INTERACTIVE VERSUS NON-INTERACTIVE LOCALLY, DIFFERENTIALLY PRIVATE ESTIMATION: TWO ELBOWS FOR THE QUADRATIC FUNCTIONAL

ANGELIKA ROHDE

Abstract: Local differential privacy has recently received increasing attention from the statistics community as a valuable tool to protect the privacy of individual data owners without the need of a trusted third party. Similar to the classic notion of randomized response, the idea is that data owners randomize their true information locally and only release the perturbed data. Many different protocols for such local perturbation procedures can be designed. In all the estimation problems studied in the literature so far, however, no significant difference in terms of minimax risk between purely non-interactive protocols and protocols that allow for some amount of interaction between individual data providers could be observed. We show that for estimating the integrated square of a density, sequentially interactive procedures improve substantially over the best possible non-interactive procedure in terms of minimax rate of estimation.