

## THE STATISTICAL PHYSICS OF DATA ASSIMILATION AND MACHINE LEARNING

Data assimilation is a hugely important mathematical technique, relevant in fields as diverse as geophysics, data science, and neuroscience. This modern book provides an authoritative treatment of the field as it relates to several scientific disciplines, with a particular emphasis on recent developments from machine learning and its relation to data assimilation. Underlying theory from statistical physics, such as path integrals and Monte Carlo methods, is developed in the text as a basis for data assimilation, and the author then explores examples from current multidisciplinary research such as the modeling of shallow water systems, ocean dynamics, and neuronal dynamics in the avian brain. The theory of data assimilation and machine learning is introduced in an accessible and unified manner, and the book is suitable for undergraduate and graduate students from science and engineering without specialized experience of statistical physics.

HENRY D. I. ABARBANEL has worked in several fields of physics including high energy physics, nonlinear dynamics, and data assimilation in neurobiology. He is the author of two previous books: *Analysis of Observed Chaotic Data* (1996) and *Predicting the Future: Completing Models of Observed Complex Systems* (2013). He is a Distinguished Professor of Physics at the University of California, San Diego (UCSD) and a Distinguished Research Physicist at UCSD's Scripps Institution of Oceanography.

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Henry D. I. Abarbanel

Excerpt

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