Experiment-05

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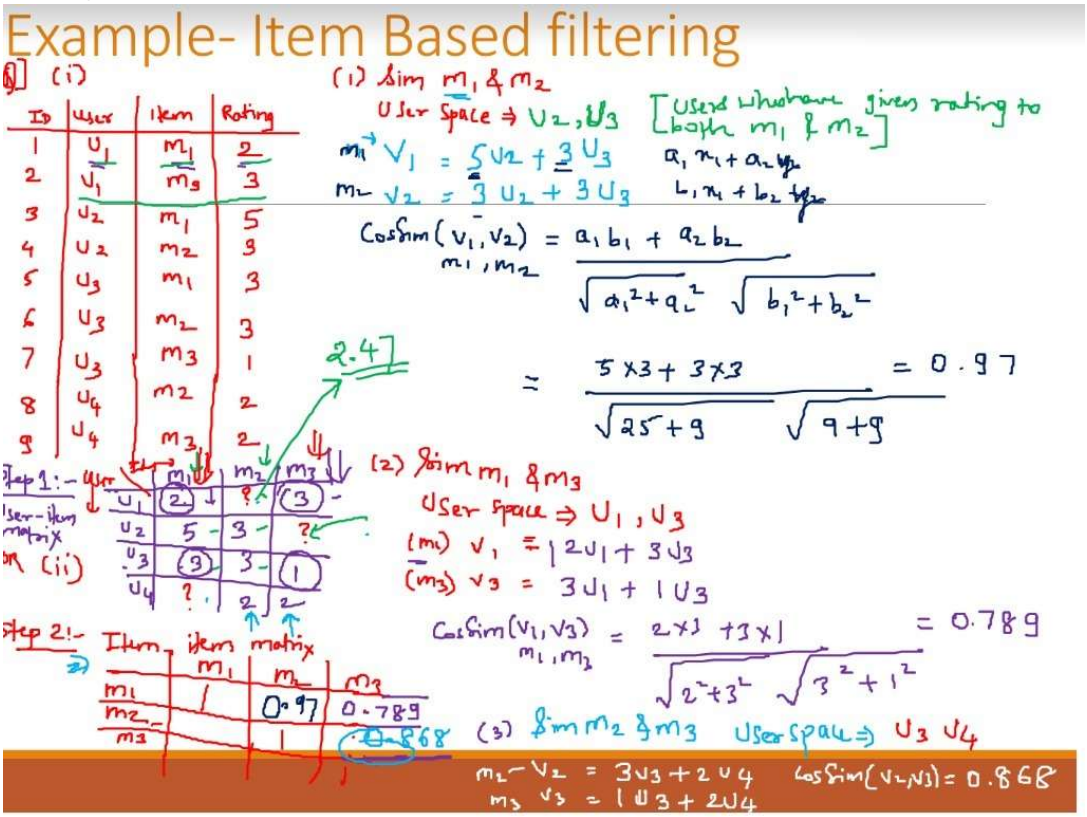
Aim: Write a Program to perform Collaborative filtering and develop a small recommender system by considering some self-created data.

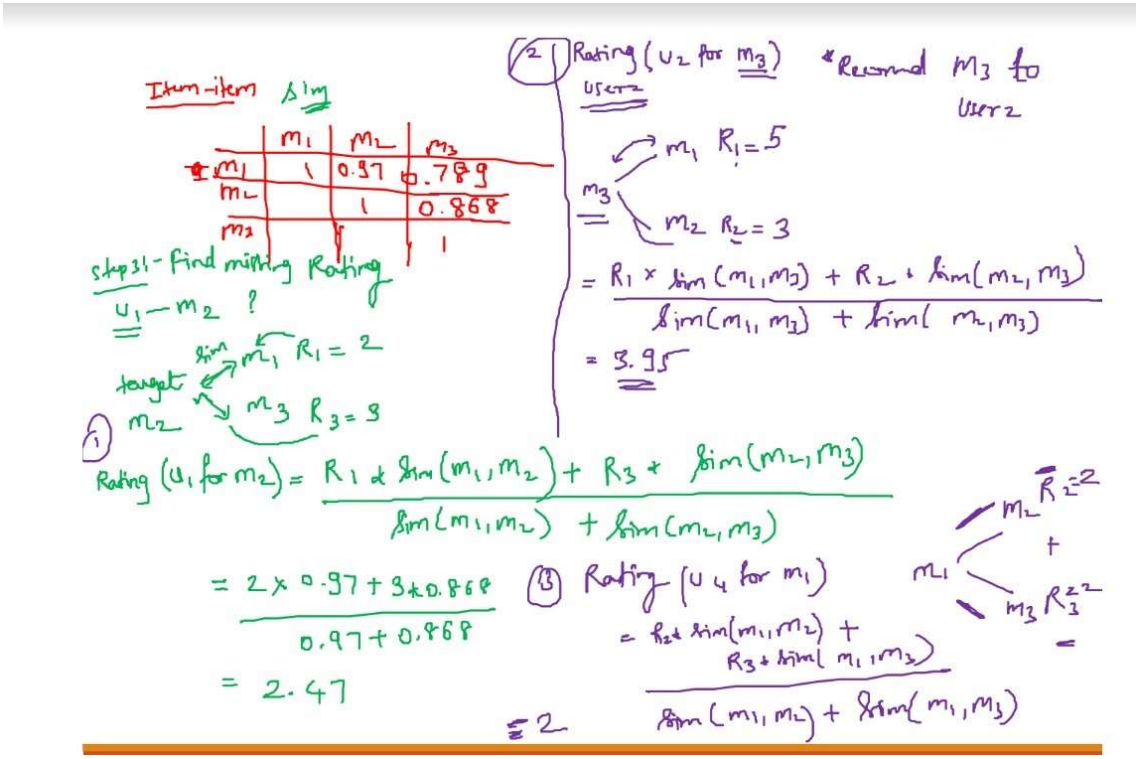
Details:

- Create a transaction data for users for different items they have purchased along with ratings.
- Let there be missing ratings and predict the ratings for these missing items and state if we can recommend the item to the user.

Batch-1: Item-based CF

Theory:





Code:

```
from math import sqrt

#USER ITEM RATING AND DICTIONARY OF USER ITEM

user_dict={}

user_set=set()

item_user_dict={}

item_set=set()

inputs=int(input("Enter no. of inputs : - "))

for i in range(1,inputs+1):

    user,item,rating=map(int,input("Enter space seperated input for
USER ITEM RATING : ").split())

    user_set.add(user)

    item_set.add(item)

    if item in item_user_dict:

        item_user_dict[item].append(user)

    else:
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```
        item_user_dict[item] = [user]
    user_dict[(user,item)]=rating
# print(user_dict)
# print(item_set)


#COSINE FORMULA
len_item_set=len(item_set)
list_item_set=list(item_set)
item_matrix=[[1 for _ in range(len_item_set)] for _ in
range(len_item_set)]
# print(item_matrix)
for i in range(1,len_item_set):
    for j in range(i+1,len_item_set+1):

set_common_users=set(item_user_dict[i]).intersection(set(item_user_d
ict[j]))
        list_set_common_users=list(set_common_users)
        # print(list_set_common_users)
        numerator=0
        denominator1=0
        denominator2=0
        for k in range(len(set_common_users)):

numerator+=user_dict[(list_set_common_users[k],i)]*user_dict[(list_s
et_common_users[k],j)]
            denominator1+=user_dict[(list_set_common_users[k],i)]**2
            denominator2+=user_dict[(list_set_common_users[k],j)]**2
        # print(i,j,item_matrix)
        item_matrix[i-1][j-
1]=numerator/(sqrt(denominator1)*sqrt(denominator2))
        item_matrix[j-1][i-
1]=numerator/(sqrt(denominator1)*sqrt(denominator2))
```

```
# print(item_matrix)


#RECOMMENDER SYSTEM
predicted_rating_dict={}
for item in range(1,len_item_set+1):
    user_not_rated = list(user_set - set(item_user_dict[item]))
    # print(item,user_not_rated)
    for user in user_not_rated:
        numerator=0
        denominator=0
        for i in range(1,len_item_set+1):
            if i!=item and (user,i) in user_dict:
                numerator+=user_dict[(user,i)]*item_matrix[i-
1][item-1]
                denominator+=item_matrix[i-1][item-1]
        predicted_rating_dict[(user,item)]=numerator/denominator


#DISPLAY
for user,rating in predicted_rating_dict.items():
    print("Predicted Rating of Item ",user[1]," by USER ",user[0],"
is : ",rating)
```

Output:

```
PS C:\Users\ACER\Desktop\Courses\College Courses\WIBD\Lab\EXPT1> & C:/Users/ACER/AppData/Local/Programs/Python/Python39/python.exe "c:/Users/ACER/Desktop/Courses/
College Courses/WIBD/Lab/EXPT1/prac5.py"
Enter no. of inputs : - 9
Enter space seperated input for USER ITEM RATING : 1 1 2
Enter space seperated input for USER ITEM RATING : 1 3 3
Enter space seperated input for USER ITEM RATING : 2 1 5
Enter space seperated input for USER ITEM RATING : 2 2 3
Enter space seperated input for USER ITEM RATING : 3 1 3
Enter space seperated input for USER ITEM RATING : 3 2 3
Enter space seperated input for USER ITEM RATING : 3 3 1
Enter space seperated input for USER ITEM RATING : 4 2 2
Enter space seperated input for USER ITEM RATING : 4 3 2
Predicted Rating of Item  1  by USER  4  is :  2.0
Predicted Rating of Item  2  by USER  1  is :  2.4722856413589422
Predicted Rating of Item  3  by USER  2  is :  3.952406403471746
PS C:\Users\ACER\Desktop\Courses\College Courses\WIBD\Lab\EXPT1>
```

***** END *****