CS 7641 CSE/ISYE 6740 Homework 3 Report

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Programming: Recommendation System

Report

In the design of the algorithm, we don't stop the process until it has iterated for certain times. First we set the times to be 300, which means that the iteration runs for 300 times before it stops.
Then we have two parameters that needed to be tuned. One is learning rate and the other is the regularizer. The learning rate is related to the speed of convergence and the regularizer makes sure that the root mean square error for the test set wouldn't be much larger than that of the training set. In the algorithm, we finally set the learning rate to be 0.0005 and the regularizer to be 1. The RMSEs for this set of parameters are listed as below.

lowRank	training set	test set
1	0.9166	0.9480
3	0.8488	0.9358
5	0.8126	0.9461
10	0.7993	0.9336
15	0.7997	0.9238
20	0.7988	0.9185

We can see from the result that with the lowRank becomes larger, the RMSE for the training set and test error both becomes smaller. To decide what value I choose for each parameters, I first set regularizer to be zero and set learning rate to be 1. I print out the RMSE for every iteration and found that it would diverge. Then I decrease the learning rate gradually and found the proper learning rate at value 0.0005.
After fixing the learning rate at value 0.0005, I tuned the regularizer to find the lowest RMSE given the same number of iterations. I found at the beginning that the regularizer doesn't matter but it affected the test set error when the lowRank became larger. In the end, the regularizer is of value 1 such that the test set error wouldn't be larger when the lowRank increases.