

Foreword

What we profoundly witness these days is a growing number of human-centric systems and a genuine interest in a comprehensive understanding of their underlying paradigms and the development of solid and efficient design practices. We are indeed in the midst of the next information revolution, which very likely brings us into a completely new world of ubiquitous and invisible computing, Ambient Intelligent (AMI), and wearable hardware. This requires a totally new way of thinking in which cognitive aspects of design, cognitive system engineering and distributed approach play a pivotal role. This book fully addresses these timely needs by filling a gap between the two well-established disciplines of cognitive sciences and cognitive systems engineering.

As we put succinctly in the preface, with the psychological perspective of human cognition in mind, “*the book explores the computational models of reasoning, learning, planning and multi-agent coordination and control of the human moods*”. This is an excellent, up to the point description of the book. The treatise is focused on the underlying fundamentals, spans across a vast territory embracing logic perspectives of human cognition, distributed models, parallel computing, expert systems, and intelligent robotics.

The leading formal framework Professors Amit Konar and Lakhmi Jain decided to use here are Petri nets. Originally introduced by Karl Adam Petri in 1962, the concept of these nets has been re-visited and enriched in many different ways leading to new ideas, efficient modeling techniques, and interesting practical insights. Some important generalization that we witness in this book concerns fuzzy Petri nets along with their learning mechanisms (those of supervised as well as unsupervised character). Fuzziness, or granularity of information, in general, is essential to human reasoning and cognitive processes. It efficiently supports various levels of abstraction we deem of interest and relevance to a given problem. The fuzzy Petri networks come with a lot of interesting applications to abductive reasoning, belief reasoning and belief revision. The distributed character of processing is also vividly presented in the models of fuzzy cognitive maps covered in this book. Given the inherently distributed and multimodal character of the environment, multi-agent planning becomes another important topic. Here the book offers an interesting view on this subject by showing its application to mobile robots and their coordination. Context aware computing, yet another dominant subject area, is discussed in the setting of a detection of human mood in which the recognition processes are concentrated on the classification of facial expressions.

Studying this book is both a rewarding and enjoyable experience. It delivers a wealth of timely material, written in an authoritative and lucid manner. The authors are experts in their research areas who are willing to share their knowledge and practical experience with their reader. And this really shows up. Studying the book is enjoyable as it positions itself at the center of the exciting developments, which are going to form our reality in the years to come. The authors share their vision and keep us in touch with the recent developments and future directions.

Professors Konar and Jain did a superb job by bringing to the research community a timely and important volume. The book definitely offers a systematic, highly readable and authoritative material. Unquestionably, it will be equally appreciated by those advancing new frontiers of research in this area as well as the readers interested in gaining a solid and systematic knowledge about the subject matter.

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