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# Gradient Flow Optimisation for Graph Topological Stability

The topological structure of data is widely relevant in various applications, hence raising the question of the stability of topological features. In this talk we address the stability of 1-dimensional holes in a simplicial complex through the optimisation of a functional that combines the spectra of the classical graph Laplacian with the one of the higher-order Hodge Laplacian. The proposed procedure is based on a matrix ODE formulation and a constrained gradient flow approach; the method's performance is illustrated on synthetic quasi-triangulation datasets and transportation networks.

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