

Concentration Inequalities, Oracles, and Applications

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Outline: Week 7

- 1) Introduction to basic terminology in density estimation; kernel density estimates, histograms in Euclidean spaces;
- 2) Errors of density estimates; L_1 and L_2 errors; convergence properties;
- 3) Expected L_1 and L_2 errors; concentration of actual errors near their expected values;
- 4) Miscellaneous delicate phenomena in nonparametric density estimation;
- 5) Introduction to the idea of an oracle; illustration with density estimates;
- 6) Performance of an oracle in parametric estimation; Youden's angel; asymptotic expansions for the mean L_1 and L_2 error of Youden's angel;
- 7) Empirical counterpart of Youden's angel; proof that empirical counterpart cannot match Youden's angel (collaboration with Jon Wellner).