

STANFORD UNIVERSITY
DEPARTMENT OF STATISTICS
DEPARTMENTAL SEMINAR

Time of talk, Weekday, Date of talk
4:15 p.m., Tuesday, September 25, 2007
Sequoia Hall Room 200
(Cookies at 3:45 in 1st Floor Lounge)

Susan Holmes
Statistics Department
Stanford

**Finding Time:
A la recherche du temps perdu.**

Classical multidimensional scaling (MDS) is a method for visualizing high-dimensional point clouds by mapping to low-dimensional Euclidean space. This mapping is defined in terms of eigenfunctions of a matrix of interpoint proximities.

We show examples of finding hidden gradients in high dimensional data, in particular we analyze in detail multidimensional scaling applied to the 2005 United States House of Representatives roll call votes.

MDS and kernel projections output ‘horseshoes’ that are characteristic of dimensionality reduction techniques. We show that in general, a latent ordering of the data gives rise to these patterns when one only has local information. That is, when only the interpoint distances for nearby points are known accurately. Our results provide a rigorous set of results and insight into manifold learning in the special case where the manifold is a curve. This method is also applied to biological data where synchronization issues are difficult and retrieving the time gradient essential.

The talk is joint work with Persi Diaconis and Sharad Goel.