



# Methods of Information Geometry (Translations of Mathematical Monographs) (Translations of Mathematical Monographs)

*Shun-Ichi Amari, Hiroshi Nagaoka*

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## **Methods of Information Geometry (Translations of Mathematical Monographs) (Translations of Mathematical Monographs)** Shun-Ichi Amari, Hiroshi Nagaoka

Information geometry provides the mathematical sciences with a new framework of analysis. It has emerged from the investigation of the natural differential geometric structure on manifolds of probability distributions, which consists of a Riemannian metric defined by the Fisher information and a one-parameter family of affine connections called the  $\alpha$ -connections. The duality between the  $\alpha$ -connection and the  $(-\alpha)$ -connection together with the metric play an essential role in this geometry. This kind of duality, having emerged from manifolds of probability distributions, is ubiquitous, appearing in a variety of problems which might have no explicit relation to probability theory. Through the duality, it is possible to analyze various fundamental problems in a unified perspective. The first half of this book is devoted to a comprehensive introduction to the mathematical foundation of information geometry, including preliminaries from differential geometry, the geometry of manifolds or probability distributions, and the general theory of dual affine connections. The second half of the text provides an overview of many areas of applications, such as statistics, linear systems, information theory, quantum mechanics, convex analysis, neural networks, and affine differential geometry. The book can serve as a suitable text for a topics course for advanced undergraduates and graduate students. This volume is co-published by the AMS and Oxford University Press. The AMS has exclusive distribution rights in North America. AMS members in Europe may purchase the book from the AMS. Both the AMS and OUP have worldwide distribution rights.

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