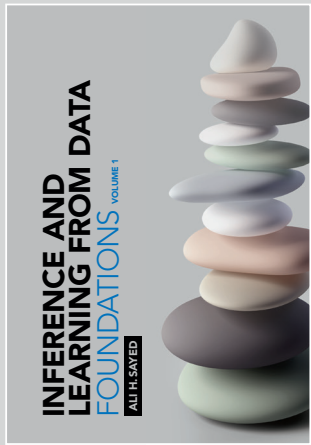




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INFERENCE AND LEARNING FROM DATA

Ali H. Sayed, *École Polytechnique Fédérale de Lausanne*



This extraordinary three-volume work, written in an engaging and rigorous style by a world authority in the field, provides an accessible, comprehensive introduction to the full spectrum of mathematical and statistical techniques underpinning contemporary methods in data-driven inference and learning.

KEY FEATURES

- A phenomenal contribution by a world authority in the field
- Unique in its scale and depth, this is a comprehensive treatment of important methods in data-driven learning and inference
- Over 1300 end-of-chapter problems (with solutions for instructors), 600 figures and 470 in-text solved examples
- Covers sufficient topics across the volumes for the construction of a variety of courses covering a wide range of themes

The first volume, Foundations, introduces core topics in inference and learning, such as matrix theory, linear algebra, random variables, convex optimization, stochastic optimization, and decentralized methods, and prepares students for studying their practical application in later volumes. A consistent structure and pedagogy is employed throughout this volume to reinforce student understanding, with over 600 end-of-chapter problems (including solutions for instructors), 100 figures, 180 solved examples, datasets and downloadable Matlab code. Supported by sister volumes Inference and Learning, and unique in its scale and depth, this textbook sequence is ideal for early-career researchers and graduate students across many courses in signal processing, machine learning, statistical analysis, data science and inference.

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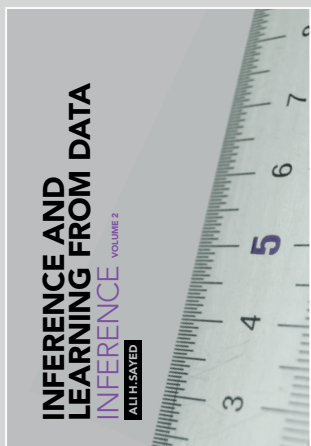
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VOLUME 1

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This second volume, Inference, builds on the foundational topics established in volume I to introduce students to techniques for inferring unknown variables and quantities, including Bayesian inference, Markov chain Monte Carlo methods, maximum likelihood, variational inference, hidden Markov models, Bayesian networks, and reinforcement learning. A consistent structure and pedagogy is employed throughout this volume to reinforce student understanding, with over 350 end-of-chapter problems (including solutions for instructors), 180 solved examples, almost 200 figures, datasets and downloadable Matlab code. Supported by sister volumes Foundations and Learning, and unique in its scale and depth, this textbook sequence is ideal for early-career researchers and graduate students across many courses in signal processing, machine learning, statistical analysis, data science and inference.

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This final volume, Learning, builds on the foundational topics established in volume I to provide a thorough introduction to learning methods, addressing techniques such as least-squares methods, regularization, online learning, kernel methods, generalization theory, feedforward, convolutional, recurrent, and generative neural networks, meta learning, explainable learning, and adversarial attacks. A consistent structure and pedagogy is employed throughout this volume to reinforce student understanding, with over 350 end-of-chapter problems (including solutions for instructors), 280 figures, 100 solved examples, datasets and downloadable Matlab code. Supported by sister volumes Foundations and Inference, and unique in its scale and depth, this textbook sequence is ideal for early-career researchers and graduate students across many courses in signal processing, machine learning, data and inference.

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