Einladung zum Oberseminar Wissenschaftliches Rechnen

Julius-Maximilians-Universität Würzburg
Lehrstuhl für Wissenschaftliches Rechnen IX

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Optimal regularized hypothesis testing applied to Poisson data

Testing unknowns for certain features with statistical hypothesis testing without reconstructing the true solution was limited by two drawbacks in the past: Testing for $\langle \varphi, u^\dagger \rangle = \langle \Phi, Tu^\dagger \rangle \stackrel{?}{=} 0$, required φ to be in the range of the adjoint of the forward operator T^*, and computing Φ from $T^*\Phi = \varphi$ is generally ill-posed, which decreases the power of the test.
To overcome these, Kretschmann et al. have developed optimal regularized hypothesis testing for Gaussian distributed data.[1]
In our work, we adapt the regularized testing approach to Poisson distributed data. We discuss how to interpret this sort of data as a Hilbert space process, how to apply regularized testing, and how to estimate the noise variance, which depends on the measurement time. We also introduce a variant based on Tikhonov regularization, which can be applied, if only a single data set is available, and discuss its properties. We investigate the performance in 2-dimensional numerical simulations and discuss the application to super-resolution fluorescence microscopy.

References

[1] R. Kretschmann, D. Wachsmuth, F. Werner, Optimal regularized hypothesis testing in statistical inverse problems, Inverse Problems,40(1)(2024),015013

Ort: Raum 30.02.003 (Mathematik West, 2.Stock) Zeit: Dienstag, 26.05.2026, 10:00 Uhr

Zu diesem Vortrag laden wir Sie herzlich ein.
You are cordially invited to this lecture.

gez. Prof. Dr. Alfio Borzì
gez. Prof. Dr. Frank Werner