WolfWare / Dashboard / My courses / CSC 591 (302) SPRG 2020 / Topic-2: Apache Spark for Big Data Analytics / (DUE: 01/23/2020) SUBMIT: QUIZ: Alternating Least Squares (ALS)

Started on Sunday, January 26, 2020, 1:11 PM

State Finished

Completed on Sunday, January 26, 2020, 1:25 PM

Time taken 13 mins 57 secs

Grade Not yet graded

Question **1**Complete

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'

 $(C'C)^{(-1)}*C'*R=S'$

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

Question 2
Correct

9.00 points out

of 9.00

Order the Steps in the ALS

Repeat Steps 1-5 (k-times)

Fix S

Assign random numbers to matrix C

Repeat Steps 3-6 (k-times)

Repeat Steps 2-5 (k-times)

Solve for S

Fix C

Fix the number of hidden factors, h and the number of iterations, k

Solve for C

N/A	~
Step 4	~
Step 2	~
Step 7	~
N/A	~
Step 3	~
Step 6	~
Step 1	~
Step 5	~

Your answer is correct.

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

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. S must square
- b. C must be invertible
- c. Product of C and S' must be commutative.
- d. C must be square
- e. S must be initialized with the row means of R
- $^{\hspace{-2pt} extstyle ext$
- h. R can be initialized with any random numbers
- i. S'S must be invertable ONLY during the initialization phase of the algorithm.
- j. S' must be invertible

Your answer is correct.

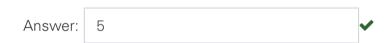
The correct answers are: S'S must be invertible during all the iterations of the ALS execution, C'C must be invertible during all the iterations of the ALS execution

Ouestion 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?



The correct answer is: 5

Ouestion **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?



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

of 5.00

5.00 points out

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

✓

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

■ (DUE: 01/23/2020): SUBMIT: QUIZ: Data Streaming Principles

Jump to...

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