Meeting: 998, Houston, Texas, SS 19A, Special Session on Algebraic Geometry

998-14-364 **Luis David Garcia*** (lgarcia@almaren.bioinformatics.vt.edu), VA. *Algebraic Geometry Applications in Bayesian Model Selection.* Preliminary report.

A Bayesian network is a family of probability distributions associated to a directed acyclic graph. They are widely used in artificial intelligence, bioinformatics and many other applications. The emerging field of algebraic statistics advocates polynomial algebra as a tool in the statistical analysis of experiments and discrete data. In this talk, I will present the necessary theory in algebraic geometry to place Bayesian networks into the realm of algebraic statistics. This allows us to create a computer algebra–statistics dictionary. In particular, we link the notion of effective dimension of a Bayesian network with the notion of dimension of a variety. We also obtain the independence constraints on the distributions over the observable variables implied by a Bayesian network with hidden variables. These results are relevant to the statistical problem known as model selection, that is, the problem of choosing the appropriate model that best fits a given set of observations. Recently, an algebraic geometry approach to this problem involving notions like dimension, deepest singularities and resolution of singularities was proposed. In this talk, I also present this method and some advancements that our theory provides to it. (Received March 02, 2004)