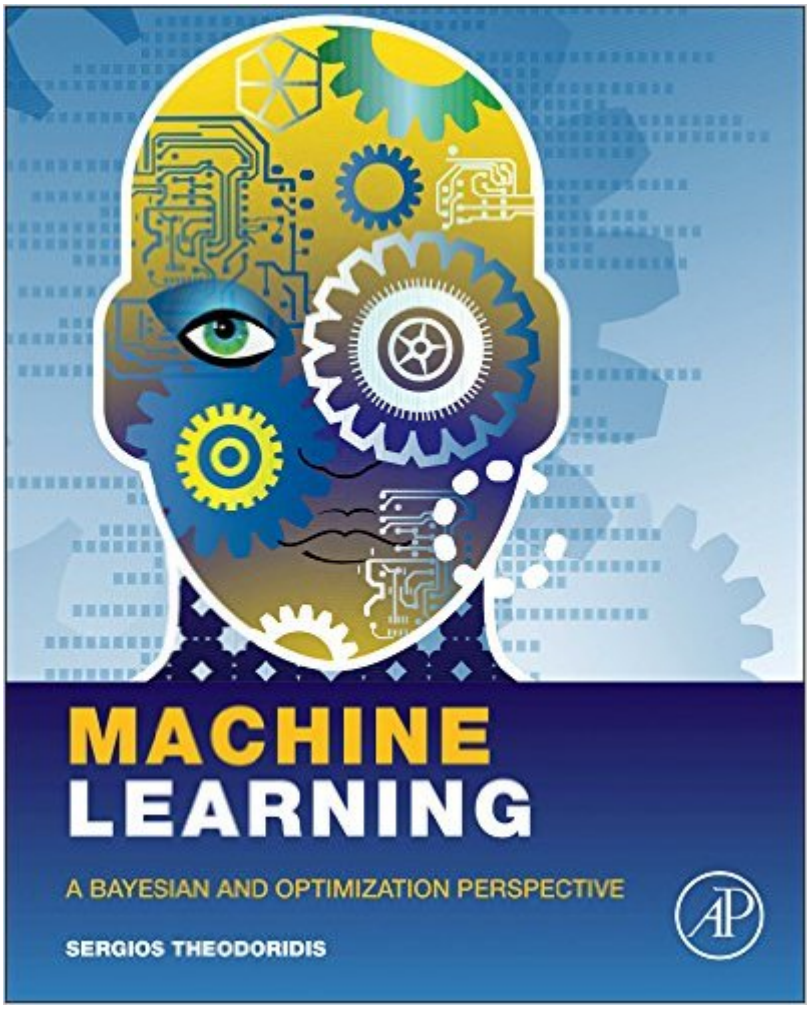
Machine Learning: A Bayesian And Optimization Perspective (Net Developers)



Synopsis

This tutorial text gives a unifying perspective on machine learning by covering bothÂ probabilistic and deterministic approaches -which are based on optimization techniques â " together with the Bayesian inference approach, whose essence liesÂ in the use of a hierarchy of probabilistic models. The book presents the major machine learning methods as they have been developed in different disciplines, such as statistics, statistical and adaptive signal processing and computer science. Focusing on the physical reasoning behind the mathematics, all the various methods and techniques are explained in depth, supported by examples and problems, giving an invaluable resource to the student and researcher for understanding and applying machine learning concepts. The book builds carefully from the basic classical methodsÂ to Â the most recent trends, with chapters written to be as self-contained as possible, making the text suitable for Â different courses: pattern recognition, statistical/adaptive signal processing, statistical/Bayesian learning, as well as short courses on sparse modeling, deep learning, and probabilistic graphical models.All major classical techniques: Mean/Least-Squares regression and filtering, Kalman filtering, stochastic approximation and online learning, Bayesian classification, decision trees, logistic regression and boosting methods.The latest trends: Sparsity, convex analysis and optimization, online distributed algorithms, learning in RKH spaces, Bayesian inference, graphical and hidden Markov models, particle filtering, deep learning, dictionary learning and latent variables modeling.Case studies - protein folding prediction, optical character recognition, text authorship identification, fMRI data analysis, change point detection, hyperspectral image unmixing, target localization, channel equalization and echo cancellation, show how the theory can be applied.MATLAB code for all the main algorithms are available on an accompanying website, enabling the reader to experiment with the code.

Book Information

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Customer Reviews

I’m still looking for a "perfect machine learning theory book": the one which is a pleasure to read and that covers most of concepts you see here and there all the time but always wanted to know how exactly they work: log-linear, maximum likelihood, MAP, least squares and MLS, expectation maximization, stochastic gradient descent, CRFs, mixtures of gaussian, and many others. I would like that the book explain to me why should I use this model or algorithm, why previous one would not be good? And I would like that the author take the time to carefully guide the reader throughout the theory, without leaving him alone with a bunch of matrix equations or integrals like if they were evident.I’m not a novice in the AI: I have a PhD (not in the theoretical Machine Learning though) and several years of practical experience with the algorithms. But most of the time I use the algorithms and models like blackboxes. My goal, however, is not only be able to use the algorithms and know where and how each algorithm can be used, but really understand the math that drives each them.Unfortunately, this is not the book that can help me with my goal. In the beginning of each chapter the author really tries to move slowly with a care to details, but very fast the math becomes the only language used on the page. If, in the middle of a section you didn’t understand how equation 12 follows from equation 11, your only option is to skip the remainder of the section and this is very frustrating.As an example, when presenting the "central limit theorem", the author writes "Consider N mutually independent random variables, each following its own distribution with mean values ... and variances ... Define a new random variable **as their sum**: ...

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