Einladung

Würzburger Mathematisches Kolloquium

Julius-Maximilians-Universität Würzburg • Institut für Mathematik

Nicolás García Trillos

University of Wisconsin-Madison, USA / Giovanni-Prodi-Gastprofessor in diesem Semester

Wasserstein-Cramér-Rao Theory of Unbiased Estimation and Tradeoffs Between Accuracy and Robustness of Estimators

Dienstag, 30. Juni 2026 • 14:15 Uhr

Seminarraum SE41 • Humboldt-Bau (Emil-Fischer-Straße 41, 97074 Würzburg)

Der Vortrag wird auch als Zoom-Meeting übertragen: go.uniwue.de/ifmcolloquium-zoom

Abstract. The quantity of interest in the classical Cramér-Rao theory of unbiased estimation (i.e., the Cramér- Rao lower bound, exact efficiency in exponential families, and asymptotic efficiency of maximum likelihood estimation) is the variance, which represents the instability of an estimator when its value is compared to the value for an independently sampled data set from the same distribution. In this talk, we will be interested in a quantity that represents the instability of an estimator when its value is compared to the value for an infinitesimal additive perturbation of the original data set; we refer to this as the "sensitivity" of an estimator. The resulting theory of sensitivity is based on the Wasserstein geometry in the same way that the classical theory of variance is based on the Fisher-Rao (equivalently, Hellinger) geometry. I'll present a collection of results which are analogous to the classical case: a Wasserstein-Cramér-Rao lower bound for the sensitivity of any unbiased estimator, a characterization of models in which there exist unbiased estimators achieving the lower bound exactly, and a guarantee that Wasserstein projection estimators achieve the lower bound asymptotically. For both the classical and Wasserstein settings a strong geometric intuition guides the corresponding statistical theories. This same geometric perspective will allow us to formulate and answer a natural and important question: how can we construct estimators that, at least asymptotically, balance between accuracy (variance) and robustness (sensitivity) optimally?

The talk is based on joint works with Adam Quinn Jaffe (Columbia), Bodhisattva Sen (Columbia), and my PhD student Congwei Yang (UWisconsin).

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Alle sind herzlich eingeladen.

Die Dozentinnen und Dozenten der Mathematik