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TOTAL POSITIVITY AND MARKOV STRUCTURES

Abstract: Positive associations between random variables can be described in a variety of ways. One of the strongest is multivariate total positivity of order two (MTP2) introduced by Karlin and Rinott [2]. The MTP2 property is stable under a number of operations, including marginalization and conditioning. The lecture investigates how the property interacts with conditional independence structures, implying, for example, that any strictly positive MTP2 distribution becomes faithful to its pairwise independence graph. In addition we shall study how this property is manifested in Gaussian, discrete, and conditional Gaussian distributions, and give a number of examples of such distributions.

The lecture is based on joint work with S. Fallat, K. Sadeghi, C. Uhler, N. Wermuth, and P. Zwiernik; [2].

References:

- [1] S. Karlin and Y. Rinott (1980). Classes of orderings of measures and related correlation inequalities I: multivariate totally positive distributions. *Journal of Multivariate Analysis*. **10**:467–498.
- [2] S. Fallat, K. Sadeghi, C. Uhler, N. Wermuth, and P. Zwiernik (2016). Total positivity in Markov structures. arXiv:1510.01290. To appear in *The Annals of Statistics*.