Tuesday Quiz

1. [1.5 point]What are the Characteristics and Challenges of Collaborative Filtering with Sparsity problems? name two approaches to deal with this problem?
   Characteristics:
   Commercial recommender systems that are based on extra large product sets;
   Most users do not rate most items which makes user-item matrix is extremely sparse;
   Challenges:
   It will reduce the probability of finding a set of users with similar ratings.
   Approaches:
   Dimensionality reduction: SVD, PCA
2. [3 points] Hierarchical Clustering: Imagine we are clustering the number of items bought on Amazon for a given user each day. We wish to perform a hierarchical clustering of the number of items bought among all users: 1, 3, 8, 16, and 30. Show what happens at each step **until there are two clusters**, and give these two clusters. Assume clusters are represented by their centroid (average), and at each step choose to merge two clusters whose resulting cluster has the **smallest density**.

   Your answer should be in steps where each step shows the members of the new cluster formed, and its centroid. More specifically, if you are merging a cluster C1 = {x, y, z} of centroid c1 with a cluster C2 = {p, q} of centroid c2, you should report {x, y, z, p, q}, as well as the centroid obtained with these 5 points).
   Initial clusters : {1}, {3}, {8}, {16}, {30}
   Centroids: 1, 3, 8, 16, 30
   First step : {1, 3}, {8}, {16}, {30} [0.5 points]
   Centroids: 2, 8, 16, 30 [0.5 points]
   Second step : {1, 3, 8}, {16}, {30} [0.5 points]
   Centroids: 4, 16, 30 [0.5 points]
   Third step : {1, 3, 8, 16}, {30} [0.5 points]
   Centroids: 7, 30 [0.5 points]
3. [1 point] What are the assumptions we make when applying the BFR algorithm?
   Clusters points are normally distributed around a cluster centroid in an Euclidean space
   -0.25 if you have not written **normally distributed around a cluster centroid**
   Only saying “points are normally distributed” has a completely different meaning
4. [1+0.5 points] What is Case Amplification? How does it help in generating better recommendations?
   Applying a transformation to weights to emphasize high weights and punishes low weights. [0.5 points]
   w(i,j)new = w(i,j) * |w(i,j)| ^ (p-1) [0.5 points]
   Where p is the case amplification power >= 1
   It reduces noise in the data [0.5 points]
   Favors high weights [0.5 points]
5. [1 point] Which of the following statements about the extension(s) to memory-based recommendation systems are TRUE?

A. Default voting gives a higher weight to pairs with a smaller number of corated items.
B. Inverse User Frequency helps to reduce the weight of unpopular items.
C. Imputation-boosted CF helps to efficiently generate the prediction.
D. Case amplification helps to reduce noise.
Answer. C,D

6. [0.5+0.5 points] What are Grey sheep and Black sheep in context with recommendation systems.
   Gray sheep users are those whose opinions do not consistently agree or disagree with any group of people
   Black sheep users are those with idiosyncratic tastes that make recommendations nearly impossible.
7. [1 point] Which among the following is the key feature of Feature Combination-Hybrid Recommender Systems?
   a) The scores of different recommendation components are combined numerically
   b) Features derived from different knowledge sources are combined together and given to a single recommendation algorithm
   c) One recommendation technique is used to compute a feature or set of features, which is then part of the input to the next technique
   d) Recommenders are given strict priority, with the lower priority ones breaking ties in the scoring of the higher ones
   Answer. B