

Fisher information geometry of beta and Dirichlet distributions

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Abstract: The Fisher information metric provides a Riemannian framework to compare probability distributions inside a parametric family. The most well-known example is the univariate Gaussian case, where the Fisher information geometry amounts to hyperbolic geometry. In this talk we will investigate the Fisher information geometry of Dirichlet distributions, and beta distributions as a particular case. We show that it is negatively curved and geodesically complete [1]. This guarantees the uniqueness of the notion of mean and makes it a suitable geometry to apply the K-means algorithm, e.g. to compare and classify histograms [2].

Joint work with: Stephen Preston, Stéphane Puechmorel, Nicolas Guigui, Sana Rebbah.

References

- [1] A. Le Brigant, S. C. Preston and S. Puechmorel. Fisher-Rao geometry of Dirichlet distributions. *Differential Geometry and its Applications*, 74, 101702, 2021.
- [2] A. Le Brigant, N. Guigui, S. Rebbah and S. Puechmorel. Classifying histograms of medical data using information geometry of beta distributions. *IFAC-PapersOnLine*, 54(9):514–520, 2021.