Industrial & Systems Engineering
Seminar Announcement

Robust statistics and learning via optimization

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Abstract: Robust statistical methods have two main aims: (1) obtain high quality estimates in spite of contaminated data, and (2) detect which data are really `outliers', i.e. don't meet the usual expectations or assumptions. We highlight the role that optimization plays in achieving these goals. For example, classic approaches to robust statistics replace the least squares minimization criterion for regression with other penalties, such as Huber: *https://en.wikipedia.org/wiki/Huber_loss*

We then look at the advantages of a nonsmooth nonconvex `trimmed' formulation, proposed in the 1980's for regression, that can achieve objectives (1) and (2) for any machine learning model. The approach is illustrated using examples from machine learning and computer vision models. Algorithms and applications are based on material in the paper below - if you have time, skim the abstract, intro, and applications (section 4) before the talk. *https://arxiv.org/abs/1610.01101*

Bio: *Aleksandr Aravkin* received an M.S. in Statistics and a Ph.D. in Mathematics from the University of Washington in 2010. He was a joint postdoctoral fellow in Earth and Ocean Sciences and Computer Science at the University of British Columbia from 2010-2012, and a research staff member at the IBM T.J. Watson Research Center from 2012-2015. During this time he also worked at Columbia as an Adjunct Professor in Computer Science and IEOR. In 2015, Dr. Aravkin joined the faculty at UW Applied Mathematics, where he works on theoretical and applied problems in optimization, machine learning, and data science.

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