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Sonja Petrovic* (sonja.petrovic@iit.edu), Department of Applied Mathematics, 10 West 32nd Street, room 208, Chicago, IL 60616. *Algebra on hypergraphs with applications to statistics*. Preliminary report.

Social networks and other large sparse data sets pose significant challenges for statistical inference, as many standard statistical methods for testing model/data fit are not applicable in such settings. Algebraic statistics offers a theoretically justified approach to goodness-of-fit testing that relies on the theory of Markov bases and is intimately connected with the geometry of the model as described by its fibers.

Most current practices require the computation of the entire basis, which is infeasible in many practical settings. We present a dynamic approach to explore the fiber of a model, which bypasses this issue, and is based on the combinatorics of hypergraphs arising from the toric algebra structure of log-linear models.

This algebraic statistics problem is intimately tied with graph and hypergraph sampling problems, which will be explained in this setting. Several open problems remain.

This talk will focus on the toric algebra of hypergraphs.

Based on joint work with Elizabeth Gross, Despina Stasi, and others. (Received September 15, 2014)