



THE UNIVERSITY OF
CHICAGO

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Universality Laws for Randomized Dimension Reduction

MONDAY, April 11, 2016, at 4:00 PM
Eckhart 133, 5734 S. University Avenue

ABSTRACT

Dimension reduction is the process of embedding high-dimensional data into a lower dimensional space to facilitate its analysis. In the Euclidean setting, one fundamental technique for dimension reduction is to apply a random linear map to the data. The question is how large the embedding dimension must be to ensure that randomized dimension reduction succeeds with high probability.

This talk describes a phase transition in the behavior of the dimension reduction map as the embedding dimension increases. The location of this phase transition is universal for a large class of datasets and random dimension reduction maps. Furthermore, the stability properties of randomized dimension reduction are also universal. These results have many applications in numerical analysis, signal processing, and statistics.

Joint work with Samet Oymak.

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