Instituto de Ingeniería Matemática y Computacional

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A FORWARD-BACKWARD ALGORITHM FOR GEODESIC PCA OF HISTOGRAMS IN THE WASSERSTEIN SPACE

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Abstract

In this talk we discuss the statistical analysis of data sets whose elements are random histograms. For the purpose of learning principal modes of variation from such data, we consider the issue of computing the PCA of histograms with respect to the 2-Wasserstein distance between probability measures. To this end, we propose to compare the methods of log-PCA and geodesic PCA in the Wasserstein space as introduced in Bigot and al. (2015), Seguy and Cuturi (2015). Geodesic PCA involves solving a non-convex optimization problem. To solve it approximately, we propose a novel forward-backward algorithm. This allows a detailed comparison between log-PCA and geodesic PCA of one-dimensional histograms, which we carry out using various datasets, and stress the benefits and drawbacks of each method.

Bigot and al. (2015). J. Bigot, R. Gouet, T. Klein, and A. Lopez. Geodesic PCA in the Wasserstein space by Convex PCA. Annales de l'Institut Henri Poincar e B: Probability and Statistics, 2015.

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