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Approximating Parameterized Convex Optimization Problems

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Machine Learning deals with the problem of making predictions of unseen data based on observed seen data, for example optical character recognition, speech recognition or user preference prediction. Many Machine Learning Problems essentially boil down to solving a parameterized optimization problem, for example Support Vector Machines (SVM). The parameter in such optimization problems describes the trade-off between model complexity and generalization ability. If the model complexity is too small, the model that is learned does not really reflect the underlying true structure. This is called 'underfitting'. If the model complexity is too high, the model might have adapted not only to the true structure but also to the noise that is inherent in the observed data. This is called 'overfitting'. In both cases the prediction quality of the learned model is poor. What one is interested in is a model that lies somewhere in between these two extreme cases; it should have adapted to the true underlying structure but not to the noise in the data. Hence, the goal is finding the right parameter that controls this trade-off and gives the best prediction quality. In this talk we will describe a method that finds the best parameter for SVMs. The method itself is a simple, general, practical and efficient method for approximating parameterized convex optimization problems.

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