# Final Project

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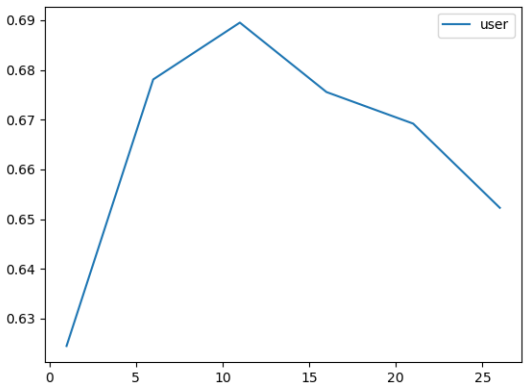
November 27, 2020

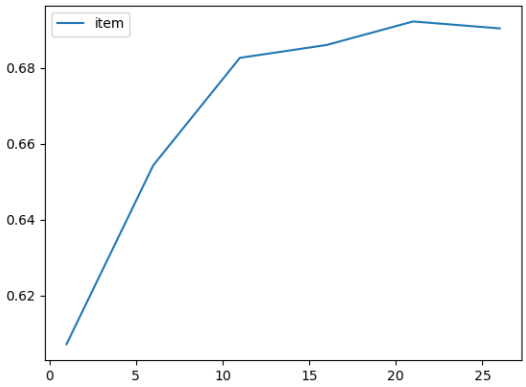
## Problem 1

a

For distance by user we have:




Validation Accuracy for k = 1: 0.6244707874682472
Validation Accuracy for k = 6: 0.6780976573525261
Validation Accuracy for k = 11: 0.6895286480383855
Validation Accuracy for k = 16: 0.6755574372001129
Validation Accuracy for k = 21: 0.6692068868190799
Validation Accuracy for k = 26: 0.6522720858029918
For distance by item we have:




Validation Accuracy for k = 1: 0.607112616426757
Validation Accuracy for k = 6: 0.6542478125882021
Validation Accuracy for k = 11: 0.6826136042901496
Validation Accuracy for k = 16: 0.6860005644933672
Validation Accuracy for k = 21: 0.6922099915325995
Validation Accuracy for k = 26: 0.69037538808919

b

We find that the best value for k for user-based collaborative filtering, k* is 11
We find that the best value for k for item-based collaborative filtering, k* is 21

c (see code)

d Clearly item-based is better

e 1: Knn is slow. Even with only 542 items and 1774 users it takes a while to predict
2: Using Euclidean distance, we consider distances in all dimension to be equal. For example if A and B's math skills are very different but english, physics, and other subjects are similar, the KNN will still predict A's math question similar to B's math questions (since skill in math is treated equally with other subjects).

## Problem 2

a