

Topology in Computing

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Geometry focuses on quantitative aspects of spaces. Topology, on the other hand, answers qualitative questions about spaces. To use topological methods in computation, however, we need to deal with noise and error. In this talk, I will talk about topological persistence, a computational method for capturing topological features of spaces.

I will begin with an application of the method to computational structural biology. I will then discuss the theoretical basis for the method, as a study of the homology of a filtered simplicial complex. In particular, this study provides a relationship between persistence and classical algebraic topology, giving us an algorithm that closely resembles Gaussian Elimination. I end the talk by discussing some recent work on capturing shape through the study of tangent spaces.