
Recommendation System for Antakshari

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Abstract.

This paper introduces an innovative Antakshri Assistant and Recommender System designed to enhance the traditional Indian singing game, Antakshri, by leveraging advanced Natural Language Processing (NLP) and Machine Learning (ML) techniques. The proposed application streamlines gameplay by providing song suggestions based on various categories, tracking scores, and offering prompts for the next song based on the ending letter of the previous one. Additionally, it includes features such as timer management and error handling to ensure a smooth and enjoyable gaming experience. Experimental results demonstrate the system's accuracy and user satisfaction, highlighting its potential for entertainment.

Keywords. recommender system, natural language processing, machine learning, musical entertainment, performance.

1. INTRODUCTION

Antakshri, a traditional Indian musical game, has been a popular form of entertainment for decades, often played at social gatherings, family functions, and cultural events. The essence of the game is simple yet engaging. Participants sing songs that start with the last letter of the song sung by the previous participant. This cyclic nature of the game not only tests the participants' musical knowledge but also provides a platform for social interaction and cultural expression. However, the spontaneous recall of song lyrics that fit the criteria can sometimes pose a challenge, especially when the list of songs is limited.

The Antakshri Assistant and Recommender System leverages these technologies to provide real-time song suggestions, thereby ensuring a seamless and enjoyable gameplay experience. This system is designed to recognize the last syllable of the sung song and recommend a song that starts with that syllable. The core components of this system include an NLP module, a comprehensive song database, and a recommendation engine.

2. RELATED WORK

Music recommendation systems have garnered significant attention in recent years due to the exponential growth of digital music consumption. Numerous approaches have been explored to enhance user satisfaction by providing personalized recommendations. In [1], authors provide a comprehensive survey of existing music recommendation systems, focusing on their evolution and the challenges posed by big data in recommendation algorithms. Their work highlights how hybrid models are becoming more prevalent, combining collaborative filtering and content-based techniques to improve recommendation accuracy. The use of machine learning algorithms in music recommendation, discussing various techniques such as support vector machines, decision trees, and neural networks is projected in [2]. Kumar and Rakesh developed a music recommendation system using machine learning techniques, specifically focusing on enhancing recommendation accuracy. Their system successfully integrates collaborative filtering and content-based approaches, resulting in improved personalization and user satisfaction by adapting to individual listening patterns [3]. The Author in [4] underscores the importance of collaborative filtering as a foundational technique in music recommendations but points out its limitations, such as cold-start problems, where new users lack sufficient data for accurate recommendations. More advanced models that incorporate user behavior and attention are examined in [5], who propose that modeling user attention improves recommendation accuracy by analyzing listening patterns and attention spans. The works in [6, 7] leverage convolutional neural networks (CNNs) to personalize

recommendations based on user-specific musical preferences, demonstrating the potential of deep learning in this domain.

3. METHODOLOGY

The system allows users to play the traditional Antakshari game online, ensuring the game remains accessible and enjoyable in a digital format. The game can be played by two or more players. The objective is to keep the game going for as long as possible by taking turns to sing or recite a word, phrase, or line from a song that begins with the last letter of the previous player's word or phrase. Design and development of a platform to play Antakshari game that incorporates our machine learning model is divided into following key modules:

3.1 *Natural Language Processing Module*

The NLP module is responsible for processing user inputs, which are typically the lyrics of the last sung song. This module uses phonetic analysis to identify the last syllable of the input. Techniques such as syllabification and phonetic transcription are employed to ensure accurate extraction.

3.2 *Recommender System*

The recommendation engine employs a hybrid approach, combining collaborative filtering and content-based filtering. Collaborative filtering uses user interaction data to identify patterns and suggest songs that similar users have chosen in the past. Content-based filtering analyses the attributes of the songs, such as genre, tempo, and lyrical themes, to recommend songs that match the extracted syllable.

3.3 *Data Collection and Preprocessing*

The foundation of the system is a comprehensive song database encompassing various Indian languages. This database was compiled from publicly available sources, music libraries, and user contributions. Each song entry includes metadata such as lyrics, language, genre, and phonetic transcription. The data preprocessing phase involves cleaning the dataset, normalizing the text, and extracting phonetic patterns to facilitate accurate syllable matching.

3.4 *System Integration*

The system integrates the NLP module and the recommendation engine into a user-friendly interface, accessible via a web application. The interface allows users to input their song, receive recommendations, and provide feedback. This setup ensures real-time processing and interaction, enhancing user experience during gameplay.

4. WORKING

4.1 *Recommendation system and it working*

For recommending songs, the Game Manager Module of the application would send a request to the recommendation sub system through API. With this request the game manager would send the data like last letter, player preference etc. By using this data, recommendation system would recommend the song and would send back the recommended songs details to the Game Manager.

4.2 *Score calculator*

The Game Manager Module would send a request to the score calculation Module through API. With this request the Game Manager would send the data like lyrics. Using this, the score calculator would calculate the score and send it back to the Game Manager. Two strings are passed to the module. A Match object is obtained that contains: 1) start index of the first string, 2) start index of the second string. 3)length or size of the match found between the two strings. The similarity score of the two input strings is printed. The ratio () function returns the similarity score (float in [0,1]) between input strings and sums the sizes of all matching sequences. It calculates the ratio as:

$$Ratio = 2.0 * M/T \quad (4.1)$$

where M= “matches” and T= “total number of elements” in both sequences.

4.3 Fetch lyrics

For showing lyrics of songs to the end user, the Game Manager Module would send a request to fetch the lyrics through this API.

The functionalities of the Antakshari Assistant typically include providing prompts for selecting songs based on the ending letter of the previous song, suggesting songs based on various categories or themes, keeping track of scores, and facilitating smooth gameplay. The Antakshari Assistant provides suggestions for songs based on various categories such as genre, singer, movie, or theme. Users can choose a category and receive song suggestions accordingly. The Assistant prompts players with the ending letter of the previous song. This helps players continue the game by selecting a song that starts with the prompted letter. The Assistant keeps track of scores for each player or team participating in the game. The Assistant manages the timing of each round or turn in the game. The Assistant handles errors or invalid inputs from users gracefully.

5. INPUT/OUTPUT SCREENS AND DISCUSSION



Figure 5.1. Home Page



Figure 5.2. Online Player Room

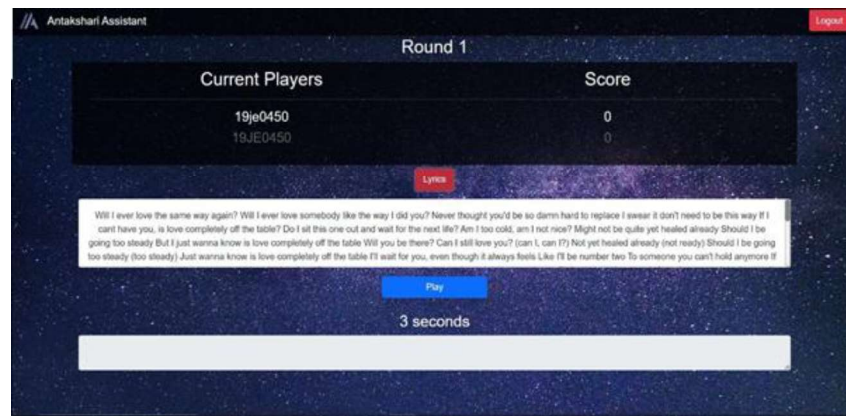


Figure 5.3. Game Page -Round 1

For playing Antakshari users have to request the system to create a room or join an existing room. Figure 5.1 shows a screenshot where the system allows the user to choose options like create room, join room, play online. Figure 5.2 displays a screenshot where the users can specify the number of players and invite others to join the game. Figure 5.3. displays how the input-output pair outlines a game scenario where players must adhere to a time constraint for song selection and singing, with failure to comply resulting in losing the game.

6. SUMMARY

The Antakshari Assistant and Recommender System is an innovative solution designed to enhance the traditional Indian musical game of Antakshari, combining cultural nostalgia with modern technology. Utilizing advanced natural language processing (NLP) and machine learning algorithms, this system can understand and respond to user inputs in making the game accessible to a diverse audience. The assistant not only suggests songs based on the last syllable of the previous song but also recommends tracks tailored to users' musical preferences, ensuring a personalized experience.

Future developments will focus on expanding language support, improving NLP capabilities, and enhancing personalization features. By integrating social media sharing and educational tools, the Antakshari Assistant aims to create a vibrant and inclusive musical community, ensuring its relevance and appeal to users of all ages and backgrounds.

7. REFERENCES

- [1] Zhaodian Zeng, Yining Wang, Yanbin Zhao, Wenxuan Shi, 'A Survey of Music Recommendation Systems', Proc. In 5th International Conference on Computer Information and Big Data Applications, 2024. DOI: 10.1145/3671151.3671243
- [2] M. L. Junaidi, K. Lo, F. J. Lie, I. S. Edbert and D. Suhartono, 'Music Recommendation System using Machine Learning Methods', 10th International Conference on Electrical Engineering, Computer Science and Informatics, pp. 565-570, 2023. DOI: 10.1109/EECSI59885.2023.10295808
- [3] R. Kumar and Rakesh, 'Music Recommendation System Using Machine Learning', IEEE 4th International Conference on Advances in Comp, Comm Control and Networking, pp. 572-576, 2022. DOI: 10.1109/ICAC3N56670.2022.10074362.
- [4] S. Dai et al. 'Modeling User Attention in Music Recommendation', IEEE 40th International Conference on Data Engineering (ICDE), pp. 761-774, 2024. DOI: 10.1109/ICDE60146.2024.00064.
- [5] Manisha Jangid, Rakesh Kumar, 'Enhancing user experience: a content-based recommendation approach for addressing cold start in music recommendation', Journal of Intelligent Info. Systems, 2024. DOI:10.1007/s10844-024-00872-x
- [6] Babak Amiri, Nikan Shahverdi, Amirali Haddadi and Yalda Ghahremani, 'Beyond the Trends: Evolution and Future Directions in Music Recommender Systems Research', IEEE Access, 2024. DOI: 10.1109/ACCESS.2024.3386684
- [7] Edwards et al, 'The Role of Machine Learning in Game Development Domain - A Review of Current Trends and Future Directions', Digital Image Computing: Techniques and Applications (DICTA), pp. 01-07, 2021. DOI: 10.1109/DICTA52665.2021.9647261