Multivariate geometric distributions with limited memory, d-monotone sequences, and infinitely divisible laws

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In this talk we discuss and characterize multivariate geometric distributions with lack-of-memory (LM) property. First, a multivariate extension of the univariate geometric law is derived using a discrete analogue of the Marshall-Olkin exponential "shock model". It is shown that only the subclass of multivariate LM distributions with positively correlated components can be obtained in this way. A more general probabilistic model, containing precisely all multivariate geometric LM distributions, is proposed. As opposed to the Marshall-Olkin construction based on exponential as well as geometric shocks, the latter construction of multivariate geometric LM distributions allows for negative correlations.

For both stochastic models, the exchangeable subclass is characterized by d-monotone sequences. Moreover, the extendible subclass with conditionally independent and identically distributed components is determined and constructed using a random walk. A one-to-one relationship between the extendible subclass of the Marshall-Olkin type geometric distributions and infinitely divisible distributions is highlighted, the copula is obtained, and the dependence structure is discussed.

References

[1] J.-F. Mai, M. Scherer, N. Shenkman, *Multivariate geometric distributions with limited memory, d-monotone sequences, and infinitely divisible laws*, working paper (2011).

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