

ISTeC

The Information Science and Technology Center



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Colorado State University's
Information Science and Technology Center (ISTeC)
presents *two* lectures by

Gunnar Carlsson

Professor, Department of Mathematics
Stanford University

ISTeC Distinguished Lecture

In conjunction with the Mathematics Department, the Electrical and
Computer Engineering Department, and the Computer Science Department

"The Shape of Data"

Monday, October 20, 2014
Reception with refreshments: 10:30 am
Lecture: 11:00 am – 12:00 noon
Location: LSC Grey Rock



Mathematics Department, Electrical and Computer Engineering Department,
and Computer Science Department Special Seminar Sponsored by ISTeC

"The Algebraic Geometry of Persistence Barcodes"

Tuesday, October 21, 2014
Lecture: 1:00 – 2:00 pm
Reception with refreshments: 2:00 pm
Location: 221 TILT

ISTeC (Information Science and Technology Center) is a university-wide organization for promoting, facilitating, and enhancing CSU's research, education, and outreach activities pertaining to the design and innovative application of computer, communication, and information systems. For more information please see ISTeC.ColoState.EDU.

Abstracts

The Shape of Data

“Big data” is a term which describes many varied problems in the management of data. These relate to storage, query capability, analysis, and numerous other aspects of the general problem of how to make most effective use of the enormous amounts of data currently being gathered. We will talk about a collection of recently developed methods for the analysis of large, high dimensional, and most importantly, complex data sets. These methods use the mathematical notion of shape, as encoded in topological methods, as a new tool in data analysis. We will discuss these methods, with numerous examples.

The Algebraic Geometry of Persistence Barcodes

Persistent homology associates to a finite metric space an invariant called a persistence barcode, which often allows one to infer the homology of an underlying space from which the finite sample is obtained. These barcodes have numerous applications, and from these applications it is clear that it is very valuable to organize the set of all barcodes in some way. This can be done as a metric space, and we will see that it can be done as an infinite dimensional analogue of an algebraic variety. We will also discuss applications, including applications of the “coordinatization” of the set of barcodes.

Speaker Biography

Gunnar Carlsson: B.A. Harvard 1973, Ph.D. Stanford 1976, Ann and Bill Swindells Professor at Stanford University. Has worked in various areas of homotopy theory, equivariant algebraic topology, and algebraic K-theory. Proved “Segal’s Burnside Conjecture” as well as a “Sullivan’s fixed point conjecture”. Sloan research fellow, invited speaker at 1986 ICM. In recent years has been developing topological data analysis, the study of the “shape” of point cloud data. Led a multi-university DARPA initiative on this topic.

To arrange a meeting with the speaker, please contact Michael Kirby, Michael.Kirby@ColoState.EDU, 970-491-6850 or Christopher Peterson, Christopher2.Peterson@ColoState.EDU, 970-491-5153.