MOVIE RECOMMENDATION SYSTEM USING MACHINE LEARNING

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ABSTRACT:

Growing demand for tailored movie recommendation systems results from growing use of digital media. This research introduces an innovative approach that enhances recommendation accuracy by integrating collaborative filtering and content-based filtering methods. Collaborative filtering predicts user preferences based on historical interactions, whereas content-based filtering analyzes movie attributes. By merging these techniques, our hybrid system generates more precise and diverse recommendations. Additionally, an adaptive algorithm dynamically adjusts the influence of each filtering technique based on user engagement and item diversity. Performance evaluations indicate that our hybrid model surpasses conventional recommendation techniques in both accuracy and user satisfaction. The system's efficiency and scalability are validated using real-world datasets. This study contributes to advancing movie recommendation technologies by addressing existing limitations and providing insights for future improvements.

Keywords:

Content-based filtering, Collaborative filtering, Hybrid approach, Recommendation algorithms, Real-world dataset.

INTRODUCTION:

Movie recommendation systems utilize sophisticated algorithms to provide personalized movie suggestions based on user preferences, viewing history, and behavior patterns. By analyzing vast datasets, including movie metadata and user interactions, these systems enhance user experiences by simplifying the movie selection process. Traditional recommendation methods often rely on either content-based or collaborative filtering, each with its limitations. Our proposed hybrid system overcomes these constraints by integrating both techniques, ensuring more accurate recommendations. Based on user interactions, the system learns frequently and over time improves its suggestions in order to better fit individual preferences. This study intends to maximise consumer involvement by means of adjusted recommendations, so developing everyone's movie-watching experience.

LITERATURE REVIEW:

Several studies have explored movie recommendation systems, leveraging various algorithms and datasets.

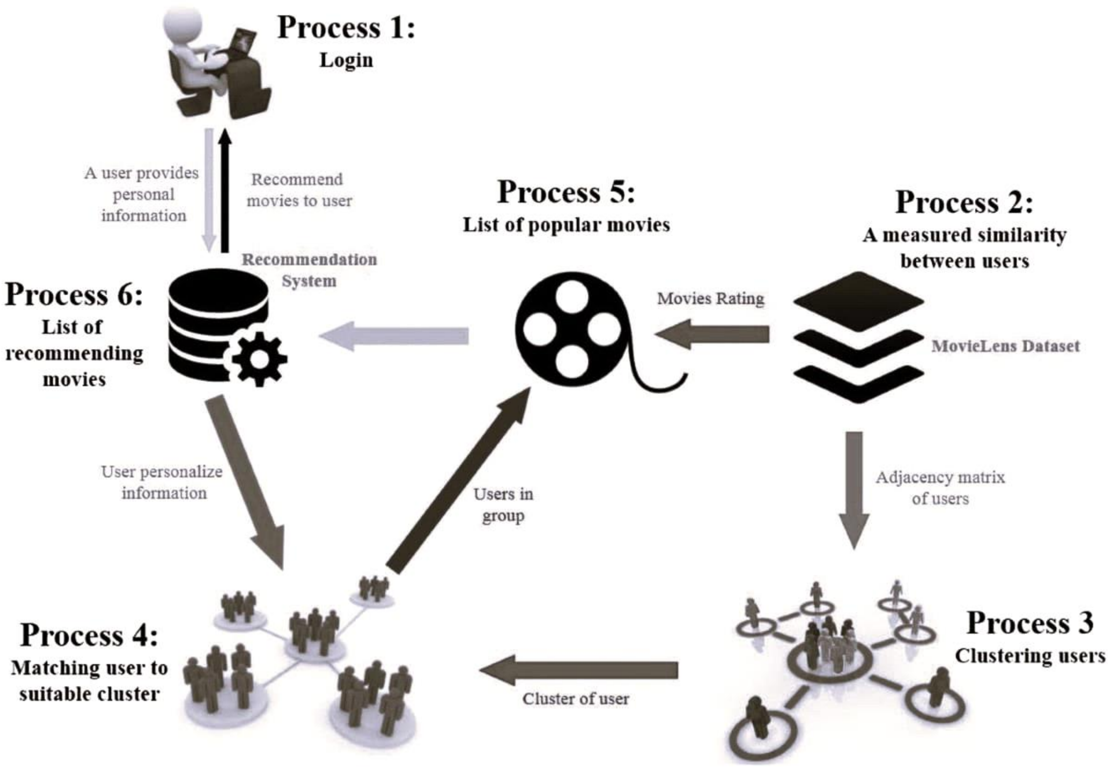
Jose Immanuvel et al. (2022) implemented a collaborative filtering system utilizing user-based similarity and Singular Value Decomposition (SVD) to generate recommendations. The study demonstrated improved accuracy in personalized movie suggestions.

Paul Marx (2013) introduced a movie recommendation algorithm that not only suggests movies but also provides explanatory insights into its recommendations. The research highlighted the importance of actionable suggestions in enhancing user satisfaction.

R. Ahuja et al. (2019) applied K-Means Clustering and K-Nearest Neighbor algorithms to develop a recommendation system. The study concluded that the proposed system exhibited lower Root Mean Square Error (RMSE) values, indicating improved prediction accuracy.

S. K. Raghuwanshi & R. K. Pateriya (2019) explored collaborative filtering techniques, emphasizing their role in enabling businesses to provide personalized recommendations. Their work reviewed filtering algorithms and their technical aspects, outlining advantages and limitations.

SUGGESTED METHODS :



Get and preprocess movie attributes (genre, cast, story) and user interaction data (ratings, reviews, watch history). Handle missing values and normalize data for efficient analysis.

Use item-based and user-based collaborative filtering (CF) techniques to capture user-item interactions. For improved user preference representation, apply matrix factorisation methods including the SVD and switching least-squares (ALS).

Content-Based Filtering (CBF): Use machine learning models and natural language processing (NLP) to extract characteristics from movie attributes.

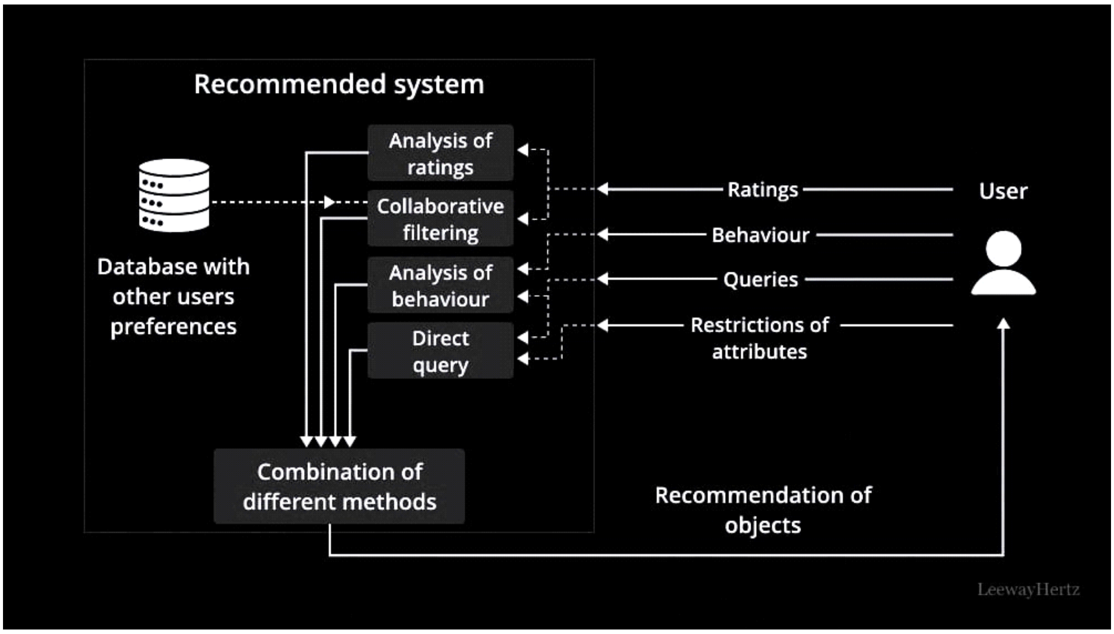
Hybrid Recommendation Approach: Develop a system that dynamically balances content-based and collaborative filtering based on user behavior and engagement. Optimize the weighting mechanism to enhance recommendation accuracy.

Evaluation and Validation: Use precision, recall, F1-score, and Mean Average Precision (MAP) to assess system performance. Conduct both offline evaluations and online A/B testing.

Optimization and Scalability: Ensure system scalability by optimizing computational efficiency through memory management and distributed processing techniques.

Integration and Deployment: Implement the recommendation system in an online platform or streaming service for real-time movie suggestions. Update the system frequently in accordance with feedback from users and shifts in content.

IMPLEMENTATION:



Step 1: Mix metadata and ratings for movies to prepare the data.
Step 2: Construct a pivot table for user-movie interactions.
Step 3: Apply collaborative filtering using Nearest Neighbors and similarity metrics.
Step 4: Implement a recommendation function to generate movie suggestions.
Step 5: Evaluate system performance through precision-recall analysis.

APPLICATIONS:

i. MovieLens: Provides personalized recommendations using collaborative filtering techniques.
ii. Jinni's Movie Genome: Utilizes content-based indexing to recommend movies based on mood, tone, and narrative style.
iii. TasteDive: Suggests new movies based on user interests.
iv. IMDb Recommendations: Offers tailored suggestions based on user reviews and viewing history.
v. Rotten Tomatoes: Uses audience reviews and ratings to generate movie recommendations.

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