Building a recommender system using graph neural network

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Agenda

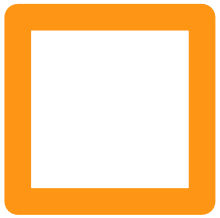
Popular based recommender system(RS)

Collaborative filtering

Graph neural network RS

Introduction

Recommendation systems are complex artificial intelligence systems that are designed to provide a prediction to users based on a preference. Recommendation systems require large data and time to train. Recommendation systems are heavily used in everyday life. Recommendation systems are widely useful because they save users a lot of time on the search, and they can efficiently provide services to users.

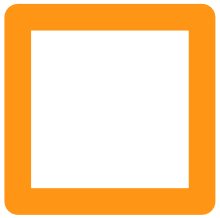


Topic one

Popular based RS

Popular based RS

In this popular-based approach, we will filter out data and get the top and most popular items for users. This approach often use to create a top list for users to select items they might like.

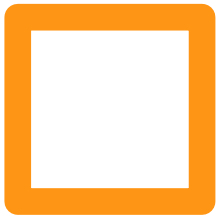


Topic two

Collaborative Filtering RS

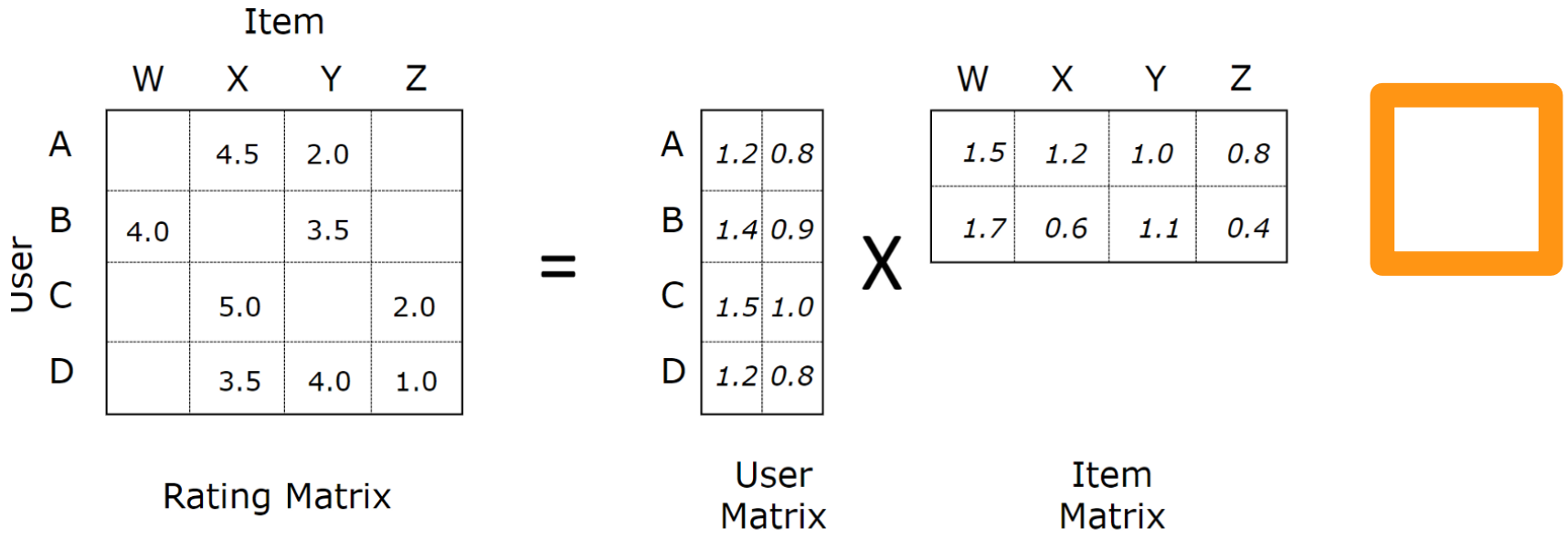
Collaborative filtering based RS

In collaborative filtering approach, the system will filter out items that a user might like on the basis of reactions by similar users. This approach is often done by using matrix factorization.



Matrix Factorization

Matrix factorization is a collaborative filtering algorithm to find the relationship between items and users' entities.

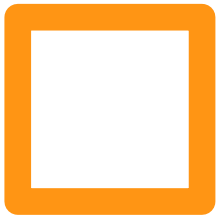


Topic two

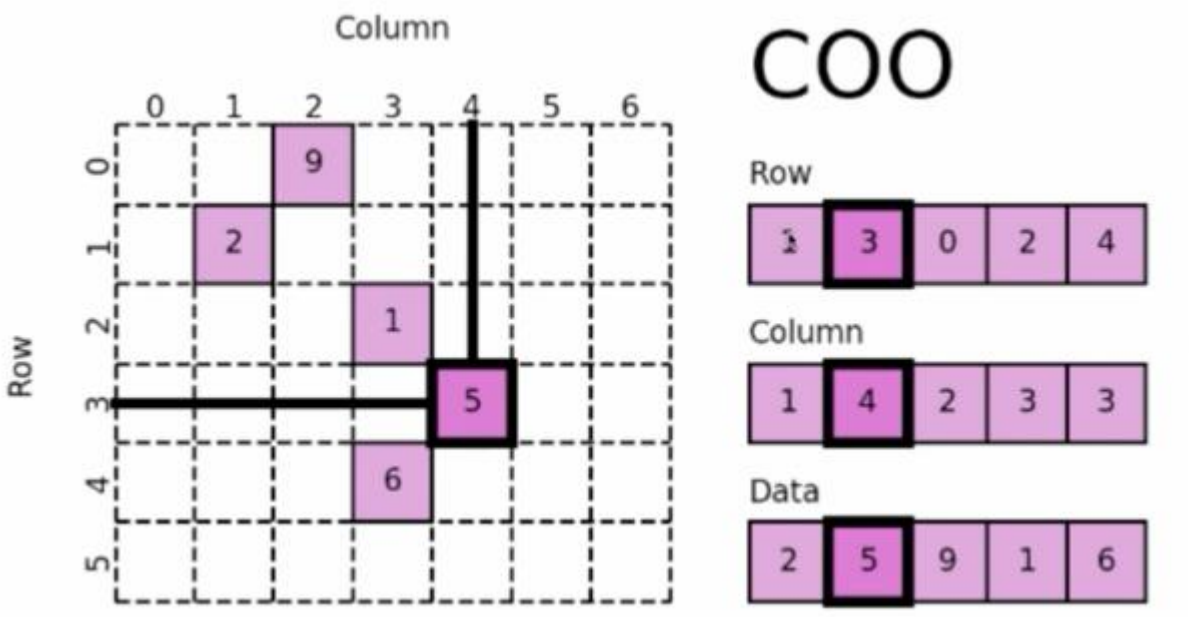
GNNs RS

GNNs

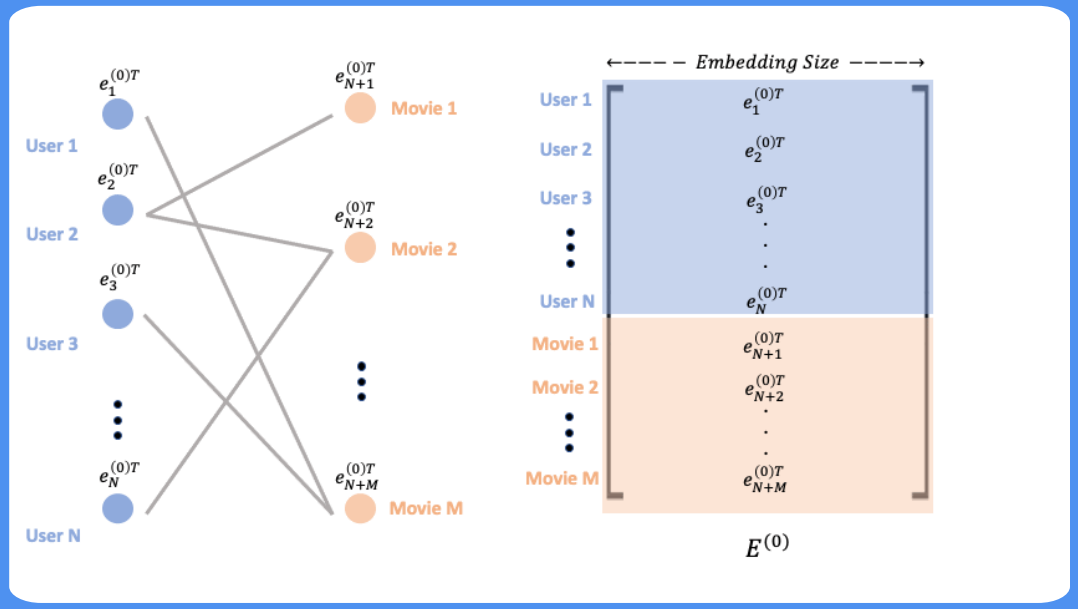
Graph neural networks allow us to easily to work with users and items. In Graph neural network (GNN) based recommendation system, where interactions of user-item are taken into consideration. Both interactions and opinions are encoded to build a user-item graph in the proposed approach.



Coordinate List(COO)



LightGCN


User 1
User 2
User 3
User N
Movie 1
Movie 2
Movie M
Embedding Size
$E^{(0)}$

Demo

Colab:
https://colab.research.google.com/drive/1xBnc36PJ_d82BS01plDYwPomoqQL0ojU#scrollTo=5b7f792e

Summary

Popular based RS:

for design top list, popular list

Collaborative filtering RS:

for find interaction between users and items

GNNs for RS:

to enhance collaborative filtering

Reference

[1] https://medium.com/@connectwithghosh/simple-matrix-factorization-example-on-the-movielens-dataset-using-pyspark-9b7e3f567536

[2] https://towardsdatascience.com/graph-neural-network-gnn-architectures-for-recommendation-systems-7b9dd0de0856#:~:text=GNNs%20for%20recommendation,-Recommendation%20systems%20are&text=Recommendations%20are%20drawn%20from%20the,item%20past%20interactions.

[3] https://link.springer.com/article/10.1007/s00521-020-05667-z

[4] https://medium.com/stanford-cs224w/lightgcn-for-movie-recommendation-eb6d112f1e8

Thank you