Journal of Artificial Intelligence and Engineering Applications

Website: https://ioinformatic.org/

15th October 2025. Vol. 5. No. 1; e-ISSN: 2808-4519

Design of a Movie Recommendation System Application Using a User-Based Collaborative Filtering Algorithm on Android

Andre Zelfanya Pandiangan[1*], Huliman[2], Octara Pribadi[3]

[1,2,3]*Informatics Engineering,* STMIK TIME, Medan, Indonesia
andrezelfanyapandiangan05@gmail.com[1], huliman.win@gmail.com [2], octarapribadi@gmail.com [3]*

Abstract

In today's digital era, the number of movies available on various streaming *platforms* continues to increase from year to year. This causes users difficulty in choosing a movie that suits their preferences. To overcome these problems, a recommendation system is needed that is able to provide personalized movie suggestions. This research aims to design an Android-based movie recommendation system application using the *User-Based Collaborative Filtering* algorithm. This algorithm works by analyzing the similarity of behavior and ratings between users to provide relevant movie recommendations. The system uses datasets from *The Movie Database (TMDb)* via *API*, and is designed with an intuitive and responsive user interface. The recommendation process is done by calculating the similarity between users, then predicting the rating of movies that have not been watched by users. The results show that the application is able to recommend movies accurately based on user preferences and interaction history of other users who have similar interests. With this system, it is expected that users can more easily find movies that suit their tastes, and contribute to the development of recommendation systems based on *mobile platforms*.

Keywords: *Movie recommendation system, User-Based Collaborative Filtering, Android, TMDB API*

1. Introduction

Film is an audio-visual communication medium that conveys stories through moving images and sound. Apart from being entertainment, movies also function to provide information and convey messages to the public as an art form and communication medium that combines moving images, sound, and narration to convey stories, ideas, or emotions to the audience.

The movie industry has now become a fairly large industry. There are 4,734,693 titles, which include TV *series*, short films, documentaries and so on. The development of the film industry is also growing rapidly along with the development of technology used in filmmaking. Not only in terms of story plot, today's movies must have a visual side that makes consumers amazed when watching it [1]. Nowadays, watching movies has become one of the ways to overcome boredom. Many people also do it as a hobby. This encourages the movie industry to compete fiercely in producing interesting works.

Movies provide a variety of choices to suit the audience's preferences, and are classified by genres such as drama, comedy, action, horror, and others. However, with the increasing number of movies available, audiences often find it difficult to find the right movie. Nielsen's *State of Play* report notes that audiences in the United States now have access to more than 817,000 program titles, an 18% increase from 646,000 titles at the end of 2019 [2].

Movie recommendations play a very important role in the m o v i e - g o i n g experience, both for individual viewers and the movie industry as a whole, as it can help viewers find content or movies they like.A recommendation system is a method applied to provide suggestions by estimating how much an item is worth to a user, and then presenting the item based on the highest predicted value. Predictions in recommendation systems can be used in various fields, including books, music, movies, tourist attractions and many others [3].
The Collaborative Filtering algorithm is one of the methods used in recommendation systems to predict user preferences or interests based on the behavior and preferences of other users. The advantages of the *collaborative filtering* algorithm are being able to handle *sparse* data, high accuracy, flexibility in integrating additional information and having good scalability [4].

2. Literature Review

2.1. Application
A movie recommendation system application is software that uses certain algorithms and techniques to help users find new movies they like based on past preferences and other user data.

2.2. Design
The design of this movie recommendation system application will focus on the development of *User-Based Collaborative Filtering* on the Android *platform*. This system is created with the aim of providing users to find new movies that are suitable for their tastes based on similar preferences with other users. The main components of the design include a *client- server* architecture, where the Android application acts as a client that displays the user interface and interacts with the user, while the *server* will manage the movie and rating database, and run the recommendation algorithm. In addition, the design of the user interface (*UI*) will emphasize ease of use. The design of the user interface (UI) will prioritize ease of use and intuitive visual aesthetics, with screen designs such as the *login* page, *home register*, movie details, and recommendation view, to ensure an optimal and responsive user experience.

2.3. Recommendation System
A recommendation system is a system designed to provide advice or recommendations to users based on existing data. This system is widely used in various fields, including *e-commerce*, social media, and *streaming platforms* such as Netflix and Spotify. According to Ricci et al. Recommender systems can be divided into three main categories: *content-based filtering, collaborative filtering*, and *hybrid methods* [5].

The recommendation system is also referred to as a system that can assist users in overcoming information overload by providing specific recommendations for users and it is hoped that these recommendations can fulfill the wants and needs of users [6]. Recommender systems help users narrow down their choices to find what is most interesting to them. In addition, the recommender can help users discover new content that they might not otherwise find.

2.4. Collaborative Filtering
Collaborative filtering is the most commonly used method in recommender systems. The two main approaches of *collaborative filtering* are *user-based and item-based*. *User-based* recommends based on user similarity, while *item-based collaborative filtering* recommends items based on item similarity. Sarwar et al. (2001) explain that by using data from other users, *collaborative filtering* can provide more personalized and relevant recommendations [7].

2.5. Previous Research
Previous research on movie recommendation systems was conducted by Agustian (2020) with the title "Movie Recommendation System Using *Collaborative Filtering* Method and *K- Nearest Neighbors". Nearest Neighbors".* From the results of this study, it is obtained that active *users* who have many movies that will be calculated rating predictions, then by calculating using the *weight sum* method can make a sequence of prediction results from the largest rating to the smallest rating for the order of movie recommendations [1].

Research also conducted by Adomavicius & Tuzhilin discusses recommendation systems with a focus on the techniques used in developing these systems. They identified two main approaches, namely *content-based filtering* and *collaborative filtering*, and proposed the use of *hybrid* methods that combine both approaches to improve recommendation accuracy [8].
Research conducted by Smith & York with the title "*Amazon.com recommendations: Item-to-item collaborative filtering*" explains the process of calculating item similarity using metrics such as *cosine* similarity and how the system can provide relevant recommendations in *real-time* by showing that an effective recommendation system can increase user satisfaction and sales. The evaluation results show that users are more likely to purchase recommended products. This research provides a concrete example of how *collaborative filtering* algorithms can be applied in an *e-commerce* context and can be adapted for movie recommendation systems [9].

A movie recommendation system that uses a *user-item-based collaborative filtering* method by analyzing movie rating data provided by users, this system is able to identify preference patterns and provide relevant recommendations to users. The evaluation results show that the developed system not only increases user satisfaction in choosing movies, but also shows the potential to increase user interaction with the platform [10].

Research conducted by Sari & Rahardjo showed that combining *collaborative filtering* and *content-based filtering* methods in book recommendation systems can significantly improve recommendation accuracy. By utilizing information from user ratings and book characteristics, the developed system is able to provide recommendations that are more personalized and in accordance with user preferences. Evaluation results show that the combination of these two methods not only improves the relevance of recommendations, but also provides a better user experience[11].

3. Problem Analysis

3.1 Problem Analysis
Problem analysis is a process carried out to understand the problems faced and find solutions to these problems. In this research, problem analysis is divided into several stages, namely, analyzing the processes that run according to the field, and analyzing the proposed algorithm.

3.2 System Design

Design is the process of planning or developing a system to be built with a structure that has been considered. This subchapter will highlight the design process involving the display design and the proposed system *flowchart* design.

4. Results

The following are the overall display results of the application built, namely:

1. *Login* Page
   This page contains a *login* authentication *form* that must be filled in so that users can log in and see a list of movies to watch. Figure 4.1 shows the *login* page.

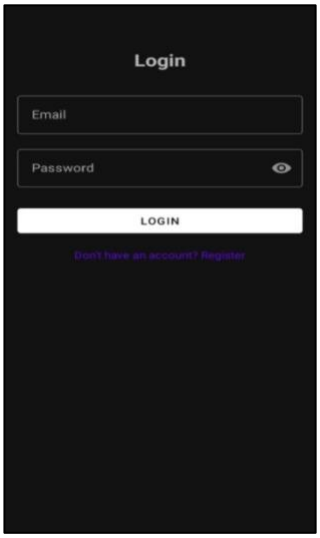

Fig. 1: *Login* Page

2. *Register* Page
   This page contains a registration data *form* that must be filled in if the user does not yet have an account to log in, then the user must register an account first so that he can access the application. Figure 4.2 shows the registration page.

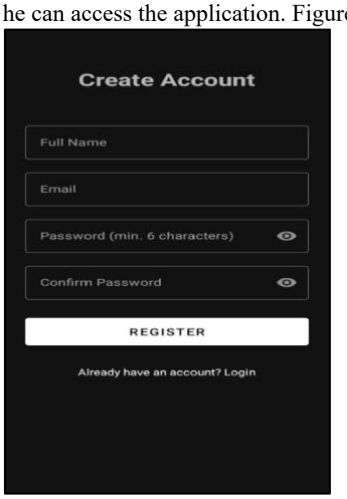

Fig. 2: *Register* Page

3. Main Page *(Home)*
   This page displays the main page that directly displays a list of movies to watch, and there are also several displays such as *text boxes* to search for movie titles manually and there are also options to select *genres*, ratings and release years. Figure 4.3 shows the main display page.

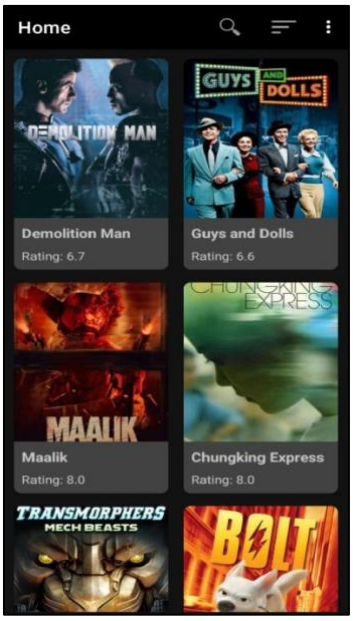

Fig. 3: Main Page (*Home*)

4. Filter and *Sort Movies* Page

This page contains several options such as popular movies, movie *genres*, ratings, and release years. If the user has determined everything then immediately press *Apply* and the system will display the movie according to what the user wants. The following Figure 4.4 shows the Filter and *Sort Movies* Page.

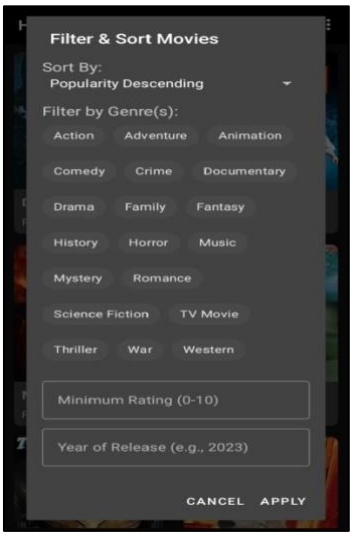

Fig. 4: *Filter* and *Sort Movies* Page

5. Movie Detail Page

This page displays directly the movie to be watched. There is a *play trailer*, movie synopsis, release date, movie rating given by the user, adding movies to the favorites list, rating, viewing recommendations, similar views related to the movie to be seen, and some actors who play a role in the film. Figure 4.5 shows the Movie Detail Page.

Fig. 5: Movie Detail Page

5.1 Conclution

The following describes the conclusions of the research that has been done, among others:

1. The results showed that the application built was able to display a list of movies to watch and display the appropriate recommendation results.
2. The use of the *User-Based Collaborative Filtering* Algorithm ensures that the system can recommend movies to watch next.

Suggestions

There are several suggestions outlined so that it can be continued in the next research, among others:

1. This application can be developed by adding a full video playlist feature, not just limited to the *trailer* feature.
2. The rating feature in the application can be developed so that it can also affect the rating of the TMDB website which can be accessed via *https://www.themoviedb.org/settings/api.*
3. The algorithm used can be developed using *model-based filtering* such as *clustering, association, bayesian networks, neural networks.*

References

[1] Eggy Ryana Agustian, "*Film Recommendation System Using Collaborative Filtering Method And K_NEAREST NEIGHBORS*," Vol. 3 No. 1, (2020).

[2] Daniel Theo Santoso, "Prototipe Sistem Rekomendasi Film Indonesia Menggunakan Pendekatan *Content Based Filtering* dan Metode *Vector Space Model* " Vol. 7 No. 2, (2024).

[3] Kiki Ratna Sari, "Pembuatan Sistem Rekomendasi Film Dengan Menggunakan Metode *Item Based Collaborative Filtering* Pada *Apache Mahout*", Vol. 2 No. 6, (2020).

[4] Koren, Y., Bell, R.M., Volinsky, C.: Matrix factorization techniques for recommender sys- tems. IEEE Computer **42**(8), 30–37 (2009)

[5] Ricci, F., Rokach, L., & Shapira, B. (2015). *Recommender Systems Handbook. Springer.*

[6] R. Naughton and X. Lin, "*Recommender Systems: Investigation the Impact of Recommendations on User Choices and Behaviours," ACM RecSys 2010 Work. User-Centric Eval. Recomm. Syst. Their Interfaces*, no. February, pp. 9–13, 2010.

[7] Sarwar, B., Karypis, G., Konstan, J., & Riedl, J. (2001). *Item-Based Collaborative Filtering Recommendation Algorithms. Proceedings of the 10th International Conference on World Wide Web* (pp. 285-295). Minneapolis: University of Minnesota.

[8] Adomavicius, G., Tuzhilin, A.: Toward the next generation of recommender systems: A sur- vey of the state-of-the-art and possible extensions. IEEE Transactions on Knowledge and Data Engineering **17**(6), 734–749 (2005)

[9] Linden, G., Smith, B., York, J.: Amazon.com recommendations: Item-to-item collaborative filtering. IEEE Internet Computing **7**(1), 76–80 (2003)

[10] Prabowo, H. R., & Supriyadi, S. (2018). Rekomendasi Film Menggunakan Metode *Collaborative Filtering* Berbasis *User-Ite*

[11] Sari, D. P., & Rahardjo, B. (2019). Sistem Rekomendasi Buku Menggunakan Metode *Collaborative Filtering* dan *Content-Based Filtering.*