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MODEL SELECTION IN THE CLASS OF GAUSSIAN MODELS INVARIANT UNDER A SUBGROUP OF THE SYMMETRIC GROUP

Abstract: We consider multivariate centred Gaussian models for the random variable $X = (X_1, \dots, X_p)$, invariant under the action of a subgroup of the group of permutations on $\{1, \dots, p\}$. Using the representation of the symmetric group on the field of reals, we derive the distribution of the maximum likelihood estimate of the covariance parameter Σ and also the analytic expression of the normalizing constant of the Diaconis-Ylvisaker conjugate prior for the precision parameter $K = \Sigma^{-1}$. We can thus perform Bayesian model selection in the class of complete Gaussian models invariant by the action of a subgroup of the symmetric group, which we could also call complete RCOP models (see [1]). We illustrate our results with a toy example of dimension 4, several simulated examples of dimension $p < 9$ and a high-dimensional example with $p = 100$ in the case of a cyclic group generated by one permutation.

This talk is based on a joint work with P. Graczyk, H. Ishi and B. Kołodziejek.

References:

- [1] Højsgaard, S. and Lauritzen, S. L. (2008) Graphical Gaussian models with edge and vertex symmetries, *J. R. Stat. Soc. Ser. B Stat. Methodol.*: 1005–1027.