Information Distance Estimation Between Mixtures of Multivariate Gaussians and its Application in Face Recognition

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Abstract

In a number of areas of application, there is an archiving need for extracting from images certain mixtures of distributions to represent the important features needed for accurate image classification as new sample images are added. This paper describes a method using information geometric techniques to measure distances between distributions in the commonly used mixtures of multivariate Gaussians. There is no general analytic solution for the information geodesic distance between two k-variate Gaussians, but for many purposes the absolute information distance is not essential and comparative values suffice for proximity testing. So, a fortiori, also we do not have the solution for two mixtures of multivariate Gaussians; for this we must resort to approximations to incorporate the weightings of component Gaussians. In practice, this may not matter greatly since the relation between a reasonable approximation and a true geodesic distance is likely to be monotonic, which is adequate for many applications. Here we provide choices for the incorporation of weightings in distance estimation, testing their classification capability in face classification. In this we assume that Gaussian Mixtures are extracted from face images and use approximated geodesic distance equations in order to classify new face samples. A face classification generative approach is introduced, where a Multivariate Gaussian Mixture is learned independently from training data. Since each class is learned independently, new classes may be introduced and change the existing face class data structure, so it is not necessary to re-train the

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