PERSISTENT OBJECTS

Amit Patel
Institute for Advanced Study, USA
amit@ias.edu

For a continuous map $f : X \to R$ to the reals, there is a persistent homology group for each interval $[r, s]$. If X_r is the r-sublevel set of f and X_s the s-sublevel set of f, then the persistent homology group is image of the homomorphism $H_d(X_r) \to H_d(X_s)$ induced by the inclusion $X_r \subset X_s$. This is the homology that spreads out over the interval $[r, s]$. Recently, it has been shown that the persistent homology group can be defined for any map $f : X \to M$, where M is an oriented manifold. If U is an open set of M, then the persistent homology over U is a subgroup of $H_d(f^{-1}(U))$ that spreads out over U. The notion of persistent homology categorifies. Let $F : D \to C$ be a diagram in a category C. Under some mild assumptions on C, there is a notion of a persistent object for F. This is the object in C that spreads out over then entire diagram. In this talk, I will present the persistent homology group of maps to the reals, the persistent homology group for maps to any oriented manifold, and the persistent object.