Lecture 3: Reproducing Kernel Hilbert Spaces
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Description

We introduce a particularly useful family of hypothesis spaces called Reproducing Kernel Hilbert Spaces (RKHS) that have a key role in the theory of learning. We first provide the necessary background in functional analysis and then define RKHS using the reproducing property. We then derive the general solution of Tikhonov regularization in RKHS -- the magic algorithm.

Suggested Reading

- Aronszajn. **Theory of reproducing kernels.** Transactions of the American Mathematical Society, 686, 337-404, 1950.
- Cucker and Smale. **On the mathematical foundations of learning.** Bulletin of the American Mathematical Society, 2002.
- Evgeniou, Pontil and Poggio. **Regularization Networks and Support Vector Machines** Advances in Computational Mathematics, 2000.
- Girosi, F. **An Equivalence between Sparse Approximation and Support Vector Machines.** Neural Computation, Vol. 10, 1455-1480, 1998. (Appendix A)
- Wahba, G. **Spline Models for Observational Data** Series in Applied Mathematics, Vol. 59, SIAM, 1990. (Chapter 1)