16Spring CPE593 Project Proposal, by Xiao Wang and Ling Ma

Project name: Support vector machine implementation in Java

Project scope:

- Create a support vector machine classifier for binary classification problem. Input: a dataset (x1, y1), ..., (xn, yn), where xi is an input vector and yi {-1, +1} is a binary label corresponding to it. Output: A SVM classifier.
- Implement four basic methods for this SVM classifier, including svm.train, svm.fit, svm.prob, svm.predict
- Explore different algorithms to solve the underlying quadratic programming(unconstrained non-smooth convex problem) behind SVM, study converge speed and complexity, including: 1) Gradient descent, with modification 2) Newton's method 3) Stochastic gradient descent 4) Sequential minimal optimization, if possible, this is implemented in the popular LibSvm library
- Implement different kernel option for the classifier, including: 1) Linear kernel 2) RBF kernel 3) Poly kernel (degree = k)
- Analyze the overall complexity.
- Implement the classifier on several benchmark datasets and analyze the performance compared with Java library.

Work allocation:

- Xiao Wang & Ling Ma: Exploration of training algorithms listed above.
- Xiao Wang: Implement methods of the classifier.
- Ling Ma: Test classifier and analyze complexity.

Github repository:

https://github.com/maling6154/CPE593-project.git