

Mathematical Sciences Colloquium Series

Fall 2022



Dr. Michael Pokojovy

The University of Texas at El Paso

📍 In person at Bell Hall 130 and online via Zoom

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📅 Friday, September 23 ⌚ 3pm

A Robust Deterministic Affine-Equivariant Algorithm for Multivariate Location and Scatter

Abstract

A new computationally feasible algorithm for the Minimum Covariance Determinant (MCD) estimator is proposed. The resulting estimator is deterministic, affine equivariant and permutation invariant unlike prominent alternatives. The new procedure, referred to as Projection Pursuit MCD, combines a single preliminary estimator obtained with a type of non-linear principal component analysis and the so-called concentration step (C-step). Fixed points of the C-step are proved to be local minimizers of the covariance determinant objective. Extensive comparisons for simulated datasets, multivariate Swiss banknote and image segmentation examples show the new algorithm is competitive with and mostly superior to such state-of-the-art procedures as FastMCD and DetMCD for both Gaussian and heavy-tailed real-world data. Outlier detection for Swiss banknote and image segmentation data is presented. A corresponding R package is provided. This is joint work with J. Marcus Jobe, Miami University, Oxford, OH.

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