ROC curve analysis for functional biomarkers

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Abstract

Functional markers become an increasingly important tool in medical diagnostics. In this talk, we introduce a novel index designed to discriminate between populations based on functional data that belong to a Hilbert space.

We address the challenges involved in estimating optimal directions that maximize the area under the curve of a projection index, and we construct the corresponding ROC curve.

Additionally, we extend our approach to scenarios involving populations with potentially different covariance operators, where we propose a quadratic discrimination rule. We study the consistency for both linear and quadratic indices under mild assumptions.

We present the results of a numerical experiment, which demonstrates the advantages of the quadratic rule when populations have different covariance structures. Finally, we apply the proposed methods to a real-world data set, showcasing their behavior in a practical diagnostic context.