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An Intelligent Podcast Recommendation System using Hybrid Filtering

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Abstract: *Recommender systems are widely used to deliver content that matches user preferences, but identifying relevant content for new users remains a challenge. Podcasting is a rapidly growing medium, and traditional recommendation methods often struggle with issues like the cold-start problem. In this work, we explore how music listening behavior can be used to better understand user preferences for podcast recommendations. Using a dataset of over 200k podcasts, we analyze two key techniques for improving recommendation accuracy. Our results show up to a 50% improvement in user engagement in both offline and online evaluations. We also study model performance and examine how using music data as input may introduce bias in recommendations..*

Keywords: Recommender Systems, Podcast Recommendation, Cold-Start Problem, User Preference Modeling, Music Consumption Behaviour, Content Recommendation, Collaborative Filtering, User Taste Prediction, Bias in Recommendations, Spotify Data

I. INTRODUCTION

In today's technology-driven world, data filtering techniques play a major role in platforms such as e-commerce and social media. Recommender systems are widely used to help users discover relevant content from large volumes of available data. These systems improve the way users access information, products, and digital content by analyzing their interests and behavior. By leveraging feedback, preferences, and interactions from user communities, recommender systems enable individuals to identify content that best matches their needs, making the overall experience more efficient and personalized.

Recommender systems are applied across various domains, including movies, music, news, books, and online services. They work by comparing a user's profile, which may include personal details and browsing history, with the behavior and preferences of other users. Based on similarities and patterns, the system predicts and suggests items that are likely to be of interest. This approach not only enhances content discovery but also improves user engagement by delivering more relevant and tailored recommendations.

II. LITERATURE SURVEY

1. Machine Learning in Recommender Systems (2015)

Recommender systems have improved significantly with the adoption of machine learning techniques, which help in understanding user preferences and delivering personalized suggestions. Earlier systems relied on simple methods, but modern approaches use algorithms like Bayesian models and decision trees to enhance prediction accuracy while keeping computational complexity low. However, selecting the most suitable algorithm remains a challenge due to the large number of available techniques. These studies highlight the need for careful design and evaluation of models to build efficient recommendation systems

2. TFP Algorithm for Frequent Itemsets (2005)

The TFP (Top-k Frequent Pattern) algorithm focuses on efficiently identifying the most relevant itemsets without requiring a predefined minimum support value. Unlike traditional methods, it uses an optimized FP-tree structure along

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with pruning techniques to reduce unnecessary computations. This approach improves both speed and scalability, making it suitable for handling large datasets. By dynamically adjusting thresholds and minimizing redundant processing, the algorithm enhances the efficiency of recommendation systems and data mining tasks

3. Collaborative Filtering with Item Classification (2009)

Collaborative filtering is widely used in recommendation systems, but it often suffers from data sparsity, where user ratings are limited or incomplete. To overcome this issue, item classification-based approaches are introduced to estimate missing values and improve prediction quality. By grouping similar items and predicting ratings more effectively, this method enhances the overall recommendation accuracy. Compared to traditional collaborative filtering techniques, it provides better results, especially in situations with insufficient data.

4. User-Based CF with Data Distribution (2010)

Traditional user-based collaborative filtering assumes uniform rating behavior among users, which is not always realistic. This study introduces a method that considers the distribution of user ratings, recognizing that different users have different rating patterns. By adjusting recommendations based on these variations, the approach improves accuracy and handles sparse data more effectively. This method provides a more practical and refined way of generating recommendations, making it a valuable improvement over conventional techniques.

III. PROPOSED METHODOLOGY

A. Proposed System

The proposed system is designed as a web-based platform that recommends podcasts based on user preferences and behavior. It follows a hybrid recommendation approach by combining content-based filtering and collaborative filtering techniques to improve accuracy. The content-based method analyzes podcast descriptions using TF-IDF and cosine similarity to match user interests, while the collaborative filtering approach uses user ratings and applies Truncated SVD to identify similar users and patterns. By merging the results from both techniques, the system provides more precise and personalized recommendations. This approach not only improves user experience but also reduces search time and effectively addresses common issues such as cold-start and low recommendation accuracy.

B. Modules Information

1. User Registration Module

This module allows new users to create an account by entering basic details, which are stored securely in the database. It ensures that each user is uniquely identified, forming the foundation for personalized recommendations.

2. User Login Module

The login module verifies user credentials and provides secure access to the system. Once authenticated, users are redirected to their dashboard where they can interact with the application.

3. Preference Module

This module enables users to specify their interests or preferences. The input provided by users is stored and later used as the basis for generating relevant recommendations.

4. Content-Based Recommendation Module

In this module, podcast descriptions are processed using TF-IDF, and similarity is calculated using cosine similarity. Based on this analysis, the system suggests podcasts that closely match the user's interests.

5. Collaborative Filtering Module

This module focuses on user behavior by utilizing rating data to build a user-item matrix. It applies Truncated SVD to identify similarities among users and generate recommendations accordingly.

6. Hybrid Recommendation Module

The hybrid module combines the outputs from both content-based and collaborative approaches. It ranks and filters the results to produce more accurate and balanced recommendations.

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7. Output / Display Module

This module presents the recommended podcasts to the user through a clean and user-friendly interface. It ensures that the results are updated dynamically, providing a smooth and interactive experience.

C. Architecture Diagram

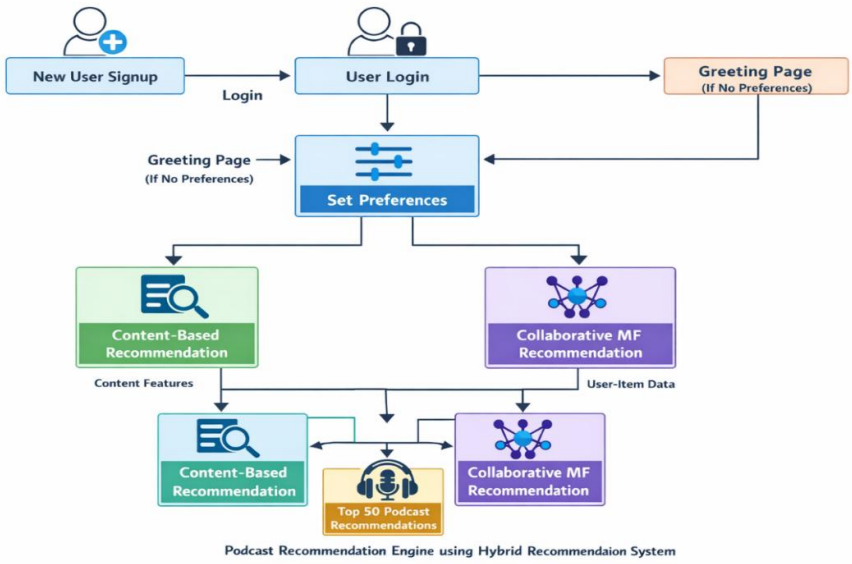

Fig 3.1: Podcast Recommendation Engine Process

IV. RESULTS

The proposed podcast recommendation system was successfully developed as a web-based application that integrates both content-based and collaborative filtering techniques. Users can register, log in, and provide their preferences, based on which the system generates personalized podcast recommendations. The content-based approach analyzes podcast descriptions, while the collaborative method utilizes user rating patterns to improve recommendation quality.

The results show that the hybrid approach provides more accurate and relevant recommendations compared to individual methods. It effectively overcomes common limitations such as lack of diversity and cold-start issues. Overall, the system improves user experience by reducing manual search effort and enabling efficient content discovery.

V. CONCLUSION

Recommender system opens many new options for searching and filtering information. It is of ever increasing importance to the sphere of e-commerce. Indeed, a good recommender system is equivalent to a strong marketing or advertising campaign. It has the potential to multiply sales numbers and engender brand loyalty in the customer base who grow to trust and rely on the recommendations put forward by the system. This paper proposes composite search algorithm that is based on: (i) Cosine similarity function (ii) Rating given by other users. According to analysis, recommender algorithms of other websites work on the bases of either attributes or ratings given by other users. Proposed algorithm refines data on the bases of attributes as well as user given ratings. This provides improved recommendations to the users. History of user plays an important role in recognizing user's interests. Composite Search does not take user's search history into consideration. So we are planning to consider this feature in our future work.

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REFERENCES

[1] Daniar Asanov, Algorithms and Methods in Recommender Systems, Berlin Institute of Technology, Berlin, Germany, 2011.
[2] P. Resnick and H. R. Varian, "Recommender systems," Common. ACM, vol. 40, March 1997, pp.56–58.
[3] Jianyong Wang, Jiawei Han, Ying Lu and Petre Tzvetkov "TFP: An Efficient Algorithm for Mining Top-K Frequent Closed Item sets", IEEE transactions on Knowledge and Data Engineering, Vol.17, No.5, May 2005 pp.652-664.
[4] H. Tan and H. Ye, "A collaborative filtering recommendation algorithm based on item classification," in Proceedings of the 2009.
[5] Kuepper, "Recommender systems," ecommerce, vol. Chapter 08, p. 13, 2011.
[6] A scalable collaborative filtering algorithm based on localized preference, vol. 1, 2008.
[7] Z. Sun and N. Luo, "A new user-based collaborative filtering Algorithm combining data-distribution," in Proceedings of the 2010.International Conference of Information Science and Management Engineering - Volume 02, ser. ISME '10. Washington, DC, USA: IEEE Computer Society, 2010, pp. 19–23.
[8] S. Vucetic and Z. Obradovic, "A regression-based approach for scaling up personalized recommender systems in e-commerce," in In: ACM WebKDD 2000 Web, 2000.
[9] Z.-D. Zhao and M.-s. Shang, "User-based collaborative-filtering Recommendation algorithms on hadoop," in Proceedings of the 2010 Third International Conference on Knowledge Discovery And Data Mining, ser. WKDD '10. Washington, DC, USA: IEEE Computer Society, 2010, pp. 478–48.
[10] X. Zhu, H.-W. Ye, and S. Gong, "A personalized recommendation System combining case-based reasoning and user-based collaborative filtering," In Control and Decision Conference, 2009. CCDC '09. Chinese, 2009, pp. 4026 – 4028.