SMU Department of Statistics and Data Science

Department Seminar (November 17, 2023)

Variety Distributions and Applications

Nonlinear systems of polynomial equations arise naturally in many applied settings. The solution sets to these systems over the reals, called real varieties, are often positive dimensional spaces that in general may be very complicated yet have very nice local behavior almost everywhere. In this work we communicate recent progress towards a Monte Carlo framework for exploring such real solution sets. After describing how to construct probability distributions whose mass focuses on a variety of interest, we describe how Hamiltonian Monte Carlo methods can be used to sample points near the variety that may then be moved to the variety using endgames. We conclude by showcasing trial experiments and applications.

Seminar Details

Date:	Friday, November 17
Time:	11:00 am to 11:50 am
Location:	Florance Hall 100
Tea-time:	Join us for refreshments at Heroy 139 at 10:15 am $$

Speaker Details

Name: David Kahle

Affiliation: Baylor University



Biography: Dr. David Kahle is an associate professor at Baylor University in the Department of Statistical Science. He obtained a Ph.D. in Statistics from Rice University. Dr. Kahle's research interests are broad, but they generally center on the computational aspects of statistics, ranging from foundational concepts of statistical computing to the development of data science software. Some of his recent interests include algebraic statistics and Bayesian biopharmaceutical statistics, leading to the creation of numerous valuable R packages, including mpoly, m2r, latte, bertini, and algstat. Some of his recent theoretical works involve algebraic pattern recognition, Markov chain Monte Carlo algorithms for exact inference in discrete exponential family models, and double sampling procedures for count data. Among his many notable contributions is the development of the ggmap package, which I co-authored with inimitable Hadley Wickham.