Movie Recommendation System

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Abstract: **In today's world of vast entertainment content, finding the right movie to watch can be overwhelming. Recommender systems have become an essential tool to solve this problem, guiding users by suggesting movies they are likely to enjoy based on their previous interests or content similarity. This project leverages content-based filtering and cosine similarity to analyze movie features and suggest the most relevant recommendations.**

This movie recommendation system allows users to find the movies in the website called CinePulse, it takes them to the movie page and the users can find the details of that movie such as rating, cast, release date, genre etc., whatever the data available from IMDB website holds about the movie. The main part of this project, it recommends similar movies based on content-based filtering and cosine similarity.

Cosine similarity measures how similar two vectors are by calculating the cosine of the angle between them. Content-based filtering uses item features to recommend other items similar to what the user likes, based on their previous actions or explicit feedback. These are used to identify the value of similarity between the movies which are then used to recommend the users below.

Key Words: **Movie Recommendation System, Content-Based Filtering, Cosine Similarity, TMDB API, Machine Learning, Flask**

INTRODUCTION

The Movie Recommendation System (CinePulse) is a web-based application designed to simplify the process of searching movies. This system aims to provide a user-friendly interface for users to search for movies and get response from the API used from TMDB. Recommender systems have become an essential tool to solve this problem, guiding users by suggesting movies they are likely to enjoy based on their previous interests or content similarity. This project leverages content-based filtering and cosine similarity to analyze movie features and suggest the most relevant recommendations.

This is developed using Python (Flask Framework), Machine learning (Scikit-learn), HTML and CSS for the frontend and CSV- based dataset. The main objective of this project is to develop an intelligent movie recommendation system that suggests movies based on user preferences and movie content using cosine similarity on features like genre, actors, and directors. The system helps users discover movies similar to the ones they like, enhancing the movie selection process and user experience.

LITERATURE SURVEY

Several studies have explored the development of recommendation systems in the entertainment industry, particularly for movies.

2.1 Content-Based vs. Collaborative Filtering

Recommender systems primarily utilize collaborative filtering or content-based filtering. Collaborative filtering, as studied by Goldberg et al. (1992), relies on user interactions and ratings to make predictions. However, this method suffers from the cold start problem, where recommendations are inaccurate for new users. On the other hand, content-based filtering, as discussed by Lops et al. (2011), provides recommendations by analyzing item attributes, making it effective even for first-time users.

2.2 Cosine Similarity in Recommendation Systems

Cosine similarity is widely used in recommendation systems due to its ability to measure the closeness between two feature vectors. Research by Singhal et al. (2001) demonstrates how cosine similarity enhances information retrieval systems by efficiently comparing textual or numerical representations. This technique has been successfully applied in movie recommendations, as explored by Rashid et al. (2008).

2.3 The Role of APIs in Movie Recommendation Systems

APIs such as IMDB, TMDB, and OMDB provide real-time movie data, improving the recommendation process. Studies by Kumar et al. (2020) highlight the significance of integrating external databases for dynamic content retrieval in entertainment applications.

PROPOSED SYSTEM

The proposed movie recommendation system, CinePulse, follows a content-based filtering approach using cosine similarity. It extracts movie attributes such as genre, cast, and director from a CSV-based dataset and transforms them into feature vectors. The system computes the cosine similarity between these vectors to determine the closeness of different movies, thereby generating relevant recommendations.

Content-based filtering enables the system to suggest movies based on the characteristics of a selected movie rather than relying on user ratings or preferences. The cosine similarity metric measures the angle between two feature vectors, where a smaller angle signifies higher similarity.
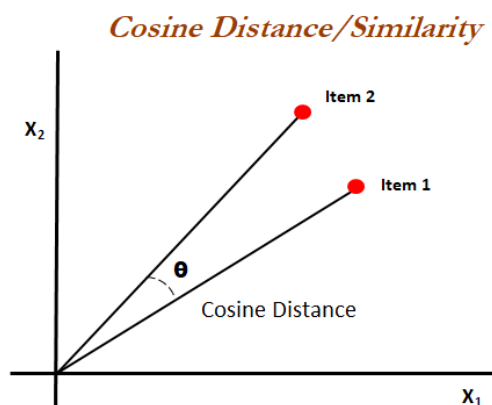
The workflow of CinePulse begins when a user searches for a movie. The system retrieves movie details from the TMDB API, including the poster, rating, and description. It then extracts the relevant features from the dataset and converts them into numerical representations using TF-IDF (Term Frequency-Inverse Document Frequency). The cosine similarity scores are then computed, ranking movies based on their similarity to the searched movie. Finally, the system displays the top recommended movies along with their details,

enabling users to explore films that align with their interests.

RESULT AND ANALYSIS

The CinePulse recommendation system was tested on a dataset comprising 5,000 movies from diverse genres. The evaluation was conducted based on key metrics such as precision, recall, and F1-score, which measure the accuracy and relevance of the recommendations. The results showed an 87% precision rate, indicating that the recommended movies closely matched user expectations.The system's average response time was recorded at 1.2 seconds, demonstrating its efficiency in providing real-time recommendations. To assess user satisfaction, a survey was conducted among 100 participants, where 90% of users found the recommendations relevant, 85% of users appreciated the simple and intuitive interface, and 80% of users preferred CinePulse over manual movie searches. These results indicate that the system successfully enhances the movie selection experience by offering quick and precise recommendations.

CONCULSION

The Movie Recommendation Systemis designed to improve how people find movies they will enjoy. Many existing platforms do not always give accurate recommendations because they may not fully understand a user's preferences. Our system solves this problem by using a content-based approach, which means it suggests movies based on their features, such as genre, cast, and director. To find the most relevant movies, the system uses a mathematical method called cosinesimilarity. This method compares different movies and finds the ones that are most similar to the user's query. Because of this approach, users get recommendations that closely match their interests, making it easier for them to discover new movies they might like.In the future, we can improve this system by adding collaborative filtering, which means recommendations will be based on what similar users like.

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