SEMINARIO

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Generalizing the Eigenvalue Problem: The Rayleigh-Ritz Degree of Algebraic Varieties

Abstract: The classical Rayleigh Quotient minimization problem deals with optimizing a quadratic form over the sphere. In this talk, we generalize this framework by considering the critical points of a homogeneous polynomial objective function f defined on the intersection among the unit sphere and the affine cone over a given projective algebraic variety X. For generic coefficients of f, the number of such constrained critical points is fixed and it is called the Rayleigh-Ritz degree of X. This invariant is shown to be a version of the well-known Euclidean distance degree (ED degree), specifically corresponding to the distance degree of a Veronese embedding of X. By establishing this fundamental link, we provide concrete formulas for the Rayleigh-Ritz degree across various scenarios.

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