

Preface

What are artificial neural networks? What is their purpose? What are their potential practical applications? What kind of problems can they solve?

With these questions in mind, this book was written with the primary concern of answering readers with different profiles, from those interested in acquiring knowledge about architectures of artificial neural network to those motivated by its multiple applications (of practical aspect) for solving real-world problems.

This book audience is multidisciplinary, as it will be confirmed by the numerous exercises and examples addressed here. It explores different knowledge areas, such as engineering, computer science, mathematics, physics, economics, finance, statistics, and neurosciences. Additionally, it is expected that this book could be interesting for those from many other areas that have been in the focus of artificial neural networks, such as medicine, psychology, chemistry, pharmaceutical sciences, biology, ecology, geology, and so on.

Regarding the academic approach of this book and its audience, the chapters were tailored in a fashion that attempts to discuss, step-by-step, the thematic concepts, covering a broad range of technical and theoretical information. Therefore, besides meeting the professional audience's desire to begin or deepen their study on artificial neural networks and its potential applications, this book is intended to be used as a textbook for undergraduate and graduate courses, which address the subject of artificial neural networks in their syllabus.

Furthermore, the text was composed using an accessible language so it could be read by professionals, students, researchers, and autodidactics, as a straightforward and independent guide for learning basic and advanced subjects related to artificial neural networks. To this end, the prerequisites for understanding this book's content are basic, requiring only a few elementary knowledge about linear algebra, algorithms, and calculus.

The first part of this book (Chaps. 1–10), which is intended for those readers who want to begin or improve their theoretical investigation on artificial neural networks, addresses the fundamental architectures that can be implemented in several application scenarios.

The second part of this book (Chaps. 11–20) was particularly created to present solutions that comprise artificial neural networks for solving practical problems from different knowledge areas. It describes several developing details considered to achieve the described results. Such aspect contributes to mature and improve the reader's knowledge about the techniques of specifying the most appropriated artificial neural network architecture for a given application.

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