Support Vector Machine Classifier with Truncated Pinball Loss

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Support Vector Machine Classifier with Truncated Pinball Loss

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Abstract

Feature noise, namely noise on inputs is a long-standing plague to support vector machine(SVM). Conventional SVM with the hinge loss(C-SVM) is sparse but sensitive to feature noise. Instead, the pinball loss SVM(pin-SVM) enjoys noise robustness but loses the sparsity completely. To bridge the gap between C-SVM and pin-SVM, we propose the truncated pinball loss SVM($\overline{pin}$-SVM) in this paper. It provides a flexible framework of trade-off between sparsity and feature noise insensitivity. Theoretical properties including Bayes rule, misclassification error bound, sparsity, and noise insensitivity are discussed in depth. To train $\overline{pin}$-SVM, the concave-convex procedure(CCCP) is used to handle non-convexity and the decomposition method is used to deal with the subproblem of each CCCP iteration. Accordingly, we modify the popular solver LIBSVM to conduct experiments

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