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CineBot Movie Recommendation System

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Abstract

Our CineBot's primary mission is to offer conversational recommender systems that assist users in achieving recommendation-related goals through chats. Its features include support for dynamically changing preferences, a multi-modal chat interface, and effective dialogue flow. Anyone with a strong Internet connection can access the CineBot, an internet-based online application. Users are assisted in finding and choosing products from the system's possibilities via recommendation systems. They supply the user with a short selection of the goods that are most appropriate given the user's wants and a description of a broad set of available items. The user can interact with movie suggestion systems effectively and view movies that are more relevant to him thanks to the comfort and personalization that movie recommendation systems offer. To give the user this degree of comfort, we put movie recommendation systems in place as our main driving force. Our system's main goal is to make movie suggestions to users depending on what they from the available selections. NodeJS, ReactJS for systems development and Firebase were used to store movie data.

Keyword: CineBot, Age filtering, Web Application, NodeJS, ReactJS.

Introduction

Over the past few decades, the internet has emerged as one of the most widely used platforms for finding any kind of content, including books, videos, movies, music, and more. Video has rapidly expanded as a result of lower hardware prices and technological advancements. Nowadays, there are a vast number of movies available, making it difficult for users to find and enjoy them. As a result, it can be vital to categories which movies are pertinent for each user. Typically, travel websites just provide the most crucial details, such as reservations. However, many websites lack the tools necessary to assist users in their searches and are unable to persuade their visitors. Of course, the complexity and scope of e-tourism offerings could become a problem

as a result of users who are unable to look through all of the information to choose which items are best for them. The recommender system can provide information from readily accessible data that is relevant for the specific user. Consequently, the current problem is to direct and plan the millions of movies. Recommender systems, meanwhile, give businesses the chance to pair movie buffs with their current clients. In the interim, these websites offer a distinctive platform for gathering data for user studies. It has the ability to change the mood of the listener in addition to expressing sentiment.

Various industries have been impacted by the advancement of technology and the impact of computers and the internet on our daily life. And practically all tasks are now carried out by computers. Users find it extremely challenging to find content that they are actually interested in in today's world of information overload. Additionally, it might be difficult for content providers to set themselves out from the competition. To resolve the discrepancy, a lot of researchers and businesses create recommender systems. Recommender systems connect users and information in order to both push

Certification	Description
A/U or U	Anyone can watch it Family-friendly movie
AVA/UA orUA	It means that children under 12 years of agecan watch this film under the direction of parents.
V/A or A	It means that the film is not suitable for people under 18 years of age

Table 1. Age-Based certification table

- Below 7 years age recommends only "U" certifiedmovies.
- Between 8 to 17 years age recommends "UA" certified movies along with the "U" certified movies.
- 18+ years age recommends all certified movies

Why Age-Based Certification?

While the media in our country are free, it is considered necessary in the general interest to examine the product when it goes out for public consumption. While there is no certification of published material, need was felt to havecertification for films because of the effect that the audio- visual medium can have on the people which can be far stronger than the influence of the printed word, particularly on the impressionable minds of the children.

Film certification is thus the end product of the process of previewing of film and it includes a decision either not to allow a particular film or public viewing or to allow it for public viewing with certain deletions and or modifications or at least proper categorization of the films. Furthermore, it is to ensure that the children do not get exposed to psychologically damaging matter.

The Supreme Court in a judgment in 1989 said that film certification becomes necessary because a film motivates thought and action and assures a high degree of attention and retention as compared to the printed words. The combination of act and speech, sight and sound in semi- darkness of the theatre with elimination of all distracting ideas will have a strong impact on the minds of the viewers and can affect emotions. Therefore, it has as much potential for evil as it has for good and has an equal potential to instill or cultivate violent or good behavior. It cannot be equated with other modes of communication. Certification by prior restraint is, therefore, not only desirable but also necessary.

Language Filtering:

The user's chosen language is used as the basis for language filtering. The user can select a language from a list of available ones, and the CineBot will only suggest movies inthat language.

This filter sorts the language used in the movie details such that it exactly matches the user's selected language. The movie data will contain references to many languages, and the sort will select the user's preferred language and provide the appropriate results.

We provide three languages in CineBot: Telugu, Hindi, and English. Once the user chooses one, the movies in that language are displayed, and the data is categorized accordingly. With the help of this application, users may classify movies fast according to their favorites genres and receive movie recommendations based on their preferred languages.

Content-based filtering

Content-based filtering is a typical strategy used when developing the CineBot movie recommendation engine. Movie genres and the user's preferences are the foundation of content-based filtering techniques. These techniques work better when there is information on movies available (movie name, genres, storyline, etc.).

Recommenders approach content-based recommendations as user-specific tasks. Learn a classifier for the user's preferences based on an item's attributes to solve a classification problem. In this system, the products are described using keywords, and genres are created to show what kinds of items this user prefers. In other words, these filters attempt to suggest products that are comparable to ones that a consumer has previously enjoyed. Anyone can use the CineBot; no login is required.
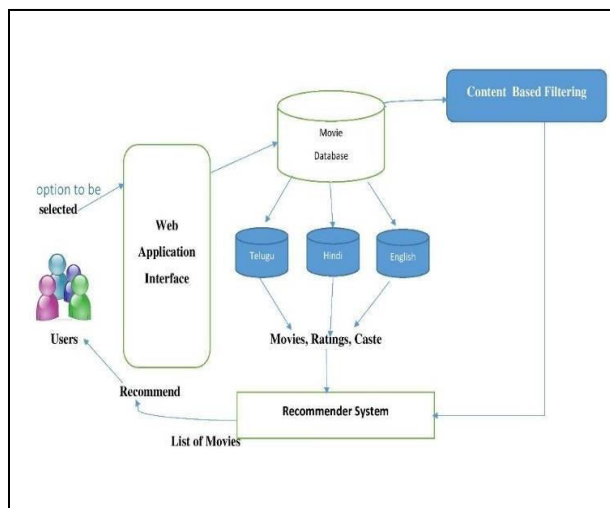

Fig 1. Architecture of CineBot

Existing System

The existing system could not keep up with the change in trends by missing out on the new movies that were released. So the past system only recommended present movies rather than the latest. Because of the change in user preferences, the existing system may not be effective and efficient. Movies are recommended only based on themes rather than their reviews. There is a system for recommending songs based on the user's mood. The system only takes input from the user and recommends songs. The existing system also doesn't recommend movies according to the user's age.

Proposed System

We have successfully proposed the CineBot (CineBot Movie Recommender system) a movie recommender system that creates a conversational environment with the user and recommends movies based on the user's preference and age. After the severe and continuous analysis of the problems that rose in the existing system, we are now familiar with the requirements that are required by the current system. The proposed system is interactive and provides users with a platform to interact with it and maintain a conversation between them and system. The movie recommender system's goal is to provide users with accurate movie recommendations. The requirements that the system needs are classified into functional and non-

functional requirements. These requirements are listed below:

Functional Requirements

Functional requirements define which functions or features are to be incorporated in any system to fulfill the business requirements and to be acknowledged by the clients. On the premise, the functional requirements specify the relationship between the inputs and outputs. All the operations to be performed on the input data to obtain the output are to be specified. This incorporates determining the choices that were chosen as the input and output data, parameters affected by the operations, and other operations that must be used to transform the inputs into outputs. Functional requirements specify the behavior of the system for valid input and output.

Non-Functional Requirement

Non-functional requirements provide a description of the features, characteristics, and ability of the system, and in addition, they may constrain the boundaries of the proposed system. The following are the non-functional requirements that are essential depending on performance, cost, control, and security efficiency and services.

Based on the above explained non-functional pre-requisites, the following are listed:

- User friendly
- The system should provide improved accuracy.
- to perform efficiently with better throughput and response time.

1. MODULES

A module is a collection of source files and build settings that allows the project to be divided into discrete units of functionality. A module is a class that addresses a business application task. In particular, it encapsulates the data model associated with a task plus the custom code to implement the task. A program will consist of one or more separately created modules. Several distinct modules may be present in an enterprise-level software program, and each module supports distinct and independent business operations. Modules are usually used to organize object definitions together that provide the same function in a business. The system comprises of three modules :-

1) User Module
2) CineBot module
3) Admin Module

User Module

The user module allows users to enter their name and age and select from the options provided by the system. Users benefit from no sign-on because the content they associate with the system is kept secure, and they don't have to worry about sharing their information. User module is the main page provided to the user using ReactJs . It is a page provided to user where user enters his name and age and movies are classified based on his age and genres they selected.

CineBot Module

A CineBot is a computer program that use options to understand client questions and automate responses to them, recreating human discussion. A CineBot maintains a human like text conversation with the user by providing a set of options and recommending movies to the user. A text-based CineBot is one that interacts with and communicates through text or messaging. This type of bot can be useful when programmed to accurately understand the clients needs and provide immediate outcomes.

Admin Module

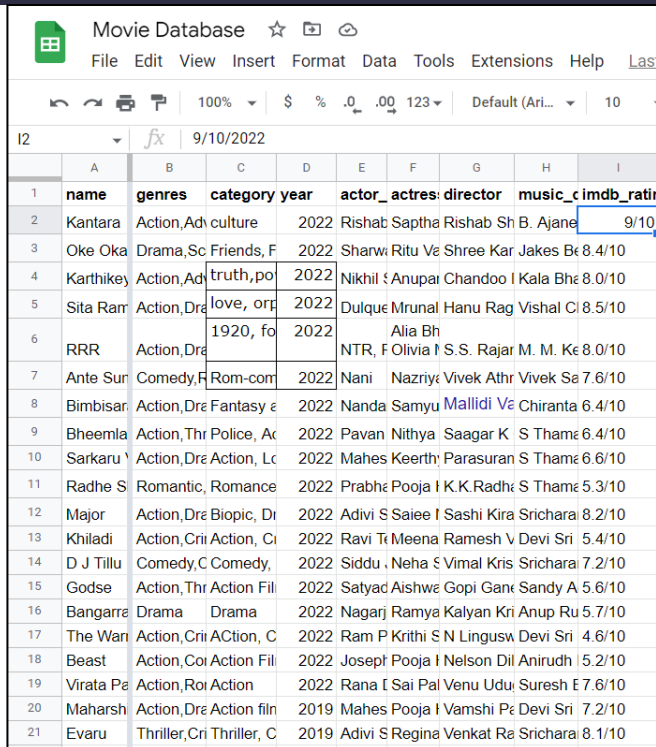The Administration Module is the administrator's interface and allows for processing all configuration operations on the system. The Admin's main responsibility is to maintain the database and modify the database . The admin uses Firebase as Backend service which allows the admin to store the movie data on the cloud as well admin uses excel sheet to store movie data in tabular format, which is later converted to JSON objects.

Data Description

Pre-filters are used in the proposed model. The attributes used to match with the user's preferences.

- Genre
- Actor
- Director
- Year
- Rating
- Certification
- Language
- Ott platform

	A	B	C	D	E	F	G	H	I
1	name	genres	category	year	actor_	actres	director	music_c	imdb_ratir
2	Kantara	Action,Adv	culture	2022	Rishab	Saptha	Rishab Sh	B. Ajane	9/10
3	Oke Oka	Drama,Sc	Friends, F	2022	Sharwa	Ritu Va	Shree Kar	Jakes Be	8.4/10
4	Karthikey	Action,Adv	truth,pov	2022	Nikhil S	Anupar	Chandoo I	Kala Bha	8.0/10
5	Sita Ram	Action,Dra	love, orp	2022	Dulque	Mrunal	Hanu Rag	Vishal Cl	8.5/10
6	RRR	Action,Dra	1920, fo	2022	NTR, F Alia Bh Olivia		S.S. Rajar	M. M. Ke	8.0/10
7	Ante Sur	Comedy,F	Rom-com	2022	Nani	Nazriya	Vivek Athr	Vivek Sa	7.6/10
8	Bimbisar	Action,Dra	Fantasy a	2022	Nanda	Samyu	Mallidi Va	Chiranta	6.4/10
9	Bheemla	Action,Thr	Police, A	2022	Pavan	Nithya	Saagar K	S Thama	6.4/10
10	Sarkaru V	Action,Dra	Action, Lc	2022	Mahes	Keerth	Parasuran	S Thama	6.6/10
11	Radhe S	Romantic,	Romance	2022	Prabha	Pooja I	K.K.Radha	S Thama	5.3/10
12	Major	Action,Dra	Biopic, Dr	2022	Adivi S	Saiee	Sashi Kira	Srichara	8.2/10
13	Khiladi	Action,Crii	Action, C	2022	Ravi T	Meena	Ramesh V	Devi Sri	5.4/10
14	D J Tillu	Comedy,C	Comedy,	2022	Siddu,	Neha S	Vimal Kris	Sricharai	7.2/10
15	Godse	Action,Thr	Action Fil	2022	Satyad	Aishwa	Gopi Gane	Sandy A	5.6/10
16	Bangarra	Drama	Drama	2022	Nagarj	Ramya	Kalyan Kri	Anup Ru	5.7/10
17	The Wari	Action,Crii	ACtion, C	2022	Ram P	Krithi S	N Lingusw	Devi Sri	4.6/10
18	Beast	Action,Cor	Action Fil	2022	Josepl	Pooja I	Nelson Dil	Anirudh	5.2/10
19	Virata Pa	Action,Ror	Action	2022	Rana [	Sai Pal	Venu Udu	Suresh E	7.6/10
20	Maharshi	Action,Dra	Action filn	2019	Mahes	Pooja	Vamshi Pa	Devi Sri	7.2/10
21	Evaru	Thriller,Cri	Thriller, C	2019	Adivi S	Regina	Venkat Ra	Sricharai	8.1/10

Fig.2 csv sheets are used to maintain the movie data in this system.

CSV stands for **"comma-separated values"** files, which have a **".csv"** extension and save data in a tabular format. convert the data in a **".csv"** file to JavaScript Object Notation (**JSON**) without using any third-party npm packages. The fundamental contrast from normal change is that the values of any row can be comma separated, and as we know, different columns are also comma separated.

In this approach, we will input the contents of the CSV file into an array and split the content of the array based on a delimiter. All the rows of the CSV will be changed to JSON objects, which will be added to the resultant array, which will then be converted to JSON, and a corresponding JSON output file will be generated.

Follow the steps below to achieve the solution:

1. Read the csv file using the default fs npm package.

2.Convert the data to a string and split it into an array.3.Generate a headers array.

4. For all the remaining n-1 rows, do the following:

- make an empty object to add the values of the present row to it.
- Declare a string str as the current array value to modify the delimiter and store the generated string in a new string s.
- If we encounter opening quote (") then we keep commas as it is or else we restore them with pipe "|"
- Keep adding the characters we traverse to a string.
- Split the string using a pipe delimiter and store the values in a properties array.
- For each header, if the value contains many comma separated data, then we store it in the form of array otherwise directly the value is stored.
- Add the generated object to our result array.

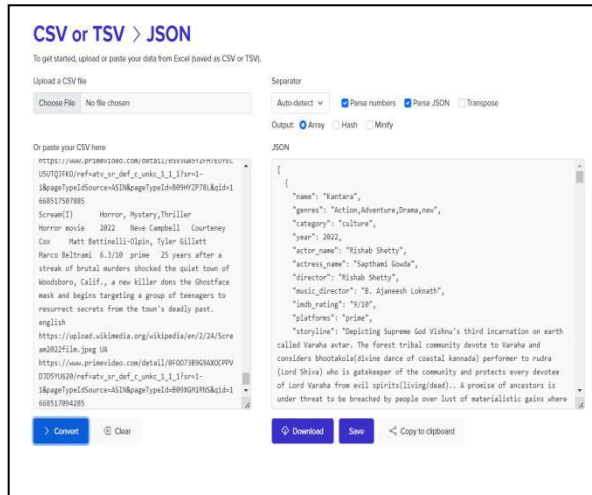5. Translate the resultant array to JSON and generate the JSON output file.

Fig 3 CSV to JSON Conversion

Software Environment

Web Technologies

We probably know that computers don't communicate with each other the way that people do. Instead, computers require codes or directions. Computers can process the necessary information with the help of binary codes and commands. Every second, billions upon billions of ones and zeros are processed in order to provide you with the information you need. So what does that have to do with your ability to post your latest pictures online?

"Web technology" refers to the processes used by computers to connect with one another using markup languages and multimedia applications. From a few marked-up web pages to the capacity to complete extremely particular tasks on a network without pausing throughout the course of the last few decades, web technology has experienced a remarkable transformation.

Technologies used in the application:
VS Code

Visual Studio Code, also commonly referred to as **VS Code**, is a source-code editor made by Microsoft with the Electron Framework for Windows, Linux, and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. Users can change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality.

NodeJS

Nodejs is an open-source server environment. Nod.js is free. Nodejs runs on various platforms (Windows, Linux, Unix, Mac OS X, etc.). Nodejs uses JavaScript on the server. Nodejs can generate dynamic page content. Nodejs can create, open, read, write, delete, and close files on the server. Form data can be collected by Nodejs. Node.js can add, delete, and change data in your database.

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ReactJS

React (also known as **Reactjs** or **ReactJS**) is a free and open source front-end JavaScript library for structure user interfaces based on UI components. React is a JavaScript library for building user interfaces. React is used to build single-page applications. React allows us to create reusable UI components. React makes it simple to create interactive user interfaces. Design simple views for each state in your application, and Respond will successfully refresh and deliver the perfect parts when your information changes.

Firebase

Firebase is a backend-as-a-service (BaaS). It provides developers with a selection of tools and services to help them build up quality apps, grow their user base, and earn profit. It is built on Google's infrastructure. Firebase is categorized as a NoSQL database program that stores data inJSON-like documents.

How filters Work?

By using split and map functions and filter functions, our CineBot implements Language-based filtering.

Split()- Using the split() method, you can construct an array of strings from the given string by splitting the string into substrings by using a separator specified in the argument, and separating each substring into its own string.

Map() - As stated above, the map() method is used to make a new array from an existing array, by dividing the array into elements and applying a function to each one of them.

Filter() - There is a method called filter() that applies a conditional statement to each element within an array and takes the result as the return value. Whenever this conditional returns true, the element will be pushed to the output array and displayed. An element that does not meet the condition does not get pushed out to the output array if the condition returns false.

- After our application takes a user's name and age, the options object is set to empty.
- As a result of using "getFilteredMovies", we can filter out movies, and it contains every action that needs to be taken to filter out the movie.
- It is important to note that the "getFilteredMovies", function takes the URL of the movie and generates an array containing the keys "orderBy,"

"equalTo," and "genre" using the split function in order to process the "orderBy" key. Note that order by key holds language as value .

- The URL that is obtained is split using URL parameters. The array is then converted into a key- value pair.

- Using these values in the getFilteredMovies function, we filter the database based on the language.

- In order to further refine the process, we use the indexOf function to filter the movies according to their genre.

Challenges Faced

In budding any system, the biggest challenge is to satisfy the end users for whom the system is being developed. We also faced certain challenges while developing our system. Some of them are:

- To have a system that is user-friendly and easy to recognize and use.

- To create a data set that has all related information about a particular movie.

- The biggest challenge was to have the most suitable movie recommendation list.

- To give weights to dissimilar attributes.

Overcome the Problems

- The proposed system has been tested on a small set of people, and we have received a positive reply from them. We have kept our system easy and interactive for this, and we have selected ReactJs and NodeJs.

- For collecting information we have intensively look for free online movie data bases and extract the information which was useful for our proposed system.

- To exactly recommend movies to users, we have used filters based on movie genres and languages.

- Suppose our recommendation system holds 6 movies. The table below matches the movies with 5 features that are important to our application.
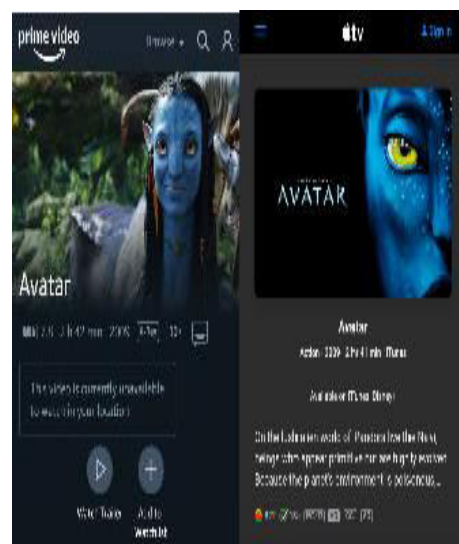
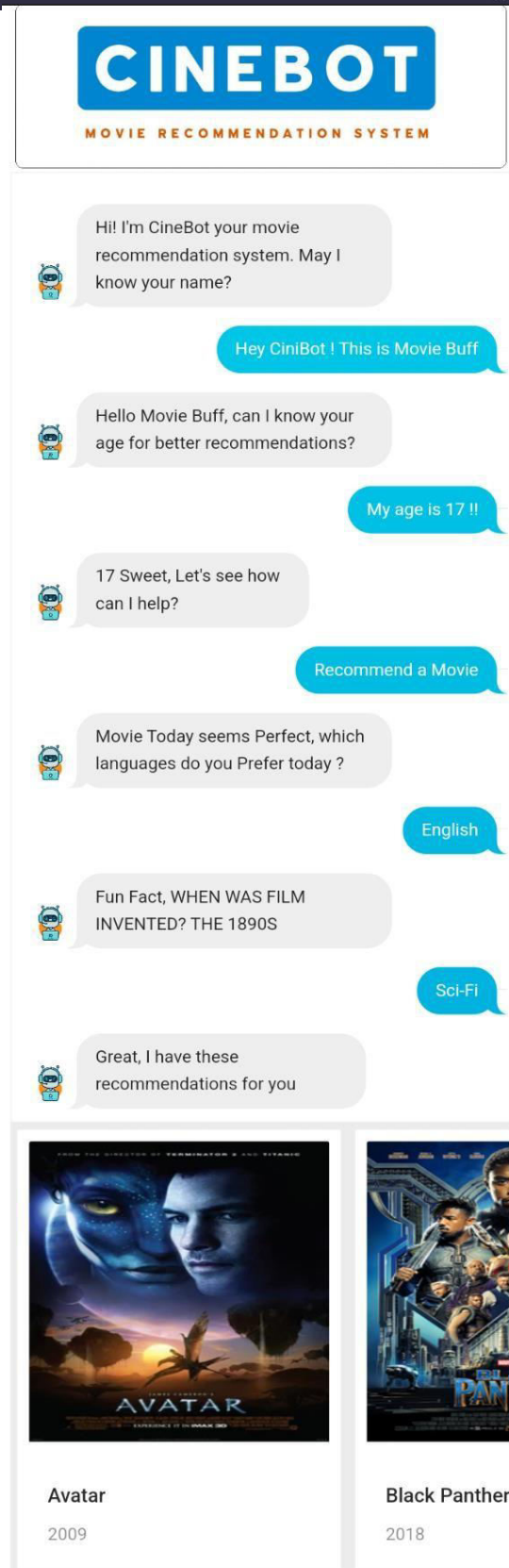|	Feature 1	Feature 2	Feature 3	Feature 4	Feature 5
Movie 1	✓		✓		
Movie 2		✓	✓		✓
Movie 3	✓	✓	✓		
Movie 4				✓	✓
Movie 5		✓	✓		
Movie 6				✓	

Table 2. movies with features

Results and Output Screens
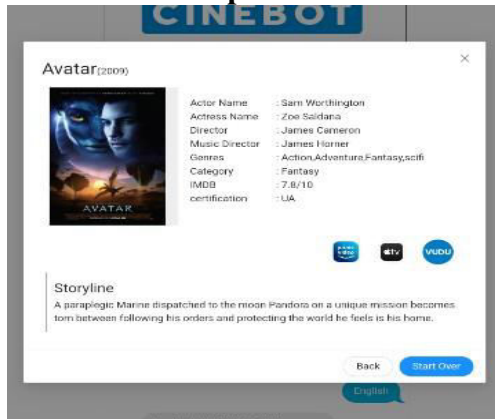
Movie card displayed

Directed to Ott platform

CineBot Interface

Conclusion

Here, we present CineBot, a recommender system for recommendation of movies, which is presented in this paper. This application allows a user to select his choices from a plurality of attributes, and then provides him with recommendations based on his choices based on an analysis of the user's preferences. Our system is designed in such a way that it is not an easy task to evaluate the performance of the system, because there are no right or wrong recommendations; it is only a matter of opinion. Upon conducting informal evaluations with a small number of users, we found that they were satisfied with the design of the website and that they had positive feedback. The use of our system will be more meaningful if we have a larger data set. Furthermore, we would like to analyze the results using different filters and compare them. The final goal is to implement a web-based user interface that includes a database of users and a tailored learning model for each user.

Future Enhancement

We will consider the following aspects in future work.

- Use collaborative filtering recommendations. Collaborative filtering recommendation will be implemented once there is sufficient user data. The foundation of collaborative filtering is user social info, which will be explored in further study.

- Introduce the movie's more accurate and appropriate features. Common collaborative filtering suggestions substitute the rating for object features. In the future, we should extract attributes from movies like tone and titles that can give a more accurate description of the film.

- The user's list of movies they don't like. Recommender systems can always benefit from user data. We will continue to gather user information and add a list of movies that users dislike. In order to generate scores that will be added to the previous result, we will also input a list of movies that we despise into the recommender system. By doing this, we can enhance the performance of the recommender system.

- understand machine learning. Future research will add dynamic parameters

to the recommender system, and we'll utilise machine learning to automatically alter each feature's weight and determine the best weights.

- Create an internal service for the recommender system. The recommender system won't be an external website used only for testing in the future. We'll create an internal API that programmers can use. On the internet, some movie lists will be organised by user reviews.

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