

Convex optimization has become an increasingly important theme in applications. We consider the construction of a binary classification rule by minimizing the risk based on a convex loss as a surrogate to the 0-1 loss. Compared with the approach of directly estimating the conditional probability of the binary class label given a vector of covariates, our proposed convex surrogate minimization approach is computationally simpler and more efficient because of the convexity. We begin with a rigorous discussion of what type of convex surrogate is valid. When the conditional probability model for class label is parametric, we show that our proposed approach is either equivalent to the traditional maximum likelihood method or a substitute for computational saving. When the conditional probability model is semiparametric, we show how to apply convex surrogate minimization in conjunction with kernel weighting, which results in an asymptotically valid classification rule. Some convergence rates are established and empirical simulation results are presented.