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Marginal faces of marginal polytopes

Abstract:

The hope of graphical modeling is to understand a larger set of random variables by understanding several subsets, corresponding to smaller neighbourhoods within the graph describing the interactions of the random variables. Unfortunately, this restriction to small neighbourhoods does not work for all mathematical or statistical questions. Looking at small neighbourhoods in the graph and combining the information just gives an approximate answer, and one has to ask how good this approximation is. This contribution studies this question in the case of the support of the generalized MLE for undirected graphical models, which can be determined when the marginal polytope of the model is known.

Recently, in joint work with Wang and Massam we have shown how to approximate the support of the GMLE by looking at subsets of the random variables. Although it is theoretically known that this approach cannot give the true answer in all cases, it is surprising to observe how good this approximation is in practice. This contribution studies this phenomenon by asking how the faces of the marginal polytope are localized in subgraphs.

This talk is based on joint work with Nanwei Wang and Hélène Massam

References:

[1] N. Wang, J. Rauh and H. Massam (2016) Approximating faces of marginal polytopes in discrete hierarchical models. *Annals of Statistics* **47** (3): 1203-1233.