MATHEMATICS COLLOQUIUM

Information Geometry: Geometric Science of Information

Information geometry investigates parametric families of statistical model by representing probability density functions over a given sample space as points of a differentiable manifold M. Treating parameters as a local coordinate chart, M is endowed with a Riemannian metric g given by the Fisher-information (the well-known Fisher-Rao metric). However, in place of the Riemannian distance, information geometry uses a non-negative but non-symmetric "divergence function" (also called contrast function) for measuring proximity of two points, for instance Kullback-Leibler divergence, f-divergence, etc. Such divergence functions not only recovers the Fisher-Rao metric, but also a pair of "dual" connections with respect to the metric (equivalently Amari-Censov tensor). This talk will use two examples to introduce some basic ingredients of this geometric framework: the probability simplex (a case with discrete support) and the univariate normal distributions (a case with continuous support). In the former case, the application to the popular data-analytic method Compositional Data Analysis (CDA) is explained in terms of duality between exponential and mixture families. In the latter case, the construction of "statistical mirror" is briefly explained as an application of the concept of dual connections. This talk assumes some basic concepts of differentiable manifold (such as parallel transport and affine connection).

UNIVERSITY OF South Carolina

THURSDAY

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02

4:30 - 5:30PM
LECONTE COLLEGE
ROOM 444

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