Sampling Zeros, Model Zeros, and Maximum Likelihood Degrees

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Given a statistical model, the maximum likelihood degree is the number of complex solutions to the likelihood equations for generic data, or equivalently, the degree of the likelihood locus. In this poster, we consider discrete algebraic statistical models and explore the solutions to the likelihood equations when the data are no longer generic, but instead contain zeros. In this case, with the help of numerical algebraic geometry, we see that the solutions partition into two clusters, solutions to the likelihood equations for sampling zeros and solutions that lie on the coordinate hyperplanes. Using this fact, we show how the problem of finding critical points to the likelihood function can be partitioned into smaller and computationally easier problems involving sampling and model zeros.

Joint work with Jose Rodriguez (University of Notre Dame).