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DEPARTMENT OF STATISTICS AND BIOSTATISTICS

Weijie Su
Department of Statistics
Wharton School
University of Pennsylvania

Statistical Inference for Stochastic Approximation and Online Learning via Hierarchical Splitting

October 18, 2017
3:20 – 4:20pm
Light refreshments will be served
110 Frelinghuysen Road
Hill Center, Room 552

Abstract: Stochastic gradient descent (SGD) is an immensely popular approach to optimization in settings where data arrives in a stream or data sizes are very large. Despite an ever-increasing volume of works on SGD, relatively little is known about statistical inferential properties of predictions based on SGD solutions. In this talk, we introduce a novel procedure termed HiGrad to conduct inference on predictions, without incurring additional computational cost compared with the vanilla SGD. HiGrad begins by performing SGD iterations for a while and then split the single thread into a few, and it hierarchically operates in this fashion along each thread. With predictions provided by multiple threads in place, a t-based confidence interval is constructed by decorrelating predictions using covariance structures given by the Ruppert-Polyak-Juditsky averaging scheme. Under certain regularity conditions, the HiGrad confidence interval is shown to attain asymptotically exact coverage probability. Finally, the performance of HiGrad is evaluated through extensive simulation studies and a real data example.

This is joint work with Yuancheng Zhu.

Bio: Weijie Su is an Assistant Professor of Statistics in the Department of Statistics at the Wharton School, University of Pennsylvania. Prior to joining Penn in Summer 2016, Su obtained his Ph.D. in Statistics from Stanford University in 2016, under the supervision of Emmanuel Candès. He received his bachelor's degree in Mathematics from Peking University in 2011. Su's research interests are in high-dimensional inference, multiple testing, first-order optimization algorithms, and privacy-preserving data analysis.