**P-th Order twin support vector machine**

**ABSTRACT**

**In this paper, a new robust twin support vector machine via p-Order optimized algorithm was proposed. We improved the TWSVM algorithm by iterative method. Theoretical support shows that iterative method is effective in the solution to improve TWSVM via p-th order of the L2-norm distances.** **A large number of experiments show that p-th order twin support vector machine (PTWSVM) can process the noise data and has a better accuracy.**

1. **Introduction**

**Support vector machine has been a vital method for pattern classification in the last decade. The standard Support vector machine devotes to get an optimal separating hyper plane that has the max margin between the two data sets. In 2001, G.Fungand and O.L.Mangasarian proposed a algorithm** that **two parallel planes are pushed apart as far as possible to classify points. In 2007,O.L. Mangasarian and E.W.Wild proposed a nonparallel plane classifier for binary data via generalized eigenvalue.**

**Different from PSVM and GEPSVM, a new nonparallel plane classifier termed as the Twin Support Vector Machine (TWSVM). It solves a pair of quadratic programming problems.**

**In this paper, we are absorbed in the problem of higher precision TWSVM on normal data set. In classical TWSVM, we are willing to minimize the distance with the squared distance. As we know, normal points account for a great proportion, the outliers just are very few points.**

**From this point，we hold the distance with a high orders, that to emphasis the percentage of normal points. A p-th order is used for the improvement to TWSVM that p ought to be higher than 2,e.g.,.**

**The p-th order twin support vector machine (pTWSVM) method is focus on the following problems:**

**1．The modification of the TWSVM objective with p-th order l2-norm.**

**2．The formulation of proposed algorithm.**

**3. The proof of the algorithm convergence.**

**The paper is organized as follows: Section 2 dwells on our theoretical work for the new method in detail, including the improvement and related proof. Section 3 is about the extension on nonlinear kernel. Section 4 deals with the experiment and Section 5 summarize this paper.**

1. **P-Order twin support vector machine**
2. **The Nonlinear Kernel Classifier**
3. **Experimental Results**
4. **Conclusions**

**References**