UNIVERSITY AT ALBANY
State University of New York

College of Arts and Sciences
Department of Mathematics and Statistics

ATMCS 10 Contributed Talk Application

Shreya Arya (†)
Justin Curry (∗)
Sayan Mukherjee (†)
∗ = University at Albany, SUNY
† = Duke University

A Sheaf-Theoretic Construction of Shape Space

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Abstract. In this talk I will present a sheaf-theoretic construction of shape space—the space of all shapes. We do this by describing a hypersheaf on the poset category of o-minimal sets, where objects of this category are mapped to their Persistent Homology Transforms (PHTs). A recent result that builds on work of Schapira, showed that this transform is injective, thus making the PHT a good summary object for each shape. Our sheaf result allows us to "glue" PHTs of different shapes together to build up the PHT of a larger shape. Furthermore, by a new approximation result I will show that degree 0 information, i.e. PHT^0, is sufficient to compute PHT^n for any n up to some tolerance. If time permits, I will discuss stability results for the PHT.

This is joint work with Shreya Arya and Sayan Mukherjee.