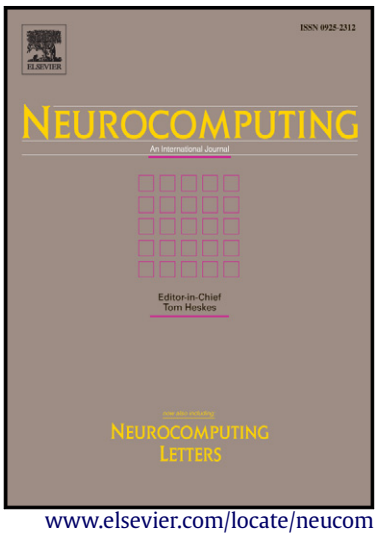

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Laplacian least squares twin support vector machine for semi-supervised classification

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Abstract

The recently proposed Laplacian twin support vector machine (Lap-TSVM) is an excellent nonparallel-based kernel tool for semi-supervised classification problems, where its optimal decision hyperplane is determined by solving two quadratic programming problems (QPPs) with matrix inversion operations. In order to reduce its computation cost, in this paper, we formulate a least squares version of Lap-TSVM, termed as Lap-LSTSVM, leading to an extremely fast approach for generating semi-supervised classifiers. Besides, a meaningful regularization parameter is introduced for each problem in Lap-LSTSVM to balance the regularization terms between the reproducing kernel Hilbert spaces (RHKS) term and manifold regularization (MR) term, instead of two parameters used in Lap-TSVM. In addition, an efficient conjugate gradient (CG) algorithm is further developed for solving the systems of linear equations (LEs) appeared to speed up the training procedure. Experimental results on both several synthetic as well as real-world datasets confirm the feasibility and effectiveness of the proposed method.

Keywords: Semi-supervised classification; Manifold regularization; Twin support vector machine; Least squares; Conjugate gradient.

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