abstract

COMPUTER SCIENCE/DISCRETE MATH I
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

The Fast Johnson-Lindenstrauss Transorm was recently discovered by Ailon and Chazelle as a technique for performing fast dimension reduction from ℓ_2^d to ℓ_2^k in time $O(\max\{d\log d, k^3\})$, where k is the target lower dimension. This beats the naive $O(dk)$ achieved by multiplying by random dense matrices, as noticed by several authors following the seminal result by Johnson and Lindenstrauss from the mid 80's.

In this talk I will show how to perform dimension reduction onto $k<d^{1/2-\delta}$ dimensions in time $O(d\log k)$ for arbitrary small δ. This beats Ailon et al's algorithm for $k>d^{1/3}$ and for $k=d^{o(1)}$. This is achieved using analysis of Rademacher series in Banach spaces (sums of vectors in Banach spaces with random signs) and a powerful measure concentration bound due to Talagrand. The set of vectors used is related to dual BCH codes.

I will also discuss reduction onto ℓ_1 space. Finally, I will show that certain reasonable assumptions on explicit construction of matrices based on codes with certain properties would extend our result to all $k<d^{1-\delta}$.

Joint work with Edo Liberty.