

Book Review:

Redes Neuronales Artificiales. Un Enfoque Práctico

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Artificial Neural Networks belong to the sub-symbolic branch of Artificial Intelligence since they allow to find the solution of a problem without the need of knowing the algorithm necessary to solve it. This turns them into a tool based on an approach completely different from that used by conventional Computing.

Artificial neural networks (ANN) have been inspired in how the brain works and in the way its cells relate to each other. Technological advances provide ever-greater resources to represent really complex structures, perform computations at high speed and in parallel. This has indeed motivated research on this kind of tool.

The contents of each chapter of the book are the following:

Chapter 1 . Introduction to Artificial Neural Networks - This chapter presents the biological basis necessary to understand how ANN works. It also describes the difference in the development of applications when using this approach in contrast with conventional Computing. Finally, it provides a description of the main historical events that have brought the progress in this discipline.

Chapter 2 . First Computational Models - As usual, most of the basic textbooks present a description of the first Neural Network architectures: Perceptron and Adaline. It finally presents the limitations of these processing elements in solving the XOR-problem.

Chapter 3 . Multilayer Perceptron . This chapter presents one of the most known ANN architectures: Backpropagation architecture. Its design arises from the multilayer perceptron to which the Generalized Delta rule is applied. Different aspects to be considered at the time of designing and training the architecture are discussed: the network's generalization capacity, the possibility of falling in local minimums, and the saturation of the processing elements composing the architecture. Finally, a performance example is presented.

Chapter 4 . Radial Basis Neural Networks . This chapter presents a justification of the architecture and the context in which they can be used. It describes the design of a neural network of this type and the training that should be used. It also presents hybrid and completely supervised learning methods. Eventually, it presents a performance example of radial basis networks and its comparison to the architecture of the previous chapter.

Chapter 5 . Recurrent Neural Networks . In contrast with feedforward architectures of the previous chapters, this chapter introduces architectures which do not count with that connectivity restriction. Under this approach, the Hopfield network is presented together with its training method. There is also a description of the energy function which allows to understand the behavior of this architecture. Jordan and Elman's ANN .presented as partially recurrent - are analyzed. Finally, completely recurrent networks are dealt with.

Chapter 6 - Non-supervised Learning . An analysis of the type of problems that can be solved with this type of architectures is presented. This chapter is mainly based on Kohonen's Self Organizing Maps and the ART1 network (Adaptive Resonance Theory). Each case describes the architecture and the training manner. Use examples are also presented.

Chapter 7 . Time Series Prediction . This chapter starts with the introduction to the temporal series, and prediction problems are generally discussed. It also presents those ANN models that can be used for the different types of prediction. Finally, a concrete example is shown.

Chapter 8 . Dynamic Process Control . The characteristics of a dynamic process and their modeling are discussed. This chapter presents different control schemes using neural networks. This is illustrated by means of an example of a temperature controller for a chemical reactor.

Chapter 9 . Classification . Here, one of the most ANN known application areas is introduced. This chapter presents the different types of training that can be used: Supervised and Non-supervised, and some of the previous chapters applications are applied to solve this type of problems. The results obtained with conventional methods (such as K-Medias) are compared. Finally, a concrete problem of classifying diabetes patients is presented.

This book is intended to be used as an introductory book. This is accomplished in the first half of the book, though in the last chapters the reader might find himself needing some additional reading in order to wholly understand the solution of the concrete problems here presented.

It is worth to mention that, in general, the existing bibliography of Neural Networks is not easy to be interpreted and that the material of this book has managed to sum up the most important aspects of this discipline.

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