TOPOLOGY SEMINAR

Worst-case examples for the computation of persistent homology

By

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Abstract: Topological Data Analysis via persistent homology is a new emerging area of data analysis that uses methods from simplicial topology. The persistent homology of a data set can be calculated using a simple algorithm called reduction algorithm. In this talk, I will present a new construction of worst-case examples for this algorithm. Our constructions are similar to the worst-case examples introduced by Morozov, but replace the single-triangle arrangement with a strip formed by base and fin triangles. This structure allows us to give an explicit algorithm for their construction and to perform experiments comparing the runtime of different variants of the reduction algorithm. We further show that, after suitable edge and triangle subdivisions,
these strip examples remain worst-case and can be realized as clique complexes of filtered graphs, and hence as Vietoris--Rips complexes of finite point clouds for a sequence of scale parameters.

Date: March 30, Monday, 2025
Time: 13:30
Place: SA141