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Estimating the reach of a submanifold

Abstract

The reach of a set was first defined by Federer in 1959. When applied to a submanifold, the reach is the radius of the largest possible tubular neighborhood of the submanifold so that the metric projection from the neighborhood back to the submanifold is well defined. It encodes local information about the submanifold's curvature as well as about how it folds back on itself on a global scale to create bottlenecks.

The reach is a key regularity parameter in questions of geometric inference, and so estimating the reach is an important goal. This talk provides two new estimators for the reach. One provides new lower bounds for the minimax convergence rate of reach estimators, the other converges much more slowly but may be of greater computational use.