

The Jordan type and the induced filtered rank invariant of a multiparameter persistence module

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In this talk, we present an approach to defining invariants of persistence modules over a poset without relying on their decomposition into direct sums of indecomposables. Our methodology is inspired by the theory of modules of constant Jordan type for elementary abelian p -groups. Let P be a poset and S a sequence of finite subsets of P . We define the Jordan type of a P -persistence module M at S as the Jordan type of a nilpotent operator T , which is constructed from M and S . The nilpotent operator T is functorial in M , and this functoriality allows us to define the Jordan filtered rank invariant of M . We first show that these invariants are strictly finer than the classical rank invariants. Furthermore, we demonstrate that the Jordan filtered rank invariants are complete for persistence modules over finite zigzag posets. For P -persistence modules M and N , we also prove that the erosion distance between their Jordan filtered rank invariants is bounded from above by the interleaving distance between M and N . This is based on joint work with Min Hyeok Kang and Dan Kline.

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