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## 4. Collaborative Filtering: the Naive Approach

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Exercises due Mar 8, 2023 08:59 -03 Completed

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**Compute the Derivative of the Regression Objective**

2.0/2 points (graded)

Recall that each user  $\mathbf{a}$  has a set of movies that (s)he has already rated. Let  $\mathbf{Y}$  be a matrix whose columns whose  $(\mathbf{a}, i)^{\text{th}}$  entry  $Y_{ai}$  is the rating by user  $\mathbf{a}$  of movie  $i$  if this rating has already been given, blank if not. Our goal is to come up with a matrix  $\mathbf{X}$  that has no blank entries and whose prediction of the rating user  $\mathbf{a}$  will give to movie  $i$ .

Let  $D$  be the set of all  $(\mathbf{a}, i)$ 's for which a user rating  $Y_{ai}$  exists, i.e.  $(\mathbf{a}, i) \in D$  if and only if  $\mathbf{a}$  to movie  $i$  exists.

A naive approach to solve this problem would be to minimize the following objective:

$$J(\mathbf{X}) = \sum \frac{(Y_{ai} - X_{ai})^2}{2} + \frac{\lambda}{2} \sum X_{ai}^2$$

For (any fixed)  $i$  :

$$\lambda X_{\{i\}}$$

? STANDARD NOTATION

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You have used 3 of 5 attempts

## Performance of the Naive Approach

2.0/2 points (graded)

Let us now check the quality of the solution when using this wrong approach. Recall that the naive approach assumes independence between all entries of the matrix.

What value of the matrix  $\hat{X}$  will minimize the loss

each  $i$ , solve the following equation for  $\hat{X}_{\{i\}}$  :

We will denote the argmin as  $\hat{X}_{\{i\}}$  and its components as  $\hat{X}_{\{i\},j}$ .

For  $j$  :

$$Y_{\{i\}} / (1 + \lambda)$$

For  $i$  :

$$0$$

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🗨 [staff] Unable to submit answer to first question

Hi! I just got this message after submitting my answer to the first problem: "Could not format HTML for problem"

🗨 Error message in Part 1 → Invalid Input: '\ai', '\lamda' not permitted in answer as a variable

Based on my understanding, the answer in the first part needs to be in terms of lamda and  $x_{ai}$ . However, I a

🗨 Why is it called Naive?

Is Naive being used in the sense of the english word or is Naive someone's name.

✅ Still trying to understand why we need to add  $\lambda/2 * \|x\|^2$  to the equation?

Why must we do that for the equation in this lecture?

✅ Replacing  $\sum (x_{a_i,j})^2$  with  $\text{norm}(X)$  at 5:00

Dear all, shouldn't it be  $\text{norm}(X)^2$ ? or just  $\text{norm}(X)$  here :). Many thanks in advance

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