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INSTITUTO TECNOLÓGICO AUTÓNOMO DE MÉXICO

Seminario Aleatorio

Sesión 353

Projection-based uniformity tests on the hypersphere

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Abstract

Testing uniformity is perhaps the most fundamental problem when dealing with hyperspherical data, a datatype in which directions encode all the relevant information. In particular, testing spherical uniformity has three interesting astronomical applications regarding the study of sunspots, comets, and craters. In this talk, we introduce a projection-based class of uniformity tests on the hypersphere based on the empirical cumulative distribution function. This new class allows the derivation of new tests that neatly extend the circular-only tests by Watson, Ajne, and Rothman to the hypersphere, while also introducing the first instance of an Anderson–Darling-like test for hyperspherical data. Tractable expressions and asymptotics for the test statistics are provided, and the connection of the new class with the Sobolev class is elucidated. A simulation study evaluates the theoretical findings and evidences the competitiveness of the new tests. Applications in astronomy are shown.

The talk is based on joint work (arXiv:2008.09897) with Paula Navarro-Esteban and Juan A. Cuesta-Albertos.

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El Seminario Aleatorio está destinado tanto a profesores como a estudiantes, por lo que el Departamento de Estadística agradece a los profesores que colaboren invitando a sus alumnos a estas sesiones.