International Journal of Mathematical, Engineering, Biological and Applied Computing, 2022, 1, 44-46
www.scipublications.org/journal/index.php/ijmebac
DOI: 10.31586/ijmebac.2022.341

Mini Review

Create a Book Recommendation System using Collaborative Filtering

Raja Marappan *

School of Computing, SASTRA Deemed University, Thanjavur, India

*Correspondence: Raja Marappan (professor.m.raja@gmail.com)

Abstract: One of the most important applications of data science is the recommendation system. Every organization requires a good recommendation system to express a large range of items. This research focuses on the creation of a book recommender system using collaborative filtering.

Keywords: Recommendation System, Book Recommender, Data Science, Machine Learning, Collaborative Filtering

How to cite this paper:
Marappan, R. (2022). Create a Book Recommendation System using Collaborative Filtering. *International Journal of Mathematical, Engineering, Biological and Applied Computing*, *1*(1), 44–46. Retrieved from https://www.scipublications.com/journal/index.php/ijmebac/article/view/341

Received: May 12, 2022
Accepted: June 19, 2022
Published: June 21, 2022

1. Introduction

The recommendation engine is defined as a machine learning (ML) class that offers the right suggestions or recommendations to the user or organization. The recommendation system helps the user or the company to create a trust for the services and products. These systems are classified into collaborative filtering (CF), content-based filtering, and a combination of both. The book recommendation system recommends the books to the readers based on their styles and interests. The online sites use book recommenders that provide several electronic book categories [1,2]. This research focuses on the creation of a book recommender using the CF approach.

2. Book Recommender using CF

This session focuses on developing a powerful book recommender using the CF approach [3-8]. The datasets are taken from the URLs:

a. https://www.kaggle.com/datasets/rxsraghavagrawal/book-recommender-system
b. https://thecleverprogrammer.com/2020/05/23/book-recommendation-system-with-machine-learning/

The datasets are BX-Users, BX-Books.csv and BX-Book-Ratings.csv. These consists of the fields: book-title, publication year, publisher, user id (users), ISBN (books), and book-rating.

The steps in the creation of the book recommender are as follows:

1. Import the necessary libraries and load the datasets.
2. Remove the unnecessary columns and rename the required columns.
3. Check the reliability of the dataset using the command: books.head()
4. Apply the matrix factorization for the CF.
5. Create the matrix with users as columns, books as indices, and values as ratings.
6. Consider the users who rated at least 250 books and book ratings as 50 for each user.
7. Perform the exploratory data analysis using ratings['user_id'].value_counts().

8. Get the users those who rated at least 250 books.
9. Combine the ratings with the books.
10. Filter the books with ratings of at least 50.
11. Define the pivot table with users as columns, books as indices, and values as ratings.
12. Develop the model using KNN training and convert the pivot entries into spare form.
13. Apply the nearest neighbor and check the top 10 books.

The performance measures are shown in Figure 1 and the sample recommendations using the KNN model are shown in Figure 2.

```
get_data(final_ratings)
cal_book_sim()
evaluate()
```

```
100%|██████████| 59850/59850 [00:08<00:00, 7330.98it/s]

success
44887
14963

100%|██████████| 886/886 [00:02<00:00, 321.47it/s]
100%|██████████| 2024/2024 [00:00<00:00, 2249.41it/s]
100%|██████████| 20/20 [00:00<00:00, 32.89it/s]

precision=0.2300        recall=0.0301    coverage=0.0358
```

Figure 1. Performance measures

#Output
Recommendations for Flesh and Blood:
1: The Murder Book, with distance of 0.58
2: Choke, with distance of 0.64
3: Easy Prey, with distance of 0.71
4: 2nd Chance, with distance of 0.73
5: The Empty Chair, with distance of 0.75

Figure 2. Sample recommendations

3. Conclusions & Future Work

The book recommender is developed using the CF approach as unsupervised learning. This model required some preprocessing steps. In the future, the proposed model can be integrated with the other soft computing strategies [9-12].

References

[1] S. Shaikh, S. Rathi and P. Janrao, "Recommendation System in E-Commerce Websites: A Graph Based Approached," 2017 IEEE 7th International Advance Computing Conference (IACC), 2017, pp. 931-934, doi: 10.1109/IACC.2017.0189.

[2] P. Li and Z. Hong, "Book recommendation algorithm based on the interest and type factor for university," *Journal of Zhejiang university of technology*, vol. 47, no. 4, pp. 425–429, 2019.

[3] P. Wang, "Research and practice of book recommendation system based on SNS," *Computer Applications and Software*, vol. 29, no. 12, pp. 21–23, 2012.

[4] C. Liu, "Collaborative filtering hybrid recommendation algorithm based on improved biased and cluster user nearest neighbor," *Computer Applications and Software*, vol. 38, no. 5, pp. 288–293, 2021.

[5] T. Huang, "Application research of collaborative filtering algorithm based on neighbor model," *Journal of Beijing Information Science and Technology University (Natural Science Edition)*, vol. 32, no. 4, pp. 90–94, 2017.

[6] Bhaskaran, S., Marappan, R. Design and analysis of an efficient machine learning based hybrid recommendation system with enhanced density-based spatial clustering for digital e-learning applications. Complex Intell. Syst. (2021). https://doi.org/10.1007/s40747-021-00509-4

[7] Bhaskaran, S.; Marappan, R.; Santhi, B. Design and Analysis of a Cluster-Based Intelligent Hybrid Recommendation System for E-Learning Applications. Mathematics 2021, 9, 197. https://doi.org/10.3390/math9020197

[8] Bhaskaran, S.; Marappan, R.; Santhi, B. Design and Comparative Analysis of New Personalized Recommender Algorithms with Specific Features for Large Scale Datasets. Mathematics 2020, 8, 1106. https://doi.org/10.3390/math8071106

[9] Marappan, R., Sethumadhavan, G. Solving Graph Coloring Problem Using Divide and Conquer-Based Turbulent Particle Swarm Optimization. Arab J Sci Eng (2021). https://doi.org/10.1007/s13369-021-06323-x

[10] Marappan, R.; Sethumadhavan, G. Complexity Analysis and Stochastic Convergence of Some Well-known Evolutionary Operators for Solving Graph Coloring Problem. Mathematics 2020, 8, 303. https://doi.org/10.3390/math8030303

[11] Marappan, R., Sethumadhavan, G. Solution to Graph Coloring Using Genetic and Tabu Search Procedures. Arab J Sci Eng 43, 525–542 (2018). https://doi.org/10.1007/s13369-017-2686-9

[12] R. Marappan and G. Sethumadhavan, "A New Genetic Algorithm for Graph Coloring," 2013 Fifth International Conference on Computational Intelligence, Modelling and Simulation, 2013, pp. 49-54, doi: 10.1109/CIMSim.2013.17.