Learning Variable Covariances via Gradients

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Learning theory studies learning function relations from samples. In this talk we are interested in the learning of function gradients from their sample values. A least-square type learning algorithm based on the Tikhonov regularization in reproducing kernel Hilbert spaces is proposed. We show with error bounds that the output function converges to the gradient of the regression function as the sample size becomes large. Hence variable selection and estimation of covariation can be expected. An efficient method is provided to reduce the size of the linear system when the number of variables is much larger than the sample size. Some applications of our algorithm to gene expression analysis will be mentioned.