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Jingyong Su* (jingyong.su@ttu.edu), Texas Tech University, Department of Mathematics & Statistics, Lubbock, TX 79424. *Rate-Invariant Analysis of Trajectories on Riemannian Manifolds.*

We consider the statistical analysis of trajectories on Riemannian manifolds that are observed under arbitrary temporal evolutions. Past methods rely on cross-sectional analysis, with the given temporal registration, and consequently may lose the mean structure and artificially inflate observed variances. We introduce a quantity that provides both a cost function for temporal registration and a proper distance for comparison of trajectories. This distance is used to define statistical summaries, such as sample mean and covariance, of synchronized trajectories. It is invariant to identical time-warpings (or temporal reparameterizations) of trajectories. This is based on a novel mathematical representation of trajectories, termed transported square-root vector field (TSRVF), and the L2 norm on the space of TSRVFs. (Received February 06, 2014)