



Institute for Pure and Applied Mathematics
University of California, Los Angeles presents

Multiscale Geometry and Analysis in High Dimensions

Workshop III: Multiscale Structures in the Analysis of High-Dimensional Data

October 25-29, 2004

Members of the Organizing Committee include **Naoki Saito**, Chair (UC Davis), **Ronald Coifman** (Yale University), **David Donoho** (Stanford University), **Mark Hansen** (UCLA) and **Peter Jones** (Yale).

Workshop III: Multiscale Structures in the Analysis of High-Dimensional Data is part of an active program of research activities, seminars and workshops throughout the **September 7 - December 17, 2004** period and core participants will be in residence at IPAM continuously for these thirteen weeks. The program will open with tutorials, and will be punctuated by 5 major workshops and a culminating workshop at UCLA's Lake Arrowhead Conference Center. Several distinguished senior researchers will be in residence for the entire period. Between the workshops there will be a program of activities involving the long-term and short-term participants, as well as visitors.



Scientific Overview:

There is an ever-expanding range of applications areas where analysis of very high-dimensional datasets lies at the heart of the matter. Relatively little is known about the structure of naturally-occurring high-dimensional data, and there are enormous opportunities for high-impact discovery. Recently, a number of researchers have pointed out the relevance of multiscale approaches to understanding high-dimensional data. For example, some data manifolds, such as image manifolds, are inherently multiscale, and some methods, such as density estimation in high dimensions, can profit greatly by multiscale representations. In this workshop we will explore the interactions between multiscale thinking and high-dimensional data, and we hope to bring together experts from classical machine learning, spectral graph theory, and visualization and sonification of high dimensional data, etc.

Topics to be covered include:

(1) Structure of high-dimensional data manifolds; (2) Multiscale structures in high-dimensional data; (3) Methods for dimensionality reduction; (4) Relations between machine learning, statistical and math analysis viewpoints; (5) Visualization and sonification; and (6) Multiscale Computational Algorithms

Semester Program Schedule:

- Tutorials:** September 8 – 11: September 13-15, 2004
- Workshop 1:** September 20 – 24: Multiscale Geometry in Image Processing and Coding
- Workshop 2:** October 19 – 23: Multiscale Geometry in Scientific Computing
- ? **Workshop 3: October 25 – 29: Multiscale Structures in the Analysis of High-Dimensional Data**
- Workshop 4:** November 8 – 12: Multiscale Geometric Methods in Astronomical Data Analysis
- Workshop 5:** November 15 – 19: Mathematical Analysis and Multiscale Geometric Analysis

Participation:

Financial support for this workshop is available for participants at all academic levels, and recent PhD's, graduate students, and researchers in the early stages of their career are especially encouraged to apply. An online application for support is available at <http://www.ipam.ucla.edu/programs/mgaws3>. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission and we welcome their applications. Applicants who are interested in becoming core participants and participating in the semester program (September 7 - December 17, 2004) should apply at <http://www.ipam.ucla.edu/programs/mga2004>.

Please visit our website at

<http://www.ipam.ucla.edu/programs/mgaws3>

or email questions to mgaws3@ipam.ucla.edu

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