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Luca Longo · Maria Chiara Leva (Eds.)

Human Mental Workload

Models and Applications

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Preface

This book endeavors to stimulate and encourage discussion on mental workload, its measures, dimensions, models, applications, and consequences. It is a topic that demands a multidisciplinary approach, spanning across human factors, computer science, psychology, neuroscience, statistics, and cognitive sciences. This book presents recent developments in the context of theoretical models of mental workload and practical applications.

This year in particular it contains a selection of the work presented in the context of the Third International Symposium on Mental Workload, Models and Applications (H-WORKLOAD 2019), sponsored by the Sapienza University of Rome and supported by the Irish Ergonomics Society. It contains a revision of the best papers presented at the symposium and selected through a strict peer-review process. The contributions of this edition were predominately focused on the use of neurosciences tools in the context of detecting, assessing, and modeling mental workload.

From the content of these research contributions, it is clear that mental workload, as a multidimensional and multifaceted construct, is still under definition, development, and investigation. This is one of the reasons why mental workload is today a keyword used and abused in life sciences, as pointed by Prof. Fabio Babiloni. However, despite the difficulty in precisely defining and modeling it, the capacity to assess human mental workload is a key element in designing and implementing information-based procedures and interactive technologies that maximize human performance. Some of the articles published in this book applied psychological subjective self-reporting measures, others made use of primary task measures and some a combination of these. Physiological measures in general, and more specifically electroencephalography (EEG), have been gaining a more prominent role, thanks to advances in data-gathering technology as well as a growing availability of computational power and classification techniques offered by the discipline of artificial intelligence. This is also reflected in the present book where half of the chapters focus on the development of novel models of mental workload employing data-driven techniques, borrowed from machine learning. However, one of the key issues in modeling mental workload employing automated learning techniques is that, although it often leads to accurate and robust models, they lack explanatory capacity. This problem is fundamental if we want to define mental workload for the fields of human factors, human–computer interaction, and in general for human-centered designers. Thus, we believe that future research efforts on mental workload modeling should employ a mix of measures as well as qualitative and quantitative research methods to not only assess mental workload but also to understand its meaning and implications on the individuals and our approach toward work and life.

September 2019

Luca Longo
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Dr. Luca Longo is currently an assistant professor at the Technological University Dublin, where he is a member of the Applied Intelligence Research Centre. His core theoretical research interests are in artificial intelligence, specifically in automated reasoning and machine learning. He also performs applied research in mental workload modeling. He is the author of 50+ peer-reviewed articles that have appeared in conference proceedings, book chapters, and journals in various theoretical and applied computer science fields. Luca has been awarded the National Teaching Hero in 2016, by the National Forum for the Enhancement of Teaching and Learning in Higher Education.

Dr. Maria Chiara Leva is a lecturer at the Dublin Institute of Technology in the College of Environmental Health. She is also a visiting research fellow in the Centre for Innovative Human Systems at Trinity College Dublin. Her area of expertise is human factors and safety management systems. Chiara holds a PhD in Human Factors conferred by the Polytechnic of Milan, Department of Industrial Engineering. Her PhD focused on human and organizational factors in safety-critical system in the transport sector. She is the co-chair of the Human Factors and Human Reliability Committee for the European Safety and Reliability Association and has been working in ergonomics and risk assessment as a consultant since 2008. She has authored more than 56 publications on human factors, operational risk assessment, and safety management in science and engineering journals.