

Cohomology for directed spaces

Quantitative Geometry and Topology Workshop

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- A **stream**¹ is a topological space X equipped with a preorder \leq_U on each open set $U \subset X$ that satisfy a compatibility condition: the preorder on $\cup U_\alpha$ is the transitive-symmetric closure of the preorders \leq_{U_α} . Stream maps $X \rightarrow Y$ are continuous functions that respect the preorders.
- Streams admit generalizations of usual topological constructions. For instance, we have classifying spaces of monoids BM , which allow us to define cohomology of a stream as $H^1(X; M) = [X, BM]$.

¹Krishnan: A convenient category of locally pre-ordered spaces. 

Unfortunately, many constructions do not detect directionality or are too wild. The fundamental monoid is not a dihomotopy invariant, and with $M = \mathbb{N}$ we obtain the usual cohomology with \mathbb{Z} coefficients. We hope to develop more refined invariants that detect this type of behavior.