

## MODIFIED NEWTON APPROACH FOR DIRECTED MULTI-TASK TWIN SUPPORT VECTOR MACHINE

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### ABSTRACT

Multi-task learning (MTL) is a promising area of machine learning that aims to improve the performance of multiple related learning tasks by leveraging useful information among them. Inspired by multi-task learning, the directed multi-task twin support vector machine (DMTSVM) was recently proposed. This paper proposes a new idea for solving the DMTSVM and names it NMTSVM. This idea converts the related optimization problems into unconstrained optimization problems. The objective functions of the unconstrained optimization problems are piecewise quadratic and only once differentiable. Therefore, we propose the modified Newton's method for solving these unconstrained problems. Experiments on Monk, Caesarian, and Heart data sets indicate that our proposed method has higher efficiency and accuracy than DMTSVM.

**Keywords:** Multi-task learning; Twin support vector machine; Modified Newton's method.