Book Recommendation System Using ML

Problem Statement:

Recommendation systems are the current popular methods to provide data to the users based on their preferences. Applications for these recommendation systems are Amazon's Alexa, Spotify for generating recommendations for music lovers.These recommendations are generated based on different techniques mainly there are content based recommendations, collaborative recommendation and hybrid systems. Content based filtering methods work on the history of the users with the item but it lacks users personal information. The collaborative filtering model generates recommendations based on the personal info but this lacks the recommendations based on the history of the item. Both the methods have their own limitations.

Literature review:

In the present scenario machine learning based recommendations are used in single recommendation categories like books or movies based using different techniques. In this paper we are using cross content based recommendations using machine learning techniques.For finding the two different types of contents and their descriptions we use TF-IDF vectorizer and K-means clustering for clustering the data and the performance of the model is evaluated based on the metric cosine similarity [1] .

In this paper we are proposing a new recommendation system for recommending the books considering library loan records, book titles, Nippon Decimal Classification, number of books that have been borrowed and publication year. For the experimental analysis we have used SVM(Support Vector Machine), Random Forest and AdaBoost algorithms.In this system we have considered the bibliography also to recommend the books.For the evaluation purpose we have experimented with different techniques i.e. rules based those are title similarities, confidence of support association [2].

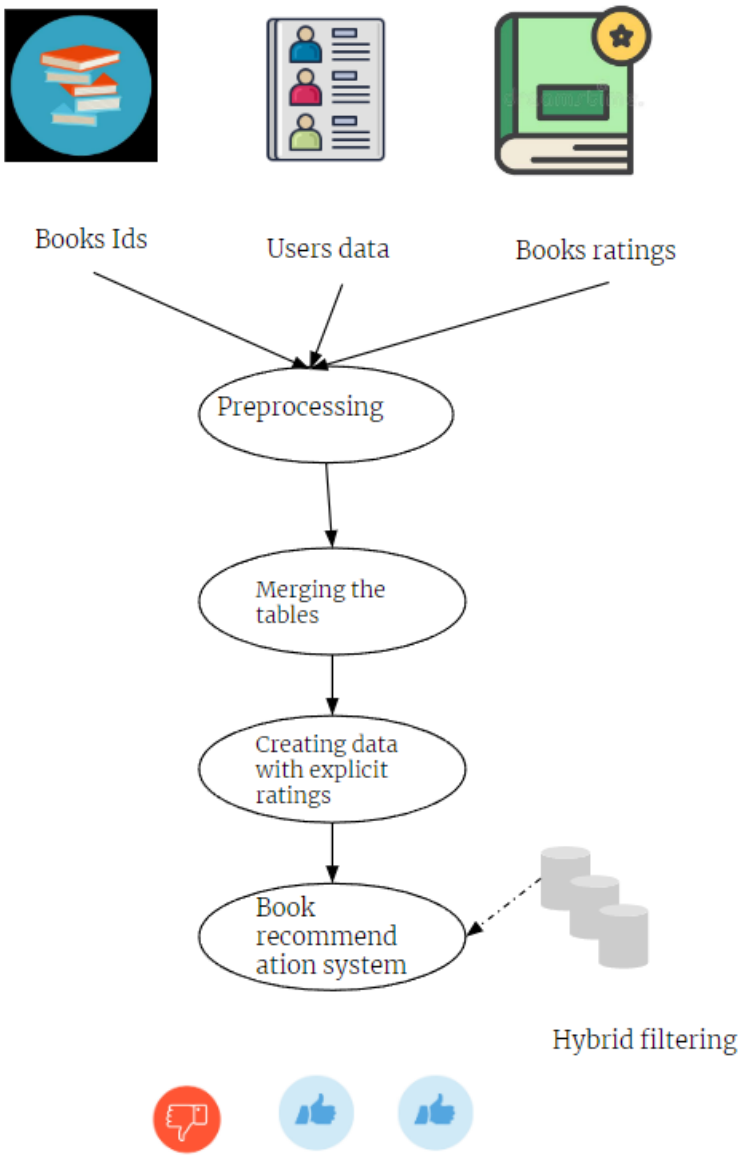
In this paper a new model is proposed i.e. user-user recommendations based on the user preferences.For the evaluation various similarity metrics are used.After similarity calculation top 10 recommendations are generated.For this experiment data is collected from kaggle resource and the data is Good reads dataset [3].

Any online platform of selling books or dealing with literature related industries needs a good recommendation system to satisfy the customer needs and retain them.This system proposes a recommendation based on their books bought in the past and their interests . With this system we can recommend the books or products to the new user which are generated based on old user ratings and preferences [4].

Proposal:

In this method we are proposing a model that overcomes the limitations of both the methods collaborative and content based filterings. We are proposing a hybrid model which solves the above problems and makes the recommendations more personalized. One way of implementing the hybrid model is to combine the predictions of both the models i.e. first we need to implement the content based filtering to draw predictions from the model, second implement the collaborative filtering and draw predictions from this model.In the end we need to ensemble the predictions.

Workflow:



Contributions:
In this project we explore different Python libraries Keras, Pandas, Numpy,Seaborn and Matplotlib .

Results analysis:
Since we are implementing both methods of filtering and combining them with ensemble technique.There are two different kinds of metrics to use that measure the quality of the recommendations.In the first case of content based filtering we use similarity measures:

- Cosine similarity
- Pearson's correlation coefficient
- Jaccard's distance
- Euclidean distance

In the later case collaborative filtering we use predictive metrics

- MAE(Mean Absolute Error)
- RMSE(Root Mean Squared Error)

References:

[1]. P. Devika, K. Jyothisree, P. Rahul, S. Arjun and J. Narayanan, "Book Recommendation System," 2021 12th International Conference on Computing Communication and Networking Technologies (ICCCNT), Kharagpur, India, 2021, pp. 1-5, doi: 10.1109/ICCCNT51525.2021.9579647.
[2].M. Kommineni, P. Alekhya, T. M. Vyshnavi, V. Aparna, K. Swetha and V. Mounika, "Machine Learning based Efficient Recommendation System for Book Selection using User based Collaborative Filtering Algorithm," 2020 Fourth International Conference on Inventive Systems and Control (ICISC), Coimbatore, India, 2020, pp. 66-71, doi: 10.1109/ICISC47916.2020.9171222.
[3].K. Tsuji, F. Yoshikane, S. Sato and H. Itsumura, "Book Recommendation Using Machine Learning Methods Based on Library Loan Records and Bibliographic Information," 2014 IIAI 3rd International Conference on Advanced Applied Informatics, Kokura, Japan, 2014, pp. 76-79, doi: 10.1109/IIAI-AAI.2014.26.
[4].A. Nawar, N. T. Toma, S. Al Mamun, M. S. Kaiser, M. Mahmud and M. A. Rahman, "Cross-Content Recommendation between Movie and Book using Machine Learning," 2021 IEEE 15th International Conference on Application of Information and Communication Technologies (AICT), Baku, Azerbaijan, 2021, pp. 1-6, doi: 10.1109/AICT52784.2021.9620432.