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Mathematics : Probability Theory and Stochastic Processes

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An Invitation to Statistics in Wasserstein Space

- Gives a succinct introduction to necessary mathematical background, focusing on the results useful for statistics from an otherwise vast mathematical literature
- Presents an up-to-date overview of the state of the art, including some original results,and discusses open problems
- Suitable for self-study or to be used as a graduate level course text
- Open access

This open access book presents the key aspects of statistics in Wasserstein spaces, i.e. statistics in the space of probability measures when endowed with the geometry of optimal transportation. Further to reviewing state-of-the-art aspects, italso provides anaccessible introduction to the fundamentals of this current topic, as well as an overview thatwill serve as an invitation and catalyst for further research. Statistics in Wasserstein spaces represents an emerging topic inmathematical statistics, situated at the interface between functional dataanalysis (where the data are functions, thus lying in infinite dimensionalHilbert space) and non-Euclidean statistics (where the data satisfy nonlinearconstraints, thus lying on non-Euclidean manifolds). The Wassersteinspace provides the natural mathematical formalism to describe datacollections that are best modeled as random measures on Euclidean space (e.g. imagesand point processes). Such random measures carry the infinite dimensionaltraits of functional data, but are intrinsically nonlinear due to positivity andintegrability restrictions. Indeed, their dominating statistical variationarises through random deformations of an underlying template, a theme that is pursued in depth in this monograph.

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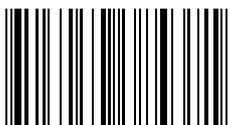Tiergartenstrasse 15-17
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