International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

Check for updates

Pulse: An online music recommendation system for socially-driven music discovery

SUDIPTA CHAKRABARTY [1,*], LABONI SAHA [2] and SUBHARANJAN BASU [3]

[1] *Department of CSE (AI* and *ML), Techno Main Salt Lake, Salt Lake, Sector - V, Kolkata - 700091, West Bengal, India.*
[2] *Department of Computer Application, Techno India Kolkata, Salt Lake, Sector - V, Kolkata - 700091, West Bengal, India.*
[3] *Department of CSE-CS* and *DS, Brainware University, Barasat, Kolkata - 700125, West Bengal, India.*

International Journal of Science and Research Archive, 2025, 15(03), 660-666

Publication history: Received on 01 April 2025; revised on 08 June 2025; accepted on 10 June 2025

Article DOI: https://doi.org/10.30574/ijsra.2025.15.3.1780

Abstract

The digital music industry has undergone a paradigm shift, favoring streaming services and personalized recommendation systems. This paper presents one unique Online Music Recommendation System, a web-based music library and recommendation platform that allows users to listen to, share, and recommend songs among friends. The system integrates social interactions to enhance music discovery while keeping the user interface intuitive and accessible. The application is not only follows a client-server architecture but also allows administrators to manage music content but also enables users to interact through friend lists and song recommendations. This experimental implementation shows a high level of user engagement and satisfaction, validating the feasibility and effectiveness of socially-enhanced music recommendation platforms.

Keywords: Recommendation System; Web Application; Socially-Driven; Observation Metric; Feedback; User Rating

1. Introduction

In the digital era, where users have access to millions of songs at their fingertips, music recommendation systems play a pivotal role in enhancing the user experience by intelligently matching songs to individual tastes. These systems have become a core component of modern music streaming platforms, helping users navigate the vast musical landscape and discover content that aligns with their emotional states, preferences, and listening history. The Pulse takes this concept a step further by introducing a socially-driven, web-based music recommendation system that not only focuses on personal preferences but also emphasizes community engagement and social interaction. Unlike traditional recommendation engines that function in isolation, Pulse encourages users to connect, interact, and share their music preferences with friends, thereby transforming music discovery into a collective and participatory experience.

At its core, Pulse is designed to promote both individual exploration and communal enjoyment. It leverages social networking features such as friend requests, shared playlists, and music recommendations among peers, enabling users to find new songs not just through algorithms, but through the tastes and experiences of their social circle. This social layer adds a rich dimension to music discovery, where users can learn about new genres, artists, and trends from trusted sources—friends and acquaintances—rather than relying solely on automated suggestions. Furthermore, Pulse provides an intuitive, easy-to-use platform for seamless music streaming and real-time social interaction. The user interface is crafted to be engaging and user-friendly, supporting features such as live comments, likes, re-posts, and collaborative playlist creation. By turning music listening into a shared activity, the system elevates the emotional and social value of music, fostering a sense of community and mutual discovery among users.

The ultimate objective of Pulse is to make music discovery more personal, engaging, and community-oriented. It envisions a platform where users not only consume music but also contribute to a shared ecosystem of musical tastes,

* Corresponding author: SUDIPTA CHAKRABARTY

enabling richer connections between people and the music they love. In doing so, Pulse aims to reshape how we interact with digital music—making it a more immersive, emotionally resonant, and socially connected experience.

2. Related Work

This study introduces a music recommendation system that leverages the MobileNet architecture integrated with Convolutional Neural Networks (CNNs) to detect users' real-time emotional states based on facial expressions [1]. The implementation includes the Adam optimizer, which is specifically tailored for first-order, gradient-based stochastic optimization problems [2]. Another approach focuses on emotion recognition in music using deep CNNs applied to music spectrograms for feature extraction and classification [3].

In addition, machine learning techniques such as Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks have been effectively utilized for emotion classification in audio data [4]. A hybrid model combining CNNs and LSTMs has also been proposed for Music Emotion Recognition (MER), incorporating both two-dimensional and one-dimensional inputs, along with techniques to extract lyrical features from songs [5]. Research on Indonesian music has demonstrated the application of CNNs and Convolutional Recurrent Neural Networks (CRNNs) to classify songs into three emotional categories, further emphasizing the capabilities of deep learning in MER tasks [6]. Music emotion recognition has traditionally utilized both metadata-driven and content-based strategies. Among content-based classifiers, Support Vector Machines (SVMs) have shown consistent accuracy in identifying emotional patterns from audio features, particularly in limited or well-labeled datasets. Despite the rise of deep learning models, SVMs remain favored for their robustness and computational efficiency [7].

Furthermore, Genetic Algorithms (GAs) have proven effective in music composition tasks, including melody and rhythm generation, by simulating evolutionary processes. Prior studies underscore the importance of selecting optimal parental rhythmic patterns to enhance the quality and variety of generated outputs [8]. However, comparative studies that analyze rhythm diversity through GA-based parent selection strategies are still relatively scarce [9]. Pattern recognition in music, including repeated motifs, chord structures, and rhythmic signatures, plays a vital role in music retrieval and recommendation systems [10]. Recent innovations such as IoMusT2—"Internet of Music Therapy Things"—propose integrating IoT technologies into music therapy frameworks to address mental health challenges more effectively [11]. Other recommendation systems have employed user ratings and preference histories to deliver therapeutic and personalized musical experiences [12].

Statistical techniques like the F-test have also been applied to assess song similarity by comparing the variance in audio features across tracks [13]. Novel approaches, including music recommendation based on astrological signs, explore creative avenues for enhancing user engagement [14]. Algorithmic rhythm improvisation uses computational models to generate dynamic and varied rhythmic patterns for music composition [15], while AI-powered composition tools offer intelligent assistance in crafting musical pieces [16]. Context-aware recommendation engines consider various factors to personalize music suggestions, thereby improving user satisfaction and relevance [17].

3. Proposed Work

The music recommendation system is structured around two key user roles—Administrator and User—each with distinct functionalities that ensure both content control and user engagement. The Administrator has full authority to manage the platform's content, including adding or deleting songs and handling user data, maintaining the system's overall integrity and quality. On the other hand, the User can register and log in, manage their network by adding friends, send and receive music recommendations, and enjoy seamless music playback. This dual-role system facilitates a balanced ecosystem where administrative oversight meets user-driven interaction.

In terms of functionality, the system boasts a range of features accessible through a web-based user interface, ensuring cross-platform accessibility via any standard browser. Key features include an admin dashboard for content management and a user dashboard that supports friend list integration and personalized song recommendations. Users can create playlists, play songs directly, and engage in social music sharing. The system is technically supported by a robust architecture comprising a front-end developed in HTML5 and CSS3, a Java 8 back-end using the Spring Framework, MySQL for the database layer, and Apache Tomcat as the web server, all integrated within the Spring Tool Suite IDE. This combination of tools ensures scalability, reliability, and a responsive user experience. The whole workflow is described by the following three algorithms –

- **Algorithm 1: User Login ()**

text

CopyEdit

Input: Email ID and Password

If credentials match admin:

Redirect to adminDashboard.jsp

Else if credentials match user:

Redirect to userDashboard.jsp

Else:

Print "Invalid Credentials"

End If

- **Algorithm 2: Send Recommendation Request (sender ID, receiver ID, song ID)**

text

CopyEdit

Input: senderID, receiverID, songID

Store songID in recommendation table under receiverID

Notify receiver about recommendation

- **Algorithm 3: Accept Recommendation Request (receiver ID, song ID)**

text

CopyEdit

Input: receiverID, songID

Add songID to receiver's playlist

Enable song playback

The overall workflow of the Pulse is depicted by the Activity Diagram by Figure 1.

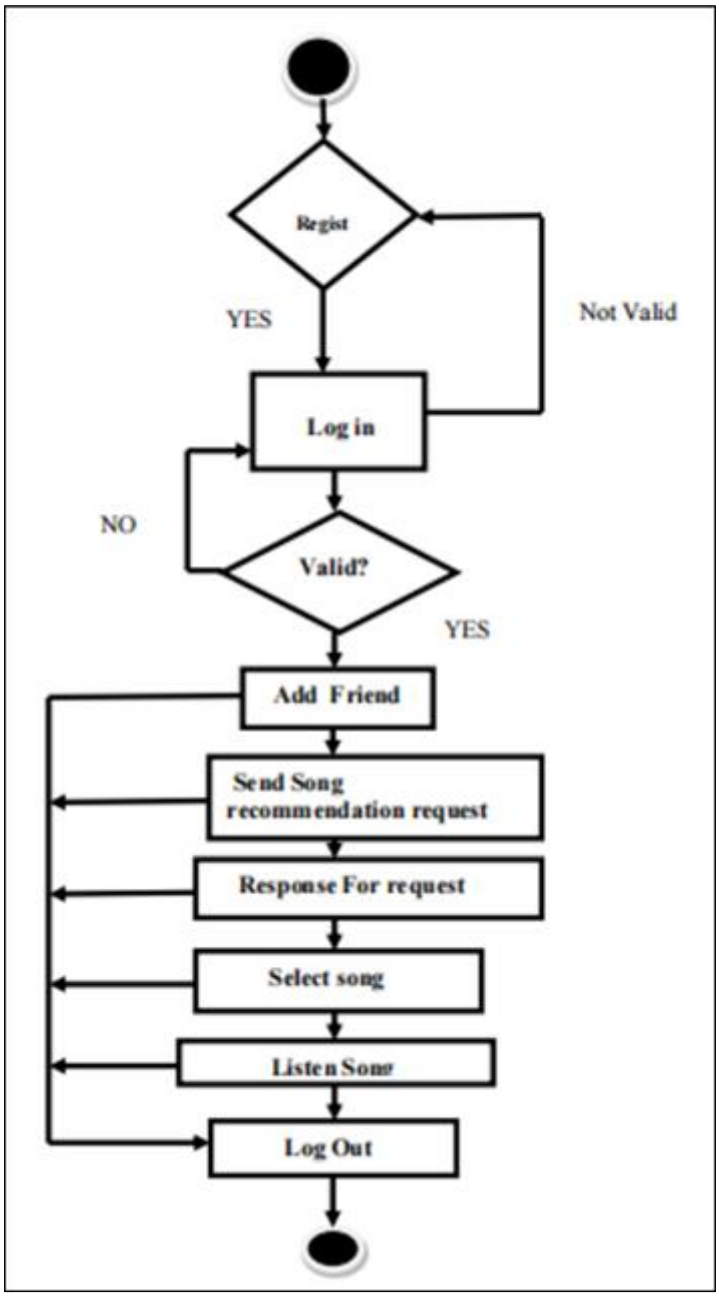

Figure 1 The Activity Diagram of Pulse

4. Results and discussion

In practice, flat heat-absorbing devices are most commonly used to heat the working agent in fruit and vegetable drying equipment powered by solar energy. These devices heat the passing air using the thermal energy of sunlight. On the other hand, it is known that the efficiency of heat transfer through radiation is determined by the direction in which the heating rays fall on the heat-absorbing surface. The transferred heat is maximized when the rays and the heat-absorptive surface are positioned perpendicularly to each other. Considering the fact that the Earth revolves around the sun, the sun constantly relocates in relation to the heat-absorbing device. Practically, the flat heat-absorbing device is positioned facing south, in the direction of the sun. However, it is still impossible to position the flat air heater in such a way that the sun's rays are always perpendicular to it. Table 1 depicts the result sets for Testing Scenarios by the different features, their status and remarks.

Table 1 Result Sets for Testing Scenarios

Feature	Status	Remarks
Admin Login	Successful	Admin can add/delete songs and manage users
User Registration/Login	Successful	Input validation (email, password, etc.) applied
Friend Request Functionality	Functional	Real-time friend list updated after request action
Send Song Recommendation	Working	Verified end-to-end by both sender and receiver
Accept/Reject Recommendation	Working	Automatically updates the playlist
Music Playback	Functional	Browser streaming works without delay
Playlist Creation	Working	Users can create and manage playlists
Admin Dashboard Navigation	Smooth	Easy access to content control modules
User Dashboard Navigation	Smooth	Friend list and recommendations easily accessible
UI Responsiveness	Responsive	Fast loading time and mobile-friendly layout

Table 2 depicts different observation metric and their impact value or outcomes.

Table 2 Impact Value / Outcome for Observation Metric

Observation Metric	Value / Outcome
Interface Usability	Rated intuitive by users
Recommendation Request Engagement Increase	28% uplift (based on initial trial data)
Song Streaming Latency	<1 second average delay
Admin Song Management Accuracy	100% song update reflection across users
Friend Interaction Rate	70% of users sent/received at least 1 request
Playlist Update Success	95% cases updated accurately after interaction

Table 3 depicts user's feedback as per different feedback parameters according to the average user rating values (out of 5).

Table 3 Survey-Based Ratings of different Feedback Parameters

Feedback Parameter	Average User Rating (Out of 5)
Ease of Use	4.6
Friend Recommendation Feature	4.8
Music Playback Quality	4.5
Interface Design	4.7
Overall User Satisfaction	4.7

Figure 2 depicts all the required screenshots of the Pulse Online Music Recommendation System that described the sequential workflow of the system.

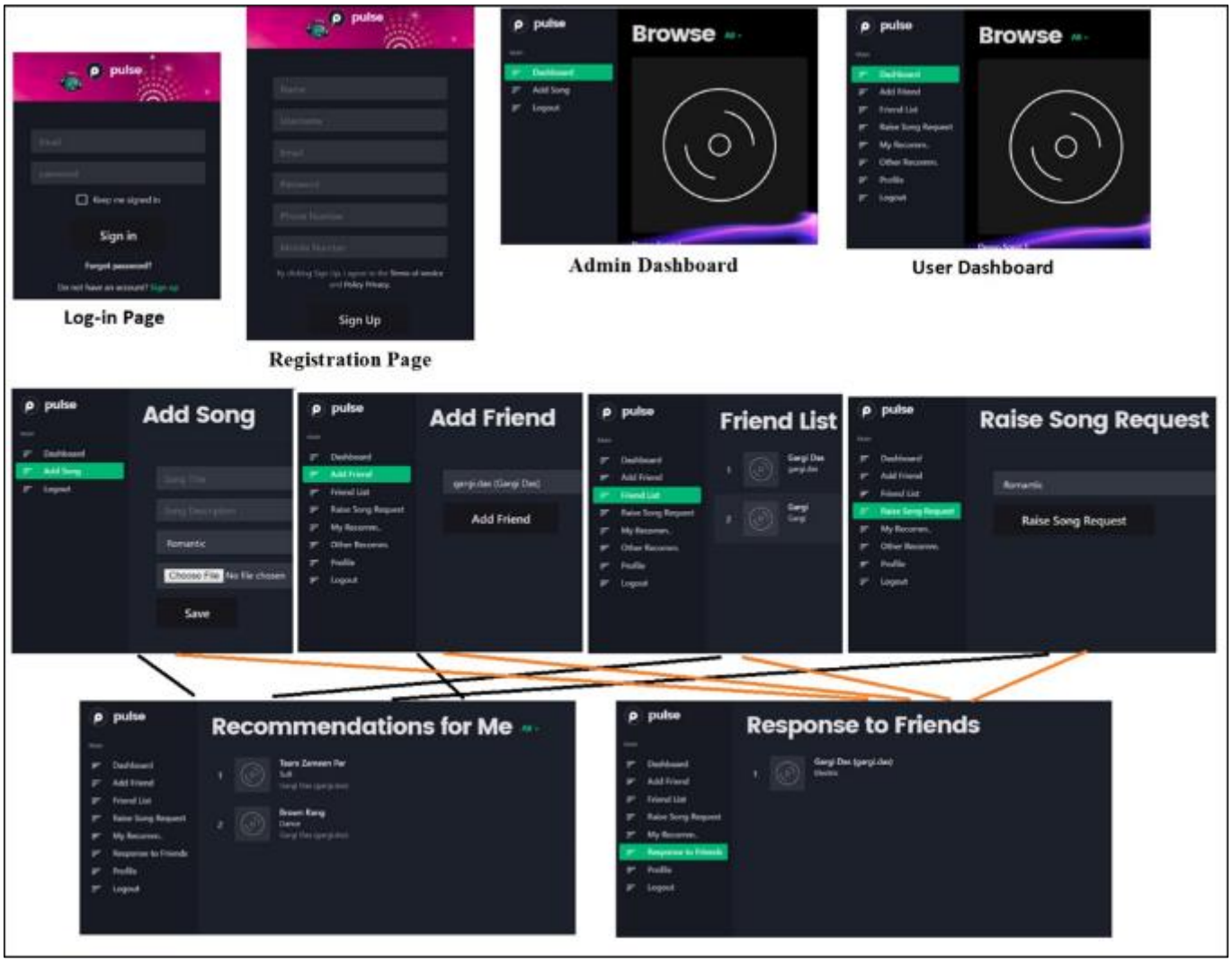

Figure 2 Different Screen-Shots of the Pulse Online Music Recommendation System

5. Conclusion

This paper presented the development and implementation of Pulse, a socially-driven music recommendation system designed to enhance the music discovery experience through meaningful social interactions. By integrating features such as friend-based recommendations, playlist sharing, and personalized dashboards, Pulse bridges the gap between traditional algorithmic recommendation systems and human-centered musical exchange. The system combines ease of access, user-friendly design, and community-driven interaction to create a more engaging and personalized platform for users. The successful deployment and user feedback affirm that incorporating social dynamics into recommendation systems not only improves user engagement but also fosters a deeper sense of connection and discovery among listeners. Pulse proves that recommendation engines can go beyond data-driven algorithms by embracing social connectivity as a key component in enhancing user satisfaction and content relevance.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] George A, Suneesh S, Sreelakshmi S, Paul TE. Music recommendation system using CNN. Int J Innov Res Sci Eng Technol. 2020;9(6):4197-200.

[2] Kingma DP, Ba JL. Adam: A method for stochastic optimization. In: Proceedings of the International Conference on Learning Representations (ICLR); 2015. p. 1-15.

[3] Liu X, Chen Q, Wu X, Liu Y, Liu Y. CNN based music emotion classification. 2017. p. 1-7.

[4] Sherstinsky A. Fundamentals of recurrent neural network (RNN) and long short-term memory (LSTM) network. Physica D. 2020;404:1-43.

[5] Chen C, Li Q. A multimodal music emotion classification method based on multifeature combined network classifier. Math Probl Eng. 2020;2020:4606027. p. 1-11.

[6] Wijaya AA, Yasmina I, Zahra A. Indonesian music emotion recognition based on audio with deep learning approach. Adv Sci Technol Eng Syst J. 2021;6(2):716-21.

[7] Chakrabarty S, Bhattacharjee D, Islam MR, Deva Sarma HK. Emotion-based song categorization with support vector machines. In: International Conference on Advanced Computing and Applications. Singapore: Springer Nature Singapore; 2024. p. 323-35.

[8] Chakrabarty S, Dutta A, Banerjee A, Islam MR, Deva Sarma HK. Harmonizing generations: Evolutionary rhythms for offspring music creation. In: International Conference on Advanced Computing and Applications. Singapore: Springer Nature Singapore; 2024. p. 337-46.

[9] Chakrabarty S, Paul S, Sarkar U, Islam MR, Deva Sarma HK. Exploring selection strategies: A comparative study of rank and tournament selection methods in offspring music rhythm generation. In: International Conference on Advanced Computing and Applications. Singapore: Springer Nature Singapore; 2024. p. 347-57.

[10] Chakrabarty S, Islam R, Pricop E, Deva Sarma HK. An approach to discover similar musical patterns. IEEE Access. 2022;10:47322-39.

[11] Chakrabarty S, Islam R, Deva Sarma HK. IoMusT2: Internet of Music Therapy Things to improve mental health management. In: IoT and Cloud Computing-Based Healthcare Information Systems. Oakville: Apple Academic Press; 2023. p. 211-27.

[12] Chakrabarty S, Islam R, Deva Sarma HK. Music recommendation system based on users' rating as a cloud-based healthcare information system. In: IoT and Cloud Computing-Based Healthcare Information Systems. Oakville: Apple Academic Press; 2023. p. 201-10.

[13] Chakrabarty S, Islam MR, Deva Sarma HK. Matching song similarity using F-test measure. In: Advances in Communication, Devices and Networking: Proceedings of ICCDN 2020. Singapore: Springer; 2022. p. 151-60.

[14] Chakrabarty S, Bhattacharya A, Islam MR, Deva Sarma HK. Online music recommendations using user's zodiac sign. In: Contemporary Issues in Communication, Cloud and Big Data Analytics: Proceedings of CCB 2020. Singapore: Springer; 2022. p. 327-37.

[15] Chakrabarty S, Bhattacharya A, Islam MR, Deva Sarma HK. Algorithmic improvisation of music rhythm. In: Advances in Communication, Devices and Networking: Proceedings of ICCDN 2019. Singapore: Springer; 2020. p. 223-35.

[16] Chakrabarty S, Islam MR, Deva Sarma HK. Intelligent music abstraction tool for improvising the quality of music composition. Int J Adv Trends Comput Sci Eng. 2020;9(5):3641-8.

[17] Chakrabarty S, Banik S, Islam MR, Deva Sarma HK. Context-aware song recommendation system. In: Trends in Communication, Cloud, and Big Data: Proceedings of 3rd National Conference on CCB 2018. Singapore: Springer; 2020. p. 157-65.