Statistical Models with Toric Structure

Aida Maraj

University of Michigan, USA

maraja@umich.edu

Staged tree models are discrete statistical models encoding relationships between events in a directed rooted tree with colored vertices. In algebro-geometric terms, the model consists of points inside a toric variety whose design matrix is determined by the root to leaf paths in the tree. For certain trees, called balanced, Duarte and Görgen proved that the model is in fact the intersection of this toric variety and the probability simplex. The toric structure gives the model a straightforward description, and has computational advantages; it provides a Gröbner basis of binomial quadratics completely determined by the paths in the tree. In this poster we (1) show that the class of staged tree models with toric structure extends far outside of the balanced case, if we allow a linear change of coordinates, and (2) discuss staged tree models for which such a change of coordinates is not possible. Part (1) is based on work with Christiane Görgen and Lisa Nicklasson and part (2) is work with Arpan Pal.