algorithmica
re-engineering it talent

Practical Data Science/Analytics (Recommender Systems)

Use the following user-item rating matrix to solve the following problems.

	item1	item2	item3	item4	item5	item6
user1	4	6	X	5	1	X
user2	2	X	8	X	3	5
user3	7	4	X	8	X	4
user4	X	10	9	X	7	8
user5	X	X	7	6	6	5

Problem 1: User-User nearest neighbor based recommender

a. Compute the user-user similarity matrix for all 5 users. Use the Euclidian Similarity metric.
b. Find the 3-nearest neighbors of user1, user3 and user5.
c. Compute the item preference vectors for user1, user3 and user5 using the formula discussed in class. Use 3-nearest users while computing preferences.
d. Find the first item you will recommend for user1, user3 and user5 respectively.

Problem 2: Item-Item nearest neighbor based recommender

a. Compute the item-item similarity matrix for all 6 items. Use the Euclidian Similarity metric.
b. Find the 3-nearest neighbors of item1, item3 and item6.
c. Compute the item preference vectors for user1, user3 and user5 using the formula discussed in class. Use 3-nearest neighbors while computing preferences.
d. Find the first item you will recommend for user1, user3 and user5 respectively.

Problem 3: Factorization nearest neighbor based recommender

a. Compute the SVD of user-item matrix. You can fill NA ratings with median rating of each user for simplifying computing matrix factors easily.
b. Compute the user-factor and item-factor matrices from SVD matrices.
c. Find the latent factor based profiles of user1 and user3.
d. Find the latent factor based profiles for item and item6.
e. Compute the item preference vectors for user1, user3 and user5 using the formula discussed in class.

Problem 4: Finding Association Rules

Apply the Apriori algorithm on the grocery store data given below with support threshold s=33.34% and confidence threshold c=60%. Enumerate all the final frequent itemsets. Also indicate the association rules that are generated and highlight the strong ones, sort them by confidence.

Practical Data Science/Analytics (Recommender Systems)

TransactionID	Items
T1	HotDogs, Buns, Ketchup
T2	HotDogs, Buns
T3	HotDogs, Coke, Chips
T4	Chips, Coke
T5	Chips, Ketchup
T6	HotDogs, Coke, Chips