chapters, which are selected from the 2010 and 2011 International Workshop on Behavior Informatics, submissions to this edited book, partial submissions to the Special Issue on Behavior Computing, and invited chapters. The book consists of four parts, covering behavior modeling, behavior analysis, behavior mining and behavior applications.

In Part I, the book reports attempts and efforts in developing representation and modeling methods and tools for capturing behavior characteristics and dynamics in areas such as social media, soccer game, and software packaging. This involves new techniques such as modeling influential behaviors in social media, a behavior ontology system called SAPMAS representing social activity process, using narrative knowledge representation language to represent behaviors, and applying semi-Markov models to represent user behaviors.

Part II selects a number of the corresponding techniques for behavior analysis. This involves great efforts to develop effective techniques and tools for emergent areas and domains in analyzing behaviors, including a group buying behavior recommendation system, simultaneously modeling reply networks and contents to generate user's profiles on web forum, analyzing information searching behaviors by reinforcement learning, estimating conceptual similarities by distributed representation and extended backpropagation, scoring and predicting risk preferences, and creating simulated feedback.

Part III features behavior mining. The selected chapters address issues including clustering trajectory routes, linking behavioral patterns to personal attributes, mining causality from non-categorical numerical data, mining high utility itemsets, modeling and detection of suspicious activities, a behavioral modeling approach to discover unauthorized copying of large-scale documents, and analyzing twitter user behaviors and topic trends.

Six case studies are reported in Part IV on behavior applications. They cover domains and areas including telecom user behaviors, event detection in calling records, predicting the next call for smart phones, 3D handwriting recognition on handheld devices, medical student search behaviors, and evaluation of software testing strategies.

The intended audience of this book will mainly consist of researchers, research students and practitioners in behavior studies, including in the communities of computer science, behavioral science, and social science. In particular, this book fits interests from behavior informatics, behavioral science, data mining, knowledge representation, machine learning, and knowledge discovery. The book is also of interest to researchers and industrial practitioners in areas such as marketing analytics, consumer behavior analysis, social analytics, online behavior analysis, business analytics, human-computer interaction, artificial intelligence, intelligent information processing, decision support systems, and knowledge management.

Readers who are interested in behavior computing and behavior informatics are encouraged to refer to the special interest group: *Behavior Informatics*. The SIG on Behavior Informatics is a dedicated online research portal and repository, presenting research outcomes and opportunities on theoretical, technical and practical issues in behavior computing and behavior informatics.

We would like to convey our appreciation to all contributors including the accepted chapters' authors, and many other participants who submitted their chapters that cannot be included in the book due to space limits. Our special thanks to Ms. Helen Desmond and Mr. Ben Bishop from Springer UK and Ms. Melissa Fearon from Springer US for their kind support and great efforts in bringing the book to fruition. In addition, we also appreciate all reviewers, as well as Mr. Zhong She's assistance in formatting the book.

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