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Homological invariants in persistence theory

Let $\mathcal{X}$ be a finite set of indecomposable modules over a given poset $\mathcal{P}$. A homological invariant relative to $\mathcal{X}$ can be seen as an approximation by a linear combination of modules in $\mathcal{X}$, which is compatible with an exact structure. We define and study these invariants, using relative homology. In particular, we compare them with known invariants such as the Hibert function, the (generalized) rank invariants, the signed barcode and compressed multiplicities. We show that the set of single-source spread modules yields a homological invariant closely related to the concept of persistence, and is strictly finer than the classical rank invariant.

This is joint work with Thomas Brüstle and Eric J. Hanson.