

New Perspectives in Signal Processing Combining Dimensionality Reduction and Persistent Homology

Mijail Guillemard
(joint work with Armin Iske)

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Abstract

In the last few years we have seen unprecedented developments of new tools for the analysis of point cloud datasets. Dimensional reduction and manifold learning are by now well established research fields with challenging tasks and important applications in engineering problems. Parallel developments for the analysis of datasets have recently appeared in computational topology, where a new emergent topic is persistent homology. In this talk, we first introduce background information before discussing new perspectives for applying these tools in signal analysis. We discuss an illustrative framework for a topological based filtering method in signal processing, as well as a toy example in image analysis.