

An Introduction to Central Limit Theorems for Fréchet Means on Manifolds

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Generalizing the concept of an expected value to metric spaces, Fréchet (1948) introduced means as minimizers of expected squared distance. Bhattacharya and Patrangenaru (2005) derived a central limit theorem (CLT) for such Fréchet means on manifolds under rather obscure conditions. We generalize their CLT and shed some light on these obscure conditions. It turns out that the CLT may have limiting rates different from the classical Euclidean $n^{-1/2}$. The challenge remains, however, to fully understand under which conditions, which specific CLT is valid. This, hopefully, gentle introduction is based on joint work with Benjamin Eltzner.

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