Regression Based on Binary Classification Using Support Vector Machines

Marcin Orchel

Abstract

In this report, we propose a method, called δ support vector regression (δ-SVR), that replaces a regression problem with binary classification problems which are solved by support vector machines (SVM). We analyze statistical equivalence of a regression problem with a binary classification problem. We show potential possibility to improve generalization error bounds based on Vapnik-Chervonenkis (VC) dimension, compared to SVM. We conducted experiments comparing δ-SVR with ε-insensitive support vector regression (ε-SVR) on synthetic and real world data sets. The results indicate that δ-SVR achieves comparable generalization error, fewer support vectors, and smaller generalization error over different values of ε and δ. The δ-SVR method is faster for linear kernels while using sequential minimal optimization (SMO) solver, for nonlinear kernels speed results depend on the data set.