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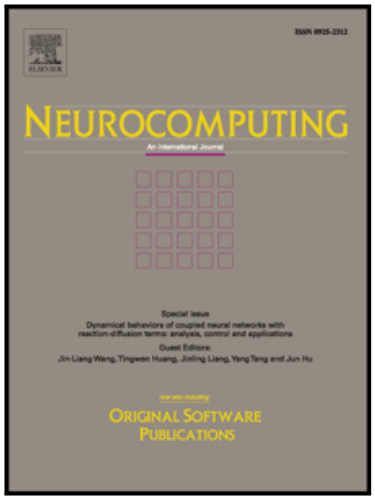

Convergence of Decomposition Methods for Support Vector Machines

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Highlights

- We prove that general decomposition algorithms for SVMs stop within a finite number of iterations after finding an optimal solution for any τ if the working set contains at least one τ-violating pair under the general assumption that the Hessian matrix $\boldsymbol{Q}$ is positive semi-definite. This assumption is always satisfied in practice and is much weaker than that given in the previous work.

- We generalize and improve the result obtained in [16] in the sense that the relaxed version of the KKT condition employed in [16] reduces to the one used in this paper for any τ when $\epsilon = 0$.

- Since little restriction is required on the working set selection and the Hessian matrix of the objective function, it is expected that our new convergence result can be applied to a wide class of decomposition algorithms. In particular, our result shows that SVM^{light}, the most widely used learning algorithm for SVMs, terminates after a finite number of iterations without requiring the stronger condition that $\min_I(\min(eig(Q_{II}))) > 0$.

[16] N. Takahashi, T. Nishi, Global convergence of decomposition learning methods for support vector machines, IEEE Transactions on Neural Networks 17 (6) (2006) 1362C1369.