

Simons Lecture:

Thu, 4/16, 3:30, room: TBA

Speaker: Mikael Vejdemo-Johansson (KTH Royal Institute, Stockholm, Sweden)

Title: Intrinsic circle-valued coordinates - theory and applications

Abstract:

A classical theorem in algebraic topology produces a constructive bijection between dimension 1 cohomology classes and functions from a topological space to the circle. In this talk, I will describe this connection, how persistence can be adapted to produce intrinsic and data-driven coordinate functions with a measure of quality for the computed coordinate, and some applications of these methods.

In particular, I will trace the development of persistent cohomology and circle-valued coordinates (joint work with Vin de Silva and Dmitriy Morozov); and then display applications of the coordinate work to analysing weather signals, analysing motion capture of gaits (joint work with Primoz Skraba, Danica Kragic and Florian Pokorny). Finally, I will present some speculative ideas for adapting these methods to an online/streaming learning setting — where for instance gait models can be learned directly from data using cohomological coordinates over time as more and more data is measured from a walking subject.