Iterative Regularization Schemes in Learning Theory

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Abstract

In supervised learning, given a sample of several input-output pairs, the problem is that of finding a deterministic rule allowing to correctly predict the output when a new input is given.

It was recently shown that learning from examples can be seen as the problem of solving a linear inverse problem from a finite dimensional discretization. What makes learning peculiar is that the discretization is stochastic and cannot be controlled. In fact in this context we demand the regularization algorithm to take care of the random discretization. It is known that Tikhonov regularization can be effectively used in the context of learning and many standard results in inverse problem can be easily carried over with minor modifications.

After recalling the connection between learning theory and inverse problem theory we show that regularization techniques other than Tikhonov regularization, namely Landweber iteration, can be used in learning. Convergence results and a priori regularization parameter choice are presented. Finally we discuss the connection between iterative regularization schemes and boosting algorithms in learning theory.