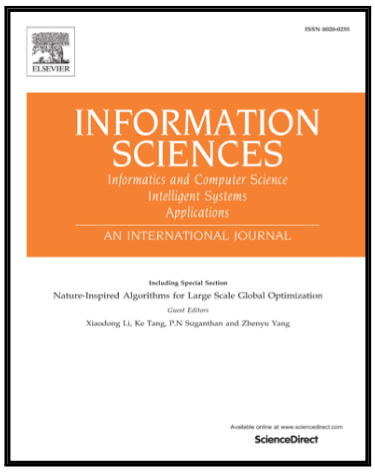

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Insensitive Stochastic Gradient Twin Support Vector Machines for Large Scale Problems

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Abstract

Within the large scale classification problem, the stochastic gradient descent method called PEGASOS has been successfully applied to support vector machines (SVMs). In this paper, we propose a stochastic gradient twin support vector machine (SGTSVM) based on the twin support vector machine (TWSVM). Compared to PEGASOS, our method is insensitive to stochastic sampling. Furthermore, we prove the convergence of SGTSVM and the approximation between TWSVM and SGTSVM under uniform sampling, whereas PEGASOS is almost surely convergent and only has an opportunity to obtain an approximation to SVM. In addition, we extend SGTSVM to nonlinear classification problems via a kernel trick. Experiments on artificial and publicly available datasets show that our method has stable performance and can handle large scale problems easily.

Keywords: Classification, support vector machine, twin support vector machine, stochastic gradient descent, large scale problem.

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