Micchelli, Charles A.; **Pontil, Massimiliano**
Learning the kernel function via regularization. (English) Zbl 1222.68265
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Summary: We study the problem of finding an optimal kernel from a prescribed convex set of kernels K for learning a real-valued function by regularization. We establish for a wide variety of regularization functionals that this leads to a convex optimization problem and, for square loss regularization, we characterize the solution of this problem. We show that, although K may be an uncountable set, the optimal kernel is always obtained as a convex combination of at most $m + 2$ basic kernels, where m is the number of data examples. In particular, our results apply to learning the optimal radial kernel or the optimal dot product kernel.

MSC:

68T05 Learning and adaptive systems in artificial intelligence

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