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Movie Popularity Content-based Database System Using Cloud Computing Based on Deep Learning and AI

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Abstract

The digital age has brought rapid growth in both the production and consumption of movies within the entertainment industry. This surge in movie availability has created a need for effective methods to assist users in discovering films that align with their preferences. This paper introduces the concept of a "Movie Popularity Content-Based Database System," designed to enhance the movie recommendation process by combining content-based filtering with popularity trends. In summary, the "Movie Popularity Content-Based Database System" represents a pioneering approach to movie recommendations by leveraging content-based analysis, and user interactions. By delving into the inherent qualities that define movie popularity, this system offers a more comprehensive, personalized, and enriching movie-selection experience for users, catering to their unique tastes while also broadening their cinematic horizons. In the digital media age, the film industry is flourishing, offering a wide variety of movies that appeal to a broad range of tastes and preferences. Movie enthusiasts, producers, and distributors seek ways to navigate this vast landscape to identify popular and trending movies. The "Movie Popularity Content-Based Database System" is an innovative solution developed to tackle this challenge.

Keywords: Popularity trends, entertainment industry, personalized suggestions, database system, movie recommendations, film ranking, user preferences, genre analysis, viewer trends, content analysis, film database

INTRODUCTION

The past few years have seen a significant transformation in how audiences engage with and experience movies in the entertainment industry. With the adventof digital platforms and streaming services, viewershave gained unprecedented access to a vast array of films spanning multiple genres, languages, and cultures. As a result, the challenge of navigating this extensive cinematic landscape and identifying content tailored to individual preferences hasbecome increasingly complex.

This paper introduces the concept of a "Movie Popularity Content-Based Database System," designed to enhance the movie recommendation process by combining content-based filtering with popularity trends. In summary, the "Movie Popularity Content-Based Database System" represents a pioneering approach to movie recommendations by leveraging content-based

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analysis, and user interactions. The "Movie Popularity Content-Based Database System" offers an innovative solution tailored to meet this challenge. This database system leverages advanced content analysis techniques to assess the popularity of movies based on their intrinsic characteristics such as genre, cast, director,plot, and user-generated reviews. By examining these attributes, the system seeks to serve as a valuable resource for diverse stakeholders, including moviegoers, film studios, and marketers. The primary objective of this research paper is to elucidate the methodologies and processes involvedin leveraging the TMDb (The Movie Database) API (application programming interface) to build a functional and user-centric movie recommendation system. Through a systematic exploration of data retrieval, storage, and presentation techniques, we aim to provide insights into the practical aspects ofintegrating external APIs into web-based applications.

In summary, the research presented hereinrepresents a comprehensive exploration of the intersection between movie popularity, content- based database systems, and user-centric recommendation frameworks. By bridging the gap between theoretical insights and practicalimplementations, we aspire to contribute to the ongoing discourse surrounding the evolution of digital media consumption and the role of technology in shaping the future of cinematic experiences.

PROBLEM STATEMENT

The problem definition for a Movie Popularity Content-Based Database System revolves around the challenges and limitations of traditional movie recommendation systems, focusing on the need to provide personalized and relevant movie suggestions based on the content attributes of films.

The primary issue that this system aims to address is the lack of content understanding. Traditional systems often lack an in-depth understanding of the actual content of movies beyond surface level metadata.

RELATED WORKS

In this section, we have presented a detailed survey on the past related work. Our work is divided in twointerrelated parts. Highlight previously proposed content-based filtering system and then discussion on movie recommendation methods. In our proposed work, content-based filtering and recommendation system are not interrelated. Our proposed work has used TMDb movie recommendation systems preconfigured architecture to predict movies popularity and predict movies target audience. The collaborative filtering is primarilydivided into two parts [1, 2], content-based filtering (CBF) [3–7] and recommendation system (RS). CF is a procedure that refine things that a usermight prefer based on response by similar users.

The rapidly growing field of movie popularity and recommendation, powered by APIs, data science, and deep learning, has gained significant research interest in recent years. Researchers are eager to leverage deep learning techniques to deliver precise movie recommendations based on various factors and attributes. This literature survey highlights several noteworthy studies and their contributions to this domain.

Collaborative and Content-Based Filtering

A broader perspective was provided in the study "Item-Based Collaborative Filtering Recommendation Algorithms" by Sarwar et al. [1]. Item-based techniques begin by analyzing the user-item matrix to uncover relationships between various items, which are then used to indirectly generate recommendations for users. This paper examines different item-based recommendation algorithms, exploring various methods for calculating item-item similarities, such as item-item correlation and cosine similarity between item vectors. It also investigates approaches for generating recommendations based on these similarities, including weighted sum and regression models.

One of the early forays into this arena was the study titled "Collaborative Filtering Based Recommendation System: A Survey" by Hameed et al. [6]. The most common technique used for

recommendations iscollaborative filtering (CF). CF -based recommender systems (RS) predict user preferences for products or services by analyzing past interactions between users and items within a group of individuals with similar tastes and preferences.

Deep learning gained prominence in recommender systems with Koren et al.'s 2015 study [2], "Advances in Collaborative Filtering", which highlights the growing interest and advancements in CF approaches. Its popularity surged partly due to its pivotal role in the recent Netflix competition. This article reviews recent developments in the field, focusing on matrix factorization techniques, which have become the preferred method for implementing CF, along with other recent innovations.

Recommendation System

Subsequently, the study "A Survey of Recommendation System: Research Challenges" by Sharma Gera [3] was reported in May 2013. This research laid the groundwork for usingrecommendation techniques (RS) like CF, content based and hybridrecommendations. Providing an overview of these challenges allows us to enhance recommendation quality by developing new approaches and methods, paving the way for further research and practical advancements in this field.

Building on these foundations, the study "Survey on Recommendation System Methods" by Nagarnaik and Thomas [5] delved into various recommendation techniques for movie popularity. This paper presents a novel system for efficient web page recommendation that utilizes hybrid CF, specifically combining collaborative techniques with the CHARM algorithm.

As the field evolved, a comprehensive review titled "Social Networking in Web Based Movie Recommendation System" by Das et al. [4] in 2018 zoomed in on movie recommendations. Web-based movie RSs predict user responses by analyzing their search history or known preferences. Item recommendations are typically made based on the attributes or content of the items, or through collaborative filtering of user ratings. These systems employ intelligent algorithms that incorporate classification and clustering techniques.

Together, these studies highlight the increasing interest in leveraging web scraping and deep learning for movie recommendations. They emphasize key factors, including feature engineering, web scraping, content filtering, collaborative filtering, and various techniques aimed at improving accuracy. As the field progresses, it presents significant potential for further advancements, providing valuable insights for movie enthusiasts, analysts, and stakeholders within the movie ecosystem.

MATERIALS AND METHODS

This research study aimed to develop a model thatwill predict movie popularity and its age-wise preference using movie recommendations [7]. Next, our objective is to find the movie's target audience and determine its influence on audience groups. We regrouped the audience into four age demographics: junior, teenage, mid-age, and senior. Our finaloutput of the system will be age-wise movie popularity prediction. In this study, we employed a content-based movie recommendation system to identify similar films [8].

The framework of our job has three significant steps, which are listed in Figure 1.

1. Acquire movie data and movie intrinsic featuresfrom TMDb dataset and computes similar movie using a content-based movie recommendation system.
2. Use similar movie information and voting data from the IMDb beta set. Predict the movie popularity.

Data Description

The proposed system has two modules [9]. The first module is a content-based (CB) RS, the first to use the TMDb database. The second module make use of the IMDb database [10].

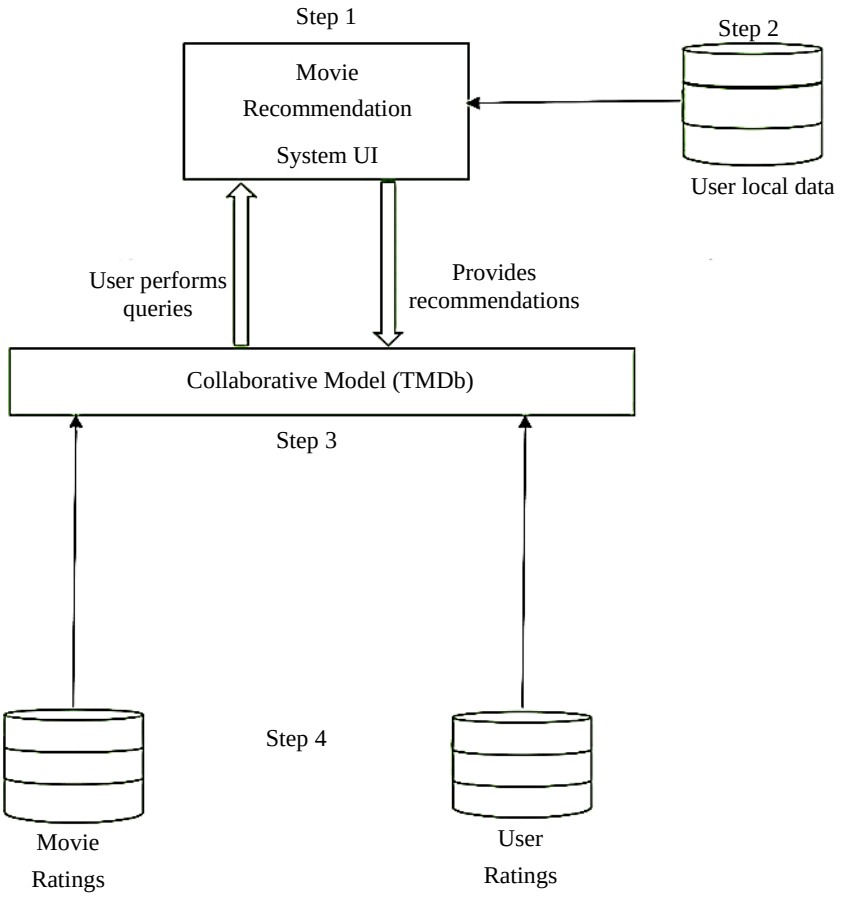

Figure 1. Framework workflow.

Table 1. Example of a movie data used in content-based recommendation system.

Attribute	Value
Movie name	e.g., Batman
Genres	Action, adventure, sci-fi,romance, animation, comedy, crime, drama, family, fantasy, horror,mystery
Keywords	Superhero, attack, war, tonystark, family, new release, etc.

Note: TMDb database is publicly available for researchwork.

The movie attributes selected for the proposedcontent-based movie system are shown in Table 1.

PROPOSED WORK

The proposed system has three major interrelated modules. The first module is content-based movie RS model, the second module is movie hit prediction module and the third module groups audience according to their age.

Finally, the whole system provides an age-wise movie popularity prediction of the upcoming movie. The overallprocess flow diagram is shown in Figures 2 and 3.

Content-Based MovieRecommendation

Content-based filter is used for finding a similar movie. This utilizes movie attributes to determine the similarity between two films.

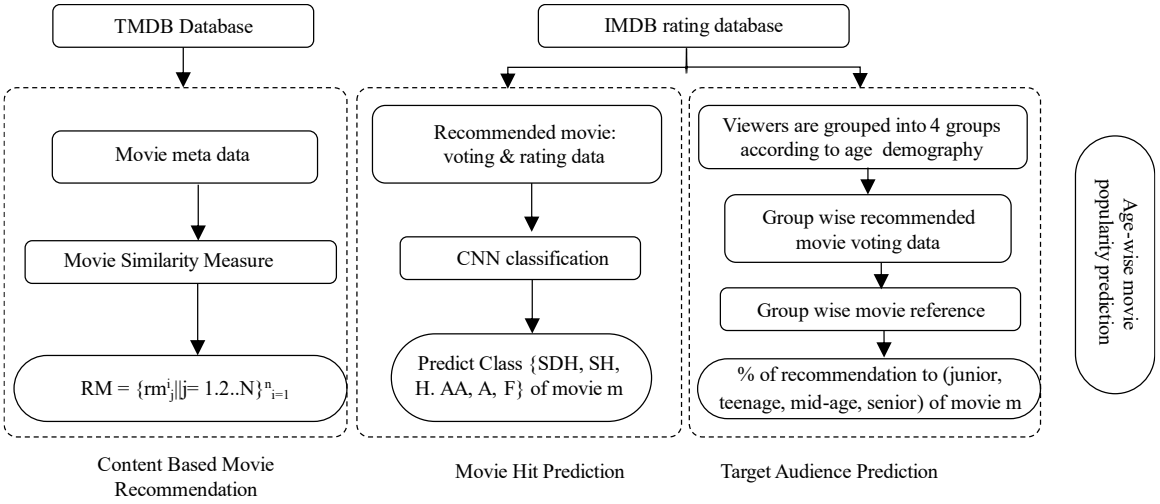

Figure 2. Overall process flow diagram.

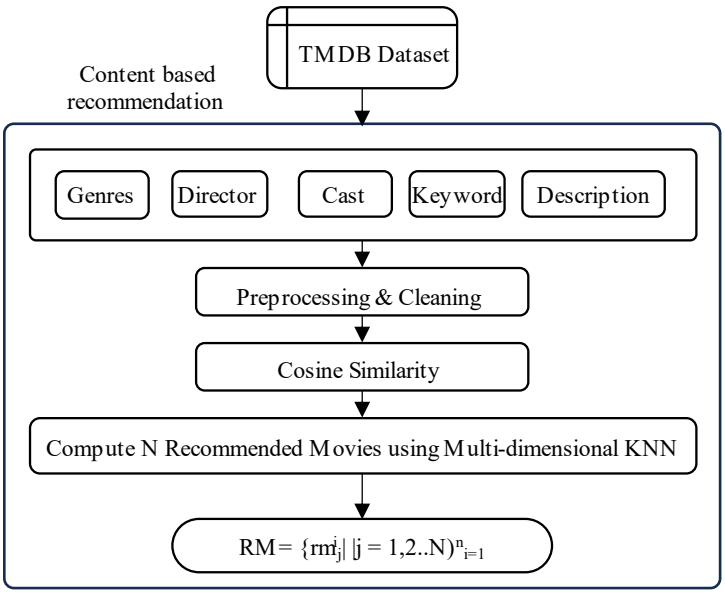

Figure 3. Overall process TMDb (The Movie Database) flow diagram.

TMDb database gives you recommendations, it contains its own recommendation module. This module works on content-based recommendations,it recommends movies based in various filters and categories like genre, keywords, director, etc. Content-based filter is used for finding a similar movie which uses movie attributes to find outsimilarities between two movies.

Let feature set F = (F_1, F_2,…,F_m). Compute the similarity between any two modules m_1 and m_2 concerning the feature F_k is

$dist\_F_k$ = similarity (F_{ki}, F_{kj})

The $dist\_F_k$ is the distance vector between movies m_1 and m_2.

CONCLUSION

Recommendation systems have become an important part of everyone's lives. With the vast number of movies released worldwide each year, many individuals often overlook remarkable works of art due

to inadequate recommendations. Therefore, implementing machine learning-based recommendation systems is crucial for delivering accurate suggestions. We observed that while content-based recommendation systems may not be highly effective on their own, combining them with collaborative techniques can address the cold start issues faced by collaborative filtering methods when used independently. Furthermore, these systems can be enhanced through neural network embedding, improving the quality of recommendations and personalizing them for users. In conclusion, examining various approaches to recommendation engines is essential for developing a collaborative engine that overcomes the limitations of these individual methods and amplifies their advantages. While independent approaches to movie recommendations may have their shortcomings, when combined effectively, they can provide users with accurate movie suggestions.

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