

Assignment 2 Coding Report

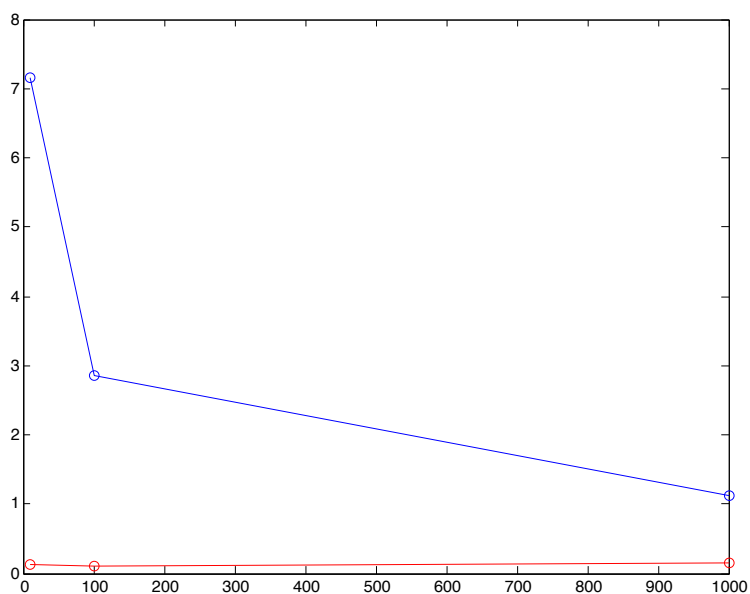
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A. Figures

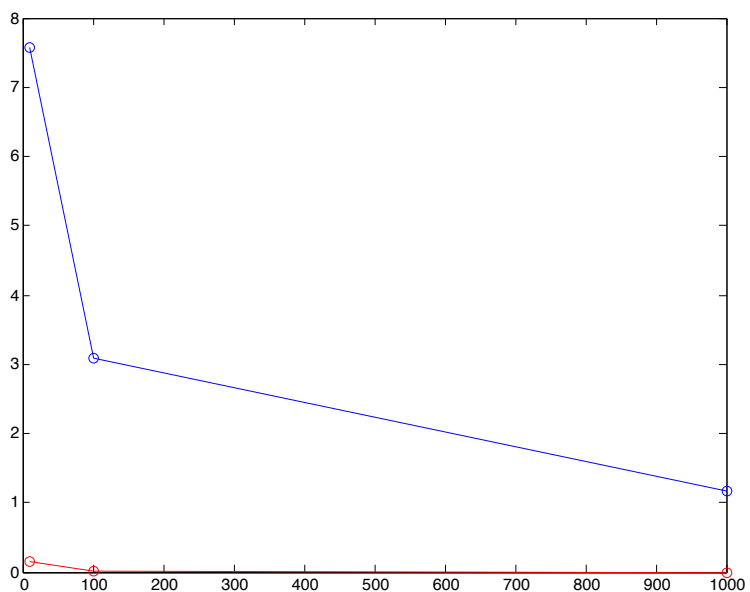
Blue line: consistency bound

Red line: testing error

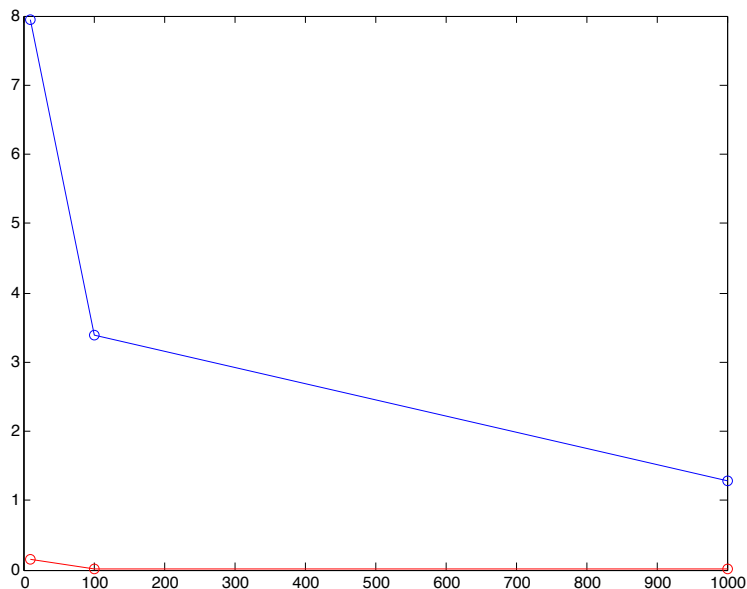
1. Without Lifting



2. Quadratic Lifting



3. Cubic Lifting



B. Discussion

1. Implementation

I implemented gradient descent with different step size which will decrease each iteration to solve the objective function specified in the spec document.

2. Discussion

As we can see, the consistency bounds decrease when the number of training instances increase.

And for same number of instances, the bounds become loosen as complexities of the lifting function increases.

When applying the classifiers trained by the training instances, we found that there's a significant improvement in performance when we go from `no_lifting` to `quadratic_lifting`. However, there's no difference when moving from `quadratic_lifting` to `cubic_lifting` as the ideal error of these two functions are both zero.