Daniela Witten, PhD
Professor
Statistics

Quantifying Uncertainty in Spikes Estimated from Calcium Imaging Data

Daniela Witten is a professor of Statistics and Biostatistics at University of Washington, and the Dorothy Gilford Endowed Chair in Mathematical Statistics. She develops statistical machine learning methods for high-dimensional data, with a focus on unsupervised learning.

Daniela is the recipient of an NIH Director's Early Independence Award, a Sloan Research Fellowship, an NSF CAREER Award, a Simons Investigator Award in Mathematical Modeling of Living Systems, a David Byar Award, a Gertrude Cox Scholarship, and an NDSEG Research Fellowship. She is also the recipient of the Spiegelman Award from the American Public Health Association for a statistician under age 40 who has made outstanding contributions to statistics for public health, as well as the Leo Breiman Award for contributions to the field of statistical machine learning. She is a Fellow of the American Statistical Association, and an Elected Member of the International Statistical Institute.

Daniela's work has been featured in the popular media: among other forums, in Forbes Magazine (three times) and Elle Magazine, on KUOW radio (Seattle's local NPR affiliate station), in a NOVA documentary, and as a PopTech Science Fellow.

Daniela is a co-author (with Gareth James, Trevor Hastie, and Rob Tibshirani) of the very popular textbook "Introduction to Statistical Learning". She was a member of the National Academy of Medicine (formerly the Institute of Medicine) committee that released the report "Evolution of Translational Omics".

Daniela completed a BS in Math and Biology with Honors and Distinction at Stanford University in 2005, and a PhD in Statistics at Stanford University in 2010.

Daniela's abbreviated CV is available here. Her full CV is available upon request.

Abstract: abstract: In recent years, a number of algorithms have been developed to estimate spike times on the basis of calcium imaging data.

In this talk, I will ask a question that arises naturally in applying these algorithms: how can we quantify uncertainty associated with the estimated spikes? I will present a selective inference framework that allows us to compute a p-value associated with each estimated spike. The key idea is that instead of asking the question "what is the probability of seeing such a large increase in fluorescence if there isn't really a spike at this position?", we must instead ask the question "what is the probability of seeing such a large increase in fluorescence if there isn't really a spike at this position, given that we estimated a spike?"

This is joint work with my current PhD student Yiqun Chen and PhD alum Sean Jewell.