Concentration Inequalities, Oracles, and Applications

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Outline: Week 8
1) Sample value closest to a given point; distribution; deviation; expectation; mean squared error;
2) Sample value closest to the mean of the sample; its location; stochastic representation; asymptotic distribution in the absolutely continuous case with finite variance;
3) Strong approximations of the empirical and the quantile process in one dimension; almost sure rates for difference between the mean and sample observation closest to the mean;
4) The oracle perspective; case of dimension > 1;
5) Sparse high dimensional and infinite dimensional Gaussian mean problem; Pinsker's lower bound on asymptotic minimax risk over ellipsoids; asymptotic minimaxity of James-Stein estimate; other means of regularization;
6) Linear pointwise oracular risk; asymptotic approximate oracle property of James-Stein estimate over linear class;
7) Adaptivity; blockwise James-Stein estimates.