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John Harlim- Leveraging the RBF operator estimation for manifold learning.

Tuesday, October 4, 2022 11:30 AM (1 hour)

I will discuss the radial-basis function pointwise and weak formulations for approximating Laplacians on functions and vector fields based on randomly sampled point cloud data, whose spectral properties are relevant to manifold learning. For the pointwise formulation, I will demonstrate the importance of the novel local tangent estimation that accounts for the curvature, which crucially improves the quality of the operator estimation. I will report the spectral theoretical convergence results of these formulations and their strengths/weaknesses in practice. Supporting numerical examples, involving the spectral estimation of the Laplace-Beltrami operator and various vector Laplacians such as the Bochner, Hodge, and Lichnerowicz Laplacians will be demonstrated with appropriate comparisons to the standard graph-based approaches.