

Model selection and fast rates for regularized least-squares

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We present some new results concerning the problem of model selection for regularized least-squares on a reproducing kernel Hilbert space.

We first describe the relevant minimax problems associated to a suitable class of priors. The prior condition is twofold, the conditional probability distribution on the input space is assumed to be known and moreover the regression function must belong to some subspaces defined in terms of the kernel and the marginal distribution.

Then both lower and upper bounds are derived, showing that optimal rates for the minimax problem are determined by the spectrum of an integral operator. The corresponding choice for the regularization parameter is expressed by the effective dimension of the problem, we show that this quantity can be effectively estimated by unlabelled data.

Finally particular attention is reserved to the setting of semi-supervised learning and generalization to multi-task learning.