Institut für Diskrete Mathematik

Combinatorics Seminar

Friday 21st June 12:30

AE06, Steyrergasse 30

Intervals in 2-parameter persistence modules

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Persistence modules in one parameter decompose into intervals, simple building blocks that capture topological features of an underlying dataset. While the notion of intervals extends to two and more parameters, not all persistence modules can be decomposed any longer into intervals. Instead, the atoms of a decomposition can become arbitrarily complicated, and such complications also arise in typical geometric scenarios.

I will present two limit theorems that support these empirical observations. These results show that in some situations, the expected frequency of intervals in a decomposition is at least 1/4 and that the probability of obtaining only intervals in a decomposition approaches 0 when the sample size goes to infinity. I will focus on the proof of the latter result which uses elementary algebraic and geometric arguments and combines them with basic properties of Poisson processes.

This is joint work with Angel Alonso (TU Graz) and Primoz Skraba (Queen Mary Univ London)

Joshua Erde, Mihyun Kang