Abstract

In this work, we propose novel second-order cone programming formulations for binary classification, by extending the Minimax Probability Machine (MPM) approach. Inspired by Support Vector Machines, a regularization term is included in the MPM and Minimum Error Minimax Probability Machine (MEMPM) methods. This inclusion reduces the risk of obtaining ill-posed estimators, stabilizing the problem, and, therefore, improving the generalization performance. Our approaches are first derived as linear methods, and subsequently extended as kernel-based strategies for nonlinear classification. Experiments on well-known binary classification datasets demonstrate the virtues of the regularized formulations in terms of predictive performance.