Started on	Tuesday, January 22, 2019, 1:19 PM
State	Finished
Completed on	Tuesday, January 22, 2019, 1:45 PM
Time taken	25 mins 12 secs
Grade	**45.00** out of 45.00 (**100**%)

Question 1

Complete

10.00 points out of 10.00

In class, we derived the formula for the matrix C in the ALS factorization of the matrix R, assuming S is known (Slide 25).

Assuming that C is known/fixed, write down the sequence of derivations that leads to the factorization for S in terms C and R?

Write your final answer as S=.... on the new line to ease grading.

To ease grading, use the following notation:

- Use * for the product of two matrices
- Use ' (i.e., prime) for the matrix transpose, e.g., X'
- Use ^(-1) for the inverse
- Example: (X'X + B)^(-1)

R=C*S'

C'*R=(C'*C)*S'

(C'*C)^(-1)*C'*R=S'

((C'*C)^(-1)*C'*R)'=S

Comment:

Question 2

Correct

9.00 points out of 9.00

Order the Steps in the ALS

Solve for C	Step 5 ✔
Solve for S	Step 3 ✔
Repeat Steps 3-6 (k-times)	Step 7 ✔
Fix C	Step 6 ✔
Repeat Steps 1-5 (k-times)	N/A ✔
Fix the number of hidden factors, h and the number of iterations, k	Step 1 ✔
Repeat Steps 2-5 (k-times)	N/A ✔
Assign random numbers to matrix C	Step 2 ✔
Fix S	Step 4 ✔

Your answer is correct.

The correct answer is: Solve for C → Step 5, Solve for S → Step 3, Repeat Steps 3-6 (k-times) → Step 7, Fix C → Step 6, Repeat Steps 1-5 (k-times) → N/A, Fix the number of hidden factors, h and the number of iterations, k → Step 1, Repeat Steps 2-5 (k-times) → N/A, Assign random numbers to matrix C → Step 2, Fix S → Step 4

Question 3

Correct

10.00 points out of 10.00

Check all the conditions that must hold true for the ALS to complete its run successfully.

Note: X' (prime) denotes the transpose

Select one or more:

- [ ] a. C must be square
- [ ] b. S must be initialized with the row means of R
- [x] c. C'C must be invertible during all the iterations of the ALS execution ✔
- [ ] d. S must square
- [ ] e. R can be initialized with any random numbers
- [x] f. S'S must be invertible during all the iterations of the ALS execution ✔
- [ ] g. Product of C and S' must be commutative.
- [ ] h. S'S must be invertable ONLY during the initialization phase of the algorithm.
- [ ] i. C must be invertible
- [ ] j. S' must be invertible

Your answer is correct.

The correct answers are: S'S must be invertible during all the iterations of the ALS execution, C'C must be invertible during all the iterations of the ALS execution

Question 4

Correct

5.00 points out of 5.00

Recall that the Loss function in the ALS problem formulation is the Frobenius Norm of the matrix $E = R - \hat{R}$ (or least squares) (see slides 26 and 28).

Suppose that the Loss Function was changed to the L_1-norm from its original L_2-norm.

Suppose as a result of running the ALS algorithm on the matrix R using this new Loss Function, the rating vector for the 5th user was $c_5 = (1, 2, 3)$ and the service vector for the 7th service was $s_7 = (3, 2, 1)$. Assuming that the true rating $r_{5,7} = 5$ in the matrix R, how much loss is being contributed to the Loss Function assuming the optimization problem for this new ALS was solved without regularization?

Answer: 5 ✔

The correct answer is: 5

Question 5

Correct

3.00 points out of 3.00

Suppose as a result of running the ALS algorithm on the matrix R, the rating vector for the 5th user was $c_5 = (1, 2, 3)$ and the service vector for the 7th service was $s_7 = (3, 2, 1)$. What is the estimated rating $r_{5,7}$ for the matrix R?

Answer: 10 ✔

The correct answer is: 10

Question 6

Correct

3.00 points out of 3.00

Suppose as a result of running the ALS algorithm on the matrix R, the rating vector for the 5th user was $c_5 = (1, 2, 3)$ and the service vector for the 7th service was $s_7 = (3, 2, 1)$. Assuming that the true rating $r_{5,7} = 5$ in the matrix R, how much loss is being contributed to the Loss Function assuming the least squares optimization problem for ALS was solved without regularization?

(HINT: See slide 28, the form of the optimization problem for the ALS)

Answer: 25 ✔

The correct answer is: 25

Question 7

Correct

5.00 points out of 5.00

In class, we derived the formula for the matrix C in the ALS factorization of the matrix R, assuming S is known (Slide 25).

Assuming that C is known/fixed, what is the factorization for S?

Write your answer as S=....

To allow for automatic grading:

- Do not use white-space characters
- Use * for the product of two matrices
- Use ' (i.e., prime) for the matrix transpose, e.g., X'
- Use ^(-1) for the inverse
- Example: (X'*X+B)^(-1)

Answer: ((C'*C)^(-1)*C'*R)' ✔

The correct answer is: S=((C'*C)^(-1)*C'*R)'

◄ (DUE: 01/23/2019): SUBMIT: QUIZ: Data Streaming Principles

Jump to...

(DUE: 01/30/2019): SUBMIT: PROJECT: Recommender Systems with ALS and Apache Spark ►