

# Coursera Machine Learning Notes

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*Note 1.* Refer to assignment PDF's.

## 1 Ex 8. Anomaly Detection and Recommender Systems

### 1.1 Collaborative Filtering Learning Algorithm

Let  $n_m$  be the number of movies,  $n_u$  be the number of users. Given rating matrix  $Y$  and a number  $n$ , we want to find a feature matrix  $X$  of size  $n_m \times n$  and parameter matrix  $\Theta$  of size  $n_u \times n$ , where the  $i$ -th row of  $X$  represents the feature vector for the  $i$ -th movie, and the  $j$ -th row of  $\Theta$  represents the parameter vector for the  $j$ -th user. In this context,  $n$  represents the number of hidden dimensions of a movie, e.g.  $x_k^i$  could refer to say how much action movie  $i$  has,  $x_l^i$  could refer to how much romance it has, and so on. Similarly,  $\theta_k^j$  would refer to how much user  $j$  likes action,  $\theta_l^j$  how much they like romance.

*Note 2.* These are only example names for the features, since in fact we don't know what features the algorithm will pick up given rating matrix  $Y$ . The features learned might have nothing to do with common movie genres, for example.

**Question 3.** *Can we cross validate to choose the best value  $n$  for the number of hidden features?*

**Keywords.** TODO