

**Metric geometry in action:
Non-rigid shape acquisition, processing, and analysis**

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Gromov-Hausdorff distance (d_{GH}) is a definition for the discrepancy between metric spaces. Until recently, it has been applied mainly in theoretical exploration of metric spaces in metric geometry, as well as theoretical computer science, specifically, in the context of metric embedding of graphs. A couple of years ago it was introduced into the field of shape analysis. In this talk we will explore the relation between the Gromov-Hausdorff distance and multi-dimensional scaling (MDS), a classical approach for embedding a given metric space into one in which distances can be analytically computed. The obvious example for such a target embedding space in MDS is Euclidean. Alternatively, we could use the Generalized MDS (GMDS) as a building block in numerically approximating d_{GH} . This generalization deals with target spaces in which distances can be numerically approximated rather than evaluated analytically.

The exposition of ideas in metric geometry and numerical optimization would be motivated through practical examples like 3D face recognition, texture mapping in computer graphics, exploring intrinsic symmetries and more. We will start from the actual acquisition process and present a 3D color video camera we developed and demonstrate the potential of our computational tools in various applications in medical information analysis.