1014-62-1063 **Alessandro Rinaldo*** (arinaldo@stat.cmu.edu), Department of Statistics - 132 Baker Hall, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213. *On the geometry of the MLE in log-linear model analysis.*

Recent advances in algebraic statistics have suggested a more general approach to the study of log-linear models that utilizes the tools and language of algebraic and polyhedral geometry. In this talk, the problem of the existence of the the Maximum Likelihood Estimate (MLE) of the cell mean vector of a contingency table, fundamental for assessment of fit, model selection and interpretation, is considered. Geometric and combinatorial conditions for the existence of the MLE are given, by combining tools from polyhedral geometry and the theory of linear exponential families. It will be shown how the MLE, which arises as the solution of an optimization problem, can be defined in a purely geometric fashion as the intersection of a polytope describing the portion of the sample space corresponding to the observed sufficient statistics, and a toric variety, representing the parameter space under mean-value parametrization. The toric variety parametrization is particularly useful as it provides an appropriate closure of the parameter space and allows for a rigorous definition of extended MLE's and extended linear exponential families. (Received September 27, 2005)