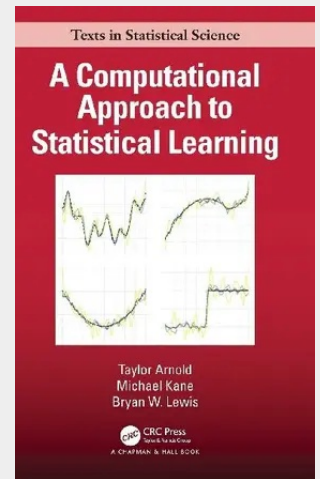


A Computational Approach to Statistical Learning

A Computational Approach to Statistical Learning gives a novel introduction to predictive modeling by focusing on the algorithmic and numeric motivations behind popular statistical methods. The text contains annotated code to over 80 original reference functions. These functions provide minimal working implementations of common statistical learning algorithms. Every chapter concludes with a fully worked out application that illustrates predictive modeling tasks using a real-world dataset. The text begins with a detailed analysis of linear models and ordinary least squares. Subsequent chapters explore extensions such as ridge regression, generalized linear models, and additive models. The second half focuses on the use of general-purpose algorithms for convex optimization and their application to tasks in statistical learning. Models covered include the elastic net, dense neural networks, convolutional neural networks (CNNs), and spectral clustering. A unifying theme throughout the text is the use of optimization theory in the description of predictive models, with a particular focus on the singular value decomposition (SVD). Through this theme, the computational approach motivates and clarifies the relationships between various predictive models.

This book synthesizes those techniques from numerical analysis, algorithms, data structures, and optimization theory most commonly employed in statistics and machine learning. We provide concrete applications of these methods by giving complete reference implementations for a large set of the most commonly used statistical estimators. The goal is to provide a self-contained textbook explaining the inner algorithmic workings of statistical estimators.



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