Lecture 19: Leave-one-out approximations
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Description

We introduce the idea of cross-validation, leave-one-out in its extreme form. We show that the leave-one-out estimate is almost unbiased. We then show a series of approximations and bounds on the leave-one-out error that are used for computational efficiency. First this is shown for least-squares loss then for the SVM loss function. We close by reporting in a worst case analysis the leave-one-out error is not a significantly better estimate of expected error than is the training error.

Suggested Reading

- V. N. Vapnik. **Statistical Learning Theory.** Wiley, 1998.
- Chapelle et al **Choosing Multiple Parameters for Support Vector Machines.** Machine Learning, 2002.
- Wahba, G. **Spline Models for Observational Data** Series in Applied Mathematics, Vol. 59, SIAM, 1990.
- T. Jaakkola and D. Haussler. **Probabilistic kernel regression models.** In Proceedings of the Seventh International Workshop on Artificial Intelligence and Statistics, 1999.