Robust Reduced Rank Regression in a Distributed Setting

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Abstract: This talk studies the reduced rank regression problem, which assumes a low-rank structure of the coefficient matrix, together with heavy-tailed noises. To address the heavy-tailed noise, we adopt the quantile loss function instead of a commonly used squared loss. However, the non-smooth quantile loss brings new challenges to both computation and the development of statistical properties, especially when the data is large in size and distributed across different machines. To this end, we first transform the response variable and reformulate the problem into a trace-norm regularized least-squares problem, which greatly facilitates the computation. Based on this formulation, we further develop a distributed algorithm. Theoretically, we establish the convergence rate of the obtained estimator and the theoretical guarantee for rank recovery. The simulation analysis is provided to demonstrate the effectiveness of our method.