
PARDIS SEMNANI, University of British Columbia

Log-concave Density Estimation in Undirected Graphical Models

We study the problem of maximum likelihood estimation of densities that have a log-concave factorization according to a given undirected graph G . We show that the maximum likelihood estimate (MLE) exists and is unique with probability 1 as long as the number of samples is larger than the smallest size of a maximal clique in a chordal cover of the graph G . Furthermore, we show that the MLE is the product of the exponentials of several tent functions, one for each maximal clique of the graph. While the set of log-concave densities in a graphical model is infinite-dimensional, our results imply that the MLE can be found by solving a finite-dimensional convex optimization problem. Finally, we discuss the conditions under which a log-concave function, which factorizes according to the maximal cliques of G , can be factorized in the same manner with log-concave clique potentials.

This talk is based on a joint work with Kaie Kubjas, Olga Kuznetsova, Elina Robeva, and Luca Sodomaco.