<<神经网络与机器学习>>

图书基本信息

书名：<<神经网络与机器学习>>

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前言

In writing this third edition of a classic book, I have been guided by the same uuderly hag philosophy of the first edition of the book:Write an up wdate treatment of neural networks in a comprehensive, thorough, and read able manner.The new edition has been retitied Neural Networks and Learning Machines, in order toreflect two reahties: L The perceptron, the multilayer perceptroo, self organizing maps, and neuro dynamics, to name a few topics, have always been considered integral parts of neural networks, rooted in ideas inspired by the human brain.2. Kernel methods, exemplified by support vector machines and kernel principal components analysis, are rooted in statistical learning theory.Although, indeed, they share many fundamental concepts and applications, there aresome subtle differences between the operations of neural networks and learning ma chines. The underlying subject matter is therefore much richer when they are studiedtogether, under one umbrella, particulasiy so when ideas drawn from neural networks and machine learning are hybridized to perform improved learning tasks beyond the capability of either one operating on its own, and ideas inspired by the human brain lead to new perspectives wherever they are of particular importance.

内容概要

神经网络是计算智能和机器学习的重要分支，在诸多领域都取得了很大的成功。
在众多神经网络著作中，影响最为广泛的是Simon Haykin的《神经网络原理》(第4版更名为《神经网络与机器学习》）。
在本书中，作者结合近年来神经网络和机器学习的最新进展，从理论和实际应用出发，全面。
系统地介绍了神经网络的基本模型、方法和技术，并将神经网络和机器学习有机地结合在一起。

本书不但注重对数学分析方法和理论的探讨，而且也非常关注神经网络在模式识别、信号处理以及控制系统等实际工程问题中的应用。
本书的可读性非常强，作者举重若轻地对神经网络的基本模型和主要学习理论进行了深入探讨和分析，通过大量的试验报告、例题和习题来帮助读者更好地学习神经网络。

本版在前一版的基础上进行了广泛修订，提供了神经网络和机器学习这两个越来越重要的学科的最新分析。

本书特色　　基于随机梯度下降的在线学习算法；小规模和大规模学习问题。

核方法，包括支持向量机和表达定理。

信息论学习模型，包括连接、独立分量分析(ICA)，一致独立分量分析和信息瓶颈。

随机动态规划，包括逼近和神经动态规划。

逐次状态估计算法，包括Kalman和粒子滤波器。

利用逐次状态估计算法训练递归神经网络。

富有洞察力的面向计算机的试验。

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作者简介

Simon Haykin，于1953年获得英国伯明翰大学博士学位，目前为加拿大McMaster大学电子与计算机工程系教授、通信研究实验室主任。
他是国际电子电气工程界的著名学者，曾获得IEEE McNaughton金奖。
他是加拿大皇家学会院士、IEEE会士，在神经网络、通信、自适应滤波器等领域成果颇

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章节摘录

插图：knowledge, the teacher is able to provide the neural network with a desired responsefor that training vector. Indeed, the desired response represents the "optimum" ac-tion to be performed by the neural network. The network parameters are adjustedunder the combined influence of the training vector and the error signal. The errorsignal is defined as the difference between the desired response and the actual re-sponse of the network. This adjustment is carried out iteratively in a step-by-stepfashion with the aim of eventually making the neural network emulate the teacher;the emulation is presumed to be optimum in some statistical sense. In this way,knowledge of the environment available to the teacher is transferred to the neuralnetwork through training and stored in the form of"fixed" synaptic weights, repre-senting long-term memory. When this condition is reached, we may then dispensewith the teacher and let the neural network deal with the environment completelyby itself.The form of supervised learning we have just described is the basis of error-correction learning. From Fig. 24, we see that the supervised-learning process con-stitutes a closed-loop feedback system, but the unknown environment is outside theloop. As a performance measure for the system, we may think in terms of the mean-square error, or the sum of squared errors over the training sample, defined as a func-tion of the free parameters （i.e., synaptic weights） of the system. This function maybe visualized as a multidimensional error-performance surface, or simply error surface,with the free pai'ameters as coordinates.The true error surface is averaged over allpossible input-output examples. Any given operation of the system under theteacher's supervision is represented as a point on the error surface. For the system toimprove performance over time and therefore learn from the teacher, the operatingpoint has to move down successively toward a minimum point of the error surface;the minimum point may be a local minimum or a global minimum. A supervisedlearning system is able to do this with the useful information it has about the gradient of the error surface corresponding to the current behavior of the system.

编辑推荐

《神经网络与机器学习(英文版第3版)》特色：基于随机梯度下降的在线学习算法；小规模和大规模学习问题。
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