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## Preface

Artificial Neural Networks (ANNs) are among the most fundamental techniques within the field of Artificial Intelligence. Their operation loosely emulates the functioning of the human brain, but the value of an ANN extends well beyond its role as a biological model. An ANN can both memorize and reason: it provides a way in which a computer can learn from scratch about a previously unseen problem. Remarkably, the exact form of the problem is rarely critical; it might be financial (e.g., can we predict the direction of the stock market in the next few months?); it might be sociological (what factors make a face attractive?); it could be medical (can we tell from an X-ray whether a bone is broken?); or, as in this volume, the problem might be purely scientific.

This text brings together some productive and fascinating examples of how ANNs are applied in the biological sciences and related areas: from the analysis of intracellular sorting information to the prediction of the behavior of bacterial communities; from biometric authentication to studies of tuberculosis; from studies of gene signatures in breast cancer classification to the use of mass spectrometry in metabolite identification; from visual navigation to computer diagnosis of possible lesions; and more. The authors describe not only *what* they have done with ANNs but also *how* they have done it. Readers intrigued by the work described in this book will find numerous practical details, which should encourage further use of these rapidly developing tools.

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