IST AUSTRIA
Institute of Science and Technology

Mathematics and CS Seminar

Barycenters in quantum information theory

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Barycenters (or mean squared error estimators) play a distinguished role in statistics and information theory. This concept is boring in Euclidean spaces in the sense that it coincides with the weighted average. However, non-Euclidean metrics and other distance-like functions (such as relative entropies) are often more natural than the flat metric from the viewpoint of applications.
First, we take the submanifold of centered Gaussian measures in the space of square integrable random variables in R^d endowed with the optimal transport (Wasserstein) distance to illustrate the challenges of computing the barycenter in non-flat metrics. We will also discuss the closely related Riemannian trace metric on positive operators, which is defined by the Hessian of the Boltzmann entropy, from this viewpoint.
Then we turn to quantum information theory and consider generalized quantum Hellinger divergences, that belong to the family of maximal quantum f-divergences and behave like squared distances in some sense to be clarified during the talk.
We derive a characterization of the barycenters for these divergences and compare our results to those of Bhatia et al. [Lett. Math. Phys. (2019), in press, arXiv:1901.01378v1]. We note that the characterization given by Bhatia et al. is not correct in general, albeit it is true for commuting operators.
Based on joint work with Jozsef Pitrik (arXiv:1903.10455)

Thursday, May 23, 2019 04:00pm - 06:00pm

IST Austria Campus Big Seminar room Ground floor / Office Bldg West (I21.EG.101)

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