

Cellular Matroids and Applications

Greg Henselman

10/19/2015

Modern applications of algebraic topology in engineering and data science derive statistical shape descriptors from noisy, high-dimensional, and highly curved data. This talk will introduce a combinatorial family of such invariants, specifically the theory of cellular matroids, and outline several of their key applications in topology and data analysis. We will illustrate how matroid-theoretic concepts inform discrete Morse theory, simplify and extend classical notions of graph connectivity to high-dimensional spaces, and determine fundamental properties such as embeddability. Time permitting, we will discuss related advances in computation and brain science vis-à-vis learning and neural coding. No prior knowledge of matroids or topological data analysis will be required!