

# Parameter optimization for Support Vector Regression

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**Abstract.** Many academic and industrial platforms rely on a statistically sound and robust qualitative (classification) and quantitative (regression) analysis of the data of interest. Recently, Support Vector Machines (SVMs) have emerged as a powerful multivariate modeling technique for classification as well as regression purposes. However, due to the explicit flexibility of the SVM, some vital model parameters need to be selected, which affect the resulting model performance. Therefore, those parameter settings need to be optimized to achieve a good generalization performance. This research focuses on the development of a fast, robust and fully automated method to obtain the optimal parameter settings (that is, kernel type, kernel parameter, the so-called  $\epsilon$ -insensitive margin and a penalty weight) in case of SVM regression. The optimization of the parameters will be accomplished through the use of Genetic Algorithms (global optimization) in combination with a Simplex optimization (refined local optimization). Preliminary bench-marks on well-known data sets indicate that the optimized SVM outperforms all other methods applied to these data sets. For example, the SVM optimization approach has improved the model performance by approximately 50% on a well-known data set by comparison with the commonly used SVM grid search optimization.

**Keywords:** SVM.