

ACMS Applied Math Seminar

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Thursday, February 27, 2020
154 Hurley Hall
3:30 - 4:30 P.M.



Tensor Decomposition and Data Analysis

After a brief intro to tensors and CP decompositions, I will talk about the problem of decomposing higher-order moment tensors, i.e., the sum of symmetric outerproducts of data vectors. Such a decomposition can be used to estimate the means in a Gaussian mixture model and for other applications in machine learning. The d th-order empirical moment tensor of a set of p observations of n variables is a symmetric d -way tensor. Our goal is to compute a low-rank tensor approximation. The challenge is that computing a low-rank approximation becomes prohibitively expensive quickly as the size of the problem grows because forming the initial moment tensor costs $O(pn^d)$. Our contribution is avoiding formation of the moment tensor and computing the low-rank approximation implicitly. This reduces the number of operations and allows for efficient computation of higher-order moments. I will show examples using symmetric tensor decompositions to estimate symmetric tensor rank and recover means of Gaussian mixture models.

The Department of Applied and Computational
Mathematics and Statistics

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