Data Science Seminar

Hosted by the Department of Mathematics and Statistics

- Date: Tuesday, April 11, 2023
- Time: 12:00pm – 1:00pm
- Room: Whitney Hall 100E
- Speaker: Dr. Chris Haines (Binghamton University)
- Title: Independent Spacings Theorem (IST) with a Maximum Product Spacings (MPS) Estimation Application.

Abstract

Suppose we have a simple random sample from an exponential distribution with unknown mean. The maximum likelikhood estimator (MLE) for the parameter is well known to be the sample mean. We propose an alternate method for parameter estimation known as Maximum Product Spacings Estimation (MPS). The MPS generally compares fairly well to the MLE and has many of the same desirable properties such as asymptotic normality and consistency. The Independent Spacings Theorem (IST) asserts that the spacings between the order statistics are independent, and also the spacings each have an exponential distribution. By re-weighting the spacings, we can construct another simple random sample from an exponential distribution with the same mean. If we apply maximum likelihood estimation to this sample, we arrive at the same estimator for the mean, but if we apply maximum product spacings estimation to this sample, we will come up with a second estimator for the mean. The IST can then be applied as many times as desired to produce a series of MPS estimators, and then perhaps an improved estimator can be constructed using this series of MPS estimators. One major general question we ask is how close to the MLE can we come using this method? The number of iterations can be adjusted as well as the sample size. Then Önally we extend this method from exponential distributions to power distributions as well as continuous distributions which are locally power distributions.

Biography of the speaker: Dr. Haines has been a visiting assistant professor (and lecturer) at Binghamton University since August 2017. During his time at Binghamton, he has been the instructor of courses such as MATH346, MATH447, MATH448 and MATH450. He earned his PhD at Lehigh University in January 2014 under the direction of Bennet Eisenberg. His thesis mainly involved estimating the mean of a two parameter exponential distribution when the location parameter is known and unknown and thereby seeing the advantage of knowing the location parameter. Between 2014 and 2017, he taught at various institutions working as a part-time adjunct instructor. Most notably, he was brieáy employed at Soochow University (Suzhou, China) in Fall 2016. He has enjoyed teaching at Binghamton and hopes to soon add some aspects of research into his professional career as well.