

(Semi-)Intrinsic Statistical Analysis on Stratified Spaces

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We present some applications from biology and medical imaging which lead to data on manifolds and stratified spaces. On such spaces the Euclidean concept of a mean forks into several canonical generalizations of non-Euclidean means. More involved data descriptors, for instance principal components generalize into even more complicated concepts. (Semi)-intrinsic statistical analysis allows to study inference on descriptors that can be represented as elements of another stratified space. We give examples for geodesic principal components on shape spaces and concentric small circles on spheres. In particular, with respect to the statistical inference via central limit theorems, due to the geometry of the spaces, we find curious non-Euclidean phenomena.

Key words: Shape spaces, Fréchet ρ -means, mean geodesics, limit theorems