SCMS Colloquium

INFORMATION GEOMETRY AND STATISTICAL MIRROR SYMMETRY

Speaker: Jun Zhang
The University of Michigan, Ann Arbor and SIMIS

Time：Thu, Oct 17th, 14:00-15:00

Venue：Gu Lecture Hall, SCMS

Abstract: A parametric statistical model is a family of probability density functions over a given sample space, whereby each function is indexed by a parameter taking value in some subset of Rn. Treating such parameterization as a local coordinate chart, the family forms a manifold M equipped with a Riemannian metric g given by the Fisher-information (the well-known Fisher-Rao metric). The classical theory of information geometry prescribes a family of dualistic, torsion-free conjugate connections constructed from Amari-Chensov tensor as deformation from the Levi-Civita connection associated with g. Here we prescribe an alternative geometric framework of the manifold M by i) treating the parameter as an affine parameter of a flat connection on M and then ii) prescribing its g-conjugate connection as a curvature-free but torsion-carrying one. This new framework enables the construction of a pair of distinct objects on the tangent bundle TM using data from the base manifold M. The pair consists of a Hermitian structure and an almost Kahler structure simultaneously constructed that are in “mirror correspondence." To the extent this complex-to-symplectic correspondence can be constructed from any parametric statistical model, we call this “statistical mirror-symmetry" and speculate its meaning in the context of statistical inference. (Joint work with Gabriel Khan of Iowa State University).