

Monica Bianchini, Marco Maggini, Franco Scarselli, and Lakhmi C. Jain (Eds.)

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Innovations in Neural Information Paradigms and Applications

# Studies in Computational Intelligence, Volume 247

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## Preface

Tremendous advances in all disciplines including engineering, science, health care, business, avionics, management, and so on, can also be attributed to the development of artificial intelligence paradigms. In fact, researchers are always interested in designing machines which can mimic the human behaviour in a limited way. Therefore, the study of neural information processing paradigms have generated great interest among researchers, in that machine learning, borrowing features from human intelligence and applying them as algorithms in a computer friendly way, involves not only Mathematics and Computer Science but also Biology, Psychology, Cognition and Philosophy (among many other disciplines).

Generally speaking, computers are fundamentally well-suited for performing automatic computations, based on fixed, programmed rules, i.e. in facing efficiently and reliably monotonous tasks, often extremely time-consuming from a human point of view. Nevertheless, unlike humans, computers have troubles in understanding specific situations, and adapting to new working environments. Artificial intelligence and, in particular, machine learning techniques aim at improving computers behaviour in tackling such complex tasks. On the other hand, humans have an interesting approach to problem-solving, based on abstract thought, high-level deliberative reasoning and pattern recognition. Artificial intelligence can help us understanding this process by recreating it, then potentially enabling us to enhance it beyond our current capabilities.

Research in machine learning methods, that has been carried out deeply and intensively in the last thirty years, has now gained a sufficient maturity to advise for depicting its state-of-the-art, both theoretically and practically (the scope of this book). In fact, if almost all classical approaches proposed in the eighties have recently been deeply investigated and revisited, in the last decade, also new models have been proposed, able to process complex structured data, naturally derived from real-world applications. Moreover, this book includes critical issues on advanced applications, aimed at spotting those problems that benefit considerably from connectionist models, i.e. that are prone to be efficiently addressed by a particular technique, with respect to those applications that stand at the boundary of the present research.

We believe that this book will prove useful to the researchers, graduate students, professors and practitioner interested in recent advances in neural information processing paradigms and applications. We are grateful to the authors and reviewers for their time and contribution. Thanks are finally due to the Springer-Verlag and the editorial team for their excellent support during the preparation of the manuscript.

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