Bernstein polynomials and subdivision schemes for the reconstruction of binary images

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We propose a new method for the stable reconstruction of a class of binary images (modelled as characteristic functions of algebraic domains) from a small number of measurements. Algebraic polynomials and the corresponding image moments are represented in terms of bivariate Bernstein polynomials. We illustrate a strategy for the computation of the coefficients involved in such a representation by means of refinable function kernels associated to convergent polynomial-generating subdivision schemes. The computational procedure relies on the construction of a quasi-interpolation operator whose coefficients are the solution to a linear system. Our approach is robust to noise, computationally fast and simple to implement. The performance of the reconstruction algorithm from noisy samples is illustrated through the results of extensive numerical experiments.

This is a joint work with Demetrio Labate and Wilfredo Molina (University of Houston, Texas, USA).

References

[1] C. Conti, M. Cotronei, D. Labate, W. Molina, *Stable recovery of planar regions with algebraic boundaries in Bernstein form*, Adv. Comput. Math., 47:18 (2021).