

Smart Innovation, Systems and Technologies

Volume 151

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Neural Approaches to Dynamics of Signal Exchanges

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ISSN 2190-3018

Smart Innovation, Systems and Technologies

ISBN 978-981-13-8949-8

<https://doi.org/10.1007/978-981-13-8950-4>

ISSN 2190-3026 (electronic)

ISBN 978-981-13-8950-4 (eBook)

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Preface

The book aims to assemble research from different fields and create a common public data framework for a large variety of applications that may range from medical diagnosis to entertainment devices (speech, facial expressions, gaze and gesture), holding the promises to contribute to the development of intelligent interactive dialog systems that simplify everyday-life man-machine interaction by taking into account individual, socio-cultural differences, and contextual instances, intended here as the dynamics of values that contextual variables assume at a given instant. Interdisciplinary aspects are taken into account and research is proposed from different fields: mathematics, computer vision, speech analysis and synthesis, machine learning, signal processing, telecommunication, human-computer interaction, psychology, anthropology, sociology, neural networks, machine learning, and advanced sensing.

The topics of this book vary from the processing of audio-visual signals to the detection of user perceived states, dedicating a section to the last scientific discoveries in processing verbal (lexicon, syntax, and pragmatics), auditory (voice, intonation, vocal expressions) and visual signals (gestures, body language, facial expressions), as well as to algorithms for detecting communication disorders, remote health status monitoring, sentiment and affect analysis, social behaviors and engagements.

The remaining sections are dedicated to neural and machine learning algorithms for the implementation of advanced telecommunication systems, communication with people with special needs, emotion modulation by computer contents, advanced sensors for tracking changes in real-life and automatic systems, as well as the development of advanced human-computer interfaces. This socio-emotional content is vital for building trusting, productive relationships that go beyond purely factual and task oriented communication and the proposed technological solutions will enhance and improve the efficiency of European industry and the quality of service provided to citizens. Therefore, the proposed book has a wide view and does not focus on solving a particular problem, rather describe the results of a research that has positive effects in different fields and for different applications.

The contributions in the book cover different scientific areas according to the thematic classification reported below, even though these areas are closely connected in the themes they afford and provide fundamental insights for the cross-fertilization of different disciplines:

- Machine learning and Artificial Neural Networks: Algorithms and models,
- Social and biometric data for applications in human-computer interfaces

It must be said that human data analysis is central to many endeavors both in basic research and across application domains, and that the contributes proposed in this book aim to enable human centered informatics.

The chapters composing this book were first discussed at the international workshop on neural networks (WIRN 2018) held in Vietri Sul Mare from the 13th to the 15th of June 2018, in the regular and special sessions. In particular it is worth to mention the special session on: *Dynamics of Signal Exchanges* organized by Anna Esposito, Antonietta M. Esposito, Gennaro Cordasco, Mauro N. Maldonato, Francesco Carlo Morabito, Vincenzo Paolo Senese, Carl Vogel; and the special session on *Neural Networks and Pattern Recognition in Medicine* organized by Giansalvo Cirrincione and Vitoantonio Bevilacqua.

The scientists contributing to this book are specialists in their respective disciplines. We are indebted to them for making (through their chapters) the book a meaningful effort. The coordination and production of this book has been brilliantly conducted by the Springer project coordinator for books production Mr. **Maniarasan Gandhi**, the Springer executive editor Dr. **Thomas Ditzinger**, and the editor assistant Mr. **Holger Schaepe**. They are the recipient of our deepest appreciation. This initiative has been skillfully supported by the Editors in chief of the Springer series Smart Innovation, Systems and Technologies, Professors **Jain Lakhmi C.**, and **Howlett Robert James**, to whom goes out deepest gratitude.

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