A Mini Project Synopsis on

Music Recommendation System

T.E. - I.T Engineering

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CERTIFICATE

This to certify that the Mini Project report on **Music Recommendation System** has been submitted by Riya Sawant (20104078), Srusti Patil (20104066), and Ritvik Shetty (20104067) who are the students of A. P. Shah Institute of Technology, Thane, Mumbai, as a partial fulfilment of the requirement for the degree in **Information Technology**, during the academic year **2022-2023** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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ABSTRACT

A music recommendation system is a software application that utilizes machine learning algorithms and data analysis techniques to provide users with personalized music suggestions based on their listening history, preferences, and contextual factors. The system typically collects data from various sources, such as user profiles, music libraries, and online streaming platforms, to build a comprehensive understanding of each user's musical tastes and behavior. The system then uses this information to generate recommendations that are tailored to the individual user, considering factors such as genre, tempo, mood, and artist similarity. Music recommendation systems are widely used by online music streaming services and can enhance the user experience by providing relevant and engaging content, leading to increased user satisfaction and retention.

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INTRODUCTION

A music recommendation system is a type of artificial intelligence technology that is used to suggest personalized music playlists or songs to users based on their listening history, preferences, and behavior. The system uses various algorithms and data analysis techniques to analyze a user's music listening patterns and suggest songs that they are likely to enjoy. Music recommendation systems can be found in various platforms such as music streaming services, radio stations, and music apps. These systems use various data sources to provide personalized music recommendations, including user preferences, music genres, tempo, mood, lyrics, and artist information.

The goal of a music recommendation system is to enhance the music listening experience for users by providing personalized suggestions that match their unique tastes and preferences. These systems have become increasingly popular in recent years due to the rise of music streaming services, which provide users with access to a vast library of songs and artists. Overall, music recommendation systems are an important tool for music lovers who want to discover new music and create personalized playlists that match their unique tastes and preferences.

Recommendation Systems are everywhere and pretty standard all over the web. Currently, there are many music streaming services, like Pandora, Spotify, eat., which are working on building high-revision commercial music recommendation systems. Amazon, Netflix, and many such companies are using Recommendation Systems. Music recommendation is a very difficult problem as we have to structure music in a way that we recommend the favorite songs to users which is never a definite prediction. In this project, we have designed, implemented, and analyzed a song recommendation system. The one we are going to build is pretty common to what Spotify or YouTube Music uses but much more straightforward. Currently, most of the streaming music systems recommend songs based on Collaborative Filtering and Content-Based filtering technique.

Purpose:

The purpose of a music recommendation system is to enhance the music listening experience for users by providing personalized and relevant music suggestions based on their unique preferences and behavior. The system aims to solve the problem of discovering new and relevant music in a vast sea of options, which can be overwhelming and time-consuming for users. By providing personalized music suggestions, users can discover new artists and songs that they are likely to enjoy, and create personalized playlists that match their unique tastes. By providing personalized recommendations, users are more likely to continue using the service and discovering new music, leading to increased revenue for music platforms. In addition, music recommendation systems can also help to increase visibility and exposure for emerging and independent artists, who may otherwise struggle to get their music discovered by new audiences in a crowded music market. Overall, the purpose of a music recommendation system is to provide a personalized and enhanced music listening experience for users, while also increasing engagement and revenue for music platforms and providing visibility for emerging artists.

Problem Definition:

Our application main aim to solve is the challenge of discovering new and relevant music in an increasingly crowded and competitive music market. These systems provide a solution by using advanced algorithms and data analysis techniques to suggest personalized music playlists and songs to users based on their unique preferences and behavior.

- Problem Identified:

  In today's fast-paced world, people have access to an overwhelming amount of music from a variety of sources. With so much content available, it can be difficult for music lovers to discover new artists and songs that match their tastes.

- Solution Proposed:

  Our goal is to develop a music recommendation system that can provide highly personalized recommendations to users based on their listening history and preferences. This system should be able to analyze a user's past listening habits

OBJECTIVES

- Personalization: To personalize the music recommendations for each user based on their listening history, preferences, and behavior using Cosine similarity rule.
- Discovery: To help users discover new music that they might like but are not aware of. This could involve recommending music from different genres or artists that the user has not listened to before using split function in python.
- Engagement: To increase user engagement by providing relevant and interesting recommendations that keep the user coming back to the system.
- Diversity: To promote musical diversity by recommending music from a variety of genres, artists, and cultures.
- Accuracy: To provide accurate recommendations that are relevant to the user's preferences and listening history.
- Serendipity: To introduce users to unexpected and unique recommendations that they might not have discovered otherwise.
- Contextualization: To provide recommendations that are tailored to the user's current context, such as the time of day, location, mood, or activity.

SCOPE

- Can be use to designed to provide personalized music recommendations to individual users based on their listening history.
- Can listen to similar songs at one place.
- Can create a playlist of their own.
- Can also add their favourite songs.
- Can access songs by a particular album and artists.

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Literature Review

Sr.no	Title	Author(s)	Year	Outcomes	Methodology	Result
1	Content-based Recommender Systems	Pasquale Lops, Marco American state Gemmis, and Giovanni Semeraro	2010	The proposed system improved customer satisfaction and sales revenue by providing personalized recommendations and accurate sales forecasting.	Advantages: Learning of profile is made easy. Quality improves overtime. Considers implicit feedback. Disadvantages: Does not completely overcome the problem of over specialization and serendipity.	Through this, we have learned about content-based recommendations
2	Feature-based Opinion Mining Using Cosine Similarity	Mahesh Chandra and P. Radha Krishna	2014	It proposes a feature-based opinion mining system that uses cosine similarity to measure the similarity between the features of products and the opinions of users.	It includes data includes, preprocessing, sentiment analysis, feature opinion matrix, cosine similarity and ranking finally.	Through this we have implemented cosine similarity rule in our recommendation system.

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PROPOSED SYSTEM

Features & Functionality:

- User Profiling

Music recommendation systems allows users to create their profile which will include information about their favourite songs and search by their favourite artist and language.

- Recent Songs

Music recommendation systems may track the listening history of each user to identify patterns and preferences in their musical taste. This information can be used to make personalized recommendations to each user based on their listening history.

- Content-based filtering

As discussed earlier, content-based filtering involves analyzing the audio features of each music track to identify similar tracks that a user may enjoy.

- Playlist creation

Music recommendation systems may allow users to create custom playlists based on their preferences and the recommendations provided by the system.

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REQUIREMENT ANALYSIS

- Requirement

The load time for the user interface screen should take no longer than 5 seconds.

- Design Constraints

The application should be able to run on any Pc or Laptop.

- Availability

The application should be always available whenever user wants to use.

Minimum Hardware and Software requirements

- Operating system= Windows Operating System is a family of proprietary operating systems developed by Microsoft Corporation.
- RAM = The application requires a device with a minimum of 512MB RAM while running.

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PROJECT DESIGN

- Use Case Diagram

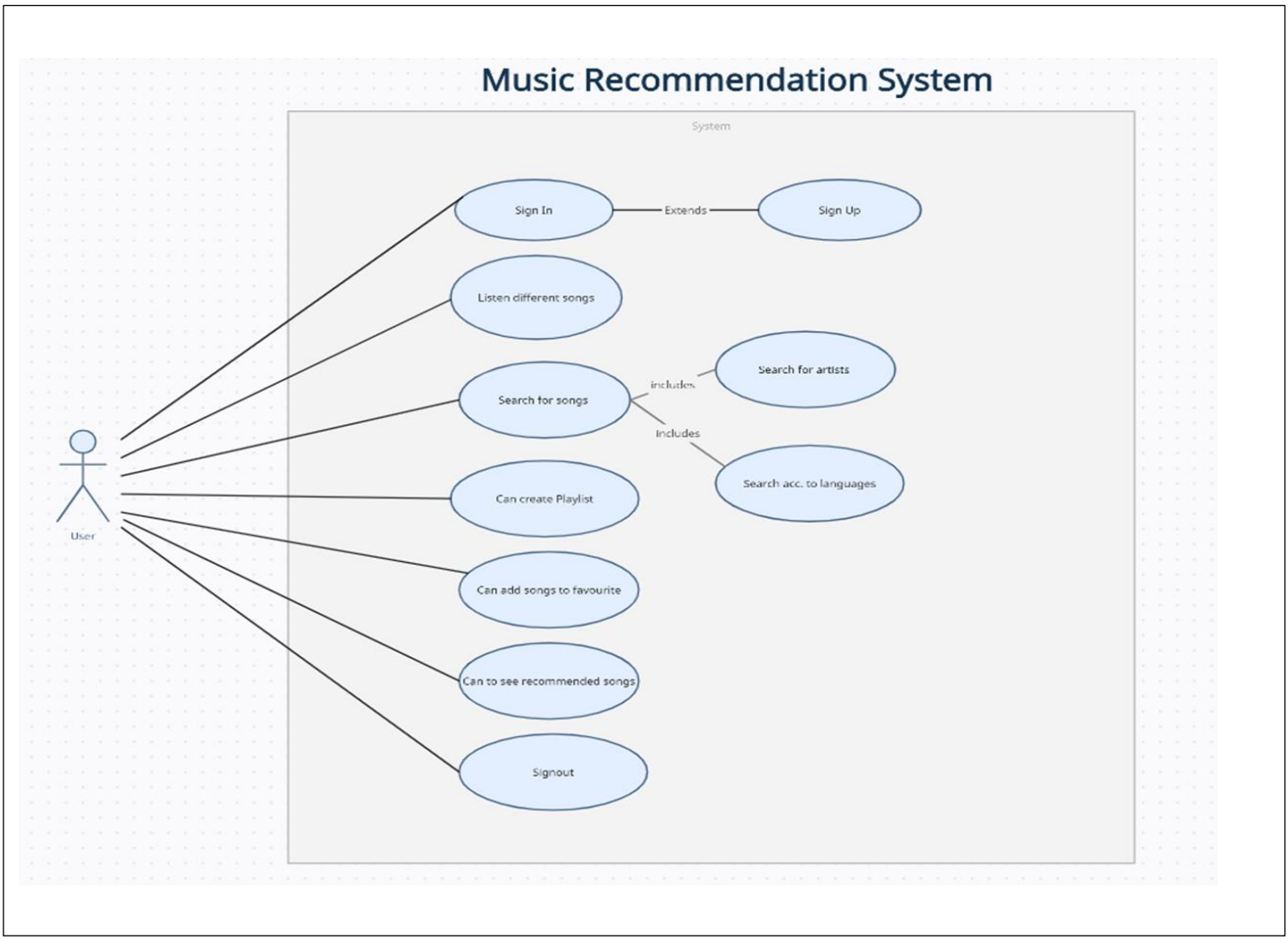

Figure 5.1: Use Case Diagram

- DFD (Data Flow Diagram) Diagram

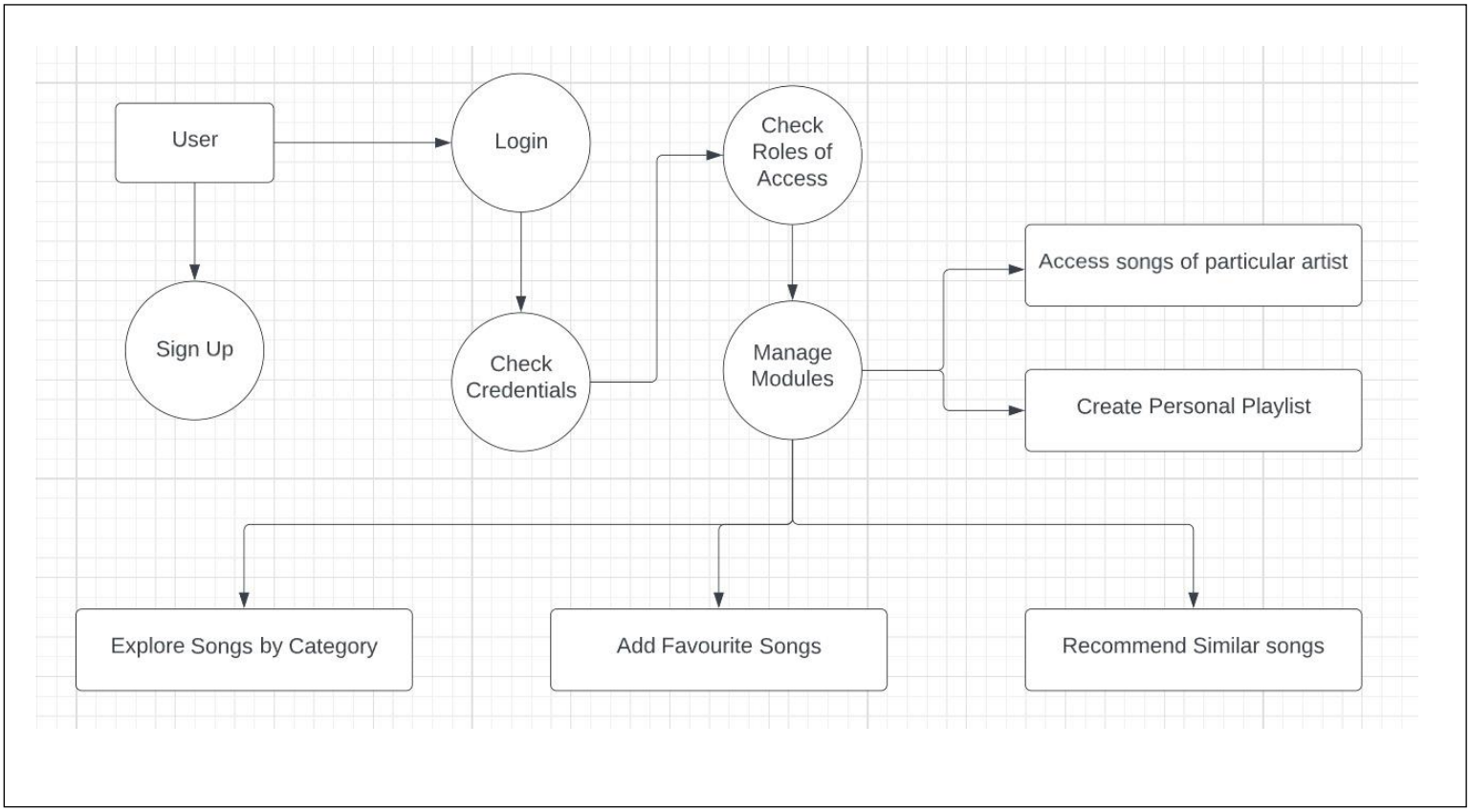

Figure 5.2.1: DFD (Level 0)

Flow Diagram

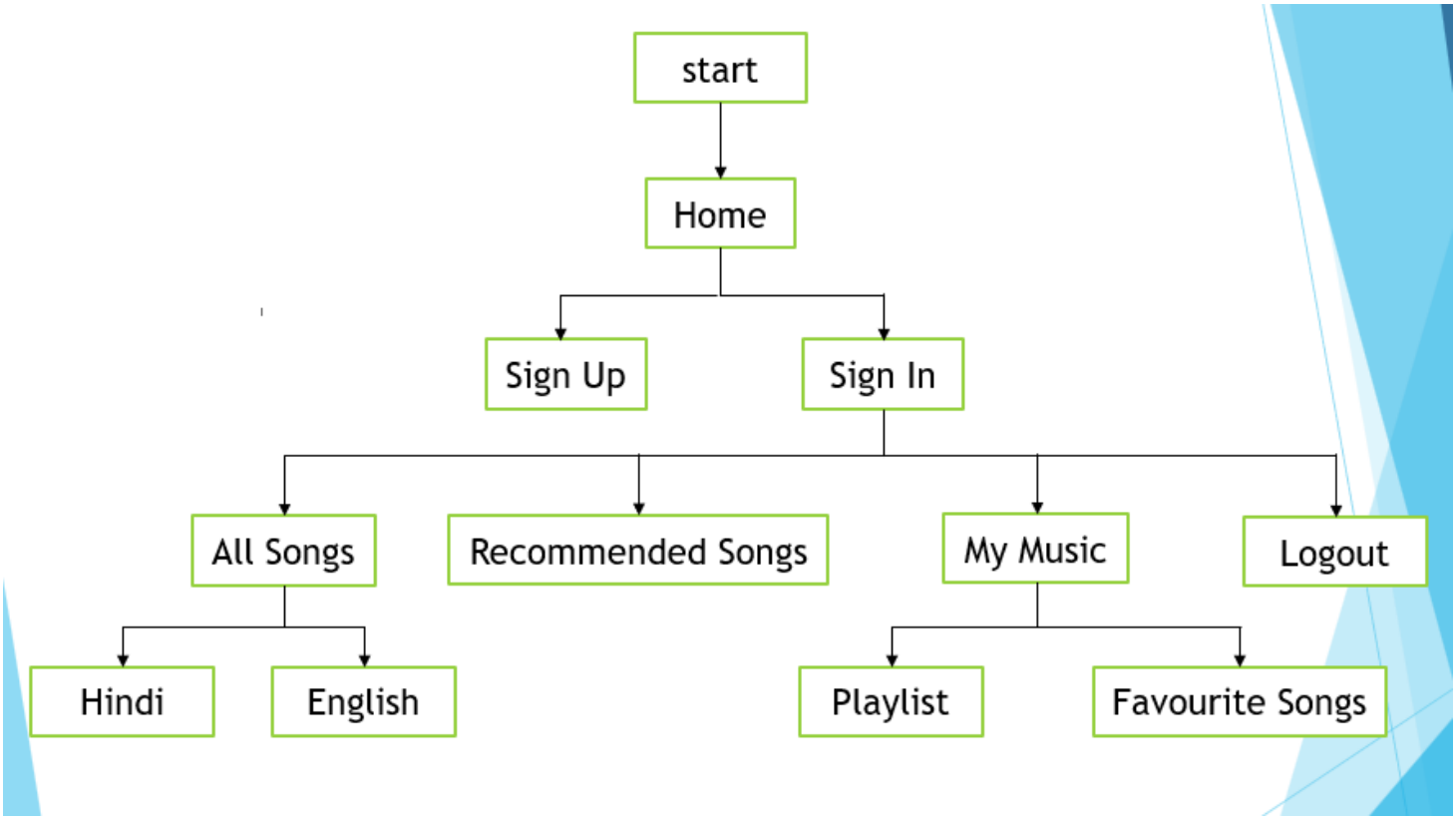

Figure 5.3: Flow Diagram

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TECHNICAL SPECIFICATIONS

Development: VS Code

VS Code also known as Visual Studio Code is a source code editor made by Microsoft for Windows, Linux, MacOS. It has various features such as Debugging, Syntax highlighting, extension, intelligent code completion.

Frontend: Python

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together.

OS: Windows

Windows is a **graphical operating system** developed by Microsoft. It allows users to view and store files, run the software, play games, watch videos, and provides a way to connect to the internet.It was released for both home computing and professional works.

Backend: SQL Lite

SQLite Studio is desktop application for browsing and editing SQLite database files. It is aimed for people, who know what SQLite is, or what relational databases are in general.

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PROJECT SCHEDULING

Date	Weeks	Contents
13/01/2023 TO 18/01/2023	1	Group formation and Topic finalization. Identifying the scope and objectives of the Mini Project
20/01/2023 TO 26/01/2023	2	Identifying the functionalities of the Mini Project
29/01/2023 TO 3/01/2023	3	Discussing the ML Algorithm.
4/02/2023 TO 10/02/2023	4	Designing the Graphical User Interface (GUI)
17/02/2023 TO 17/2/2023	5	Review 1 Presentations
20/02/2023 TO 28/02/2022	6	Detail ML Algorithm implementation
03/03/2023 TO 10/03/2023	7	Integration of GUI with ML Algorithm code
14/03/2023 To 21/03/2023	8	Report Writing
20/04/2023 TO 20/04/2023	9	Review 2 Presentations

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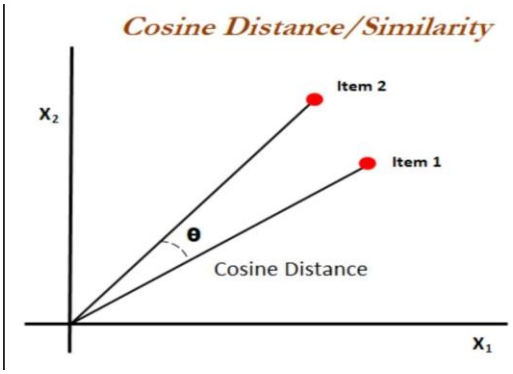
IMPLEMENTATION

Algorithm Used: KNN Algorithm (Cosine Similarity Rule)

K-nearest neighbor (KNN) is a machine learning algorithm that can be used in OpenCV pose estimation to identify the most similar poses in a dataset. KNN works by comparing the distances between the pose features of an unknown pose and those of labeled poses in a dataset. To use KNN in pose estimation, we first need to extract features from the poses. These features can be things like joint angles, distances between joints, or other relevant measures of the pose. Then, we can train a KNN model on a labeled dataset of poses with known feature values.

Once the model is trained, we can use it to predict the pose of a new, unknown sample by finding the k-nearest labeled poses in the dataset based on the feature distances, and then taking the most common pose among those k neighbors as the predicted pose. KNN can be used in conjunction with other pose estimation methods, such as Open Pose, to improve accuracy and robustness of the overall pose estimation system.

Cosine similarity finds its major use for character types of data wherein with respect to machine learning cosine similarity can be used for various classification data and helps us to determine the nearest neighbors when used as an evaluation metric in the KNN algorithm. Cosine similarity in the recommendation system is used with the same principle of cosine angles, where even if the similarity of the content is less similar it would be considered as the least recommended content, and for higher similarity of contents, the recommendations generated would be at the top. Cosine similarity is also used in textual data to find the similarity between the vectorized texts from the original text document.



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RESULT & DISCUSSION

Result:

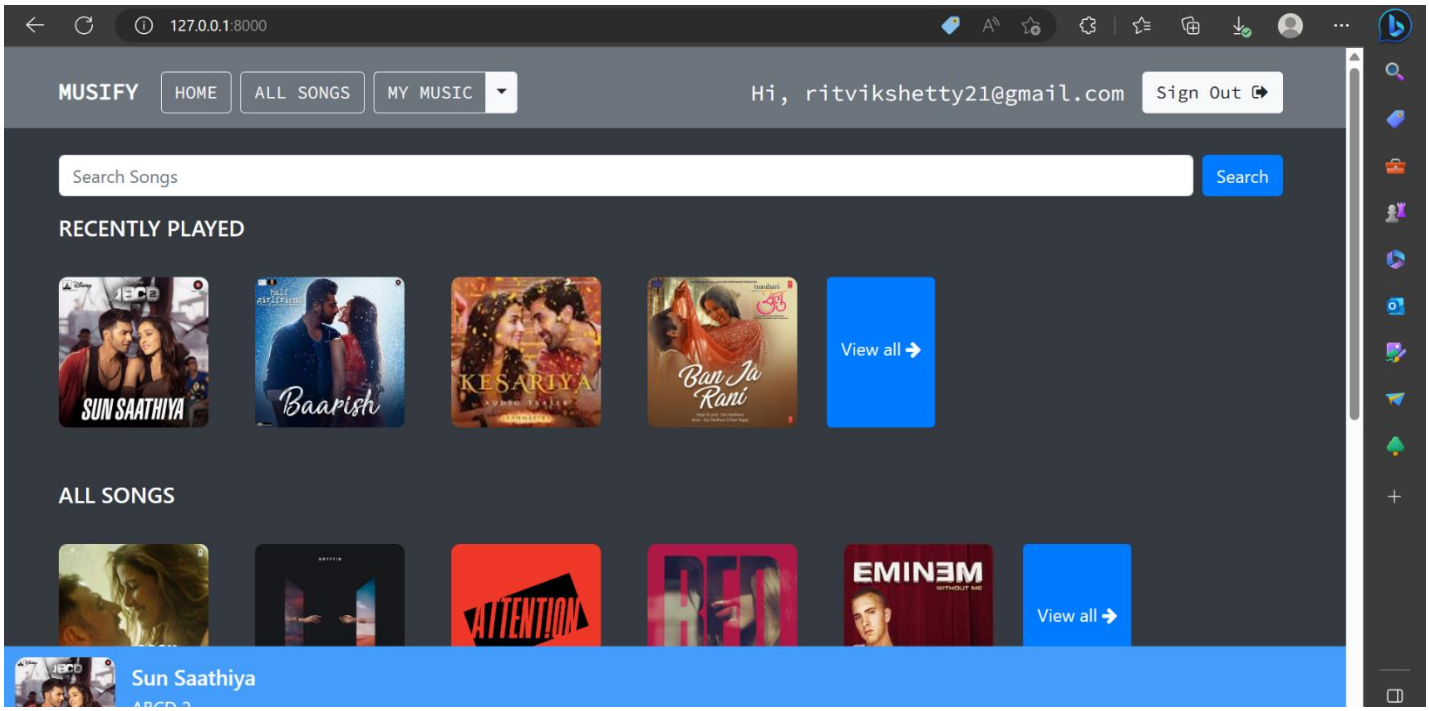

Figure 8.1: Home Screen

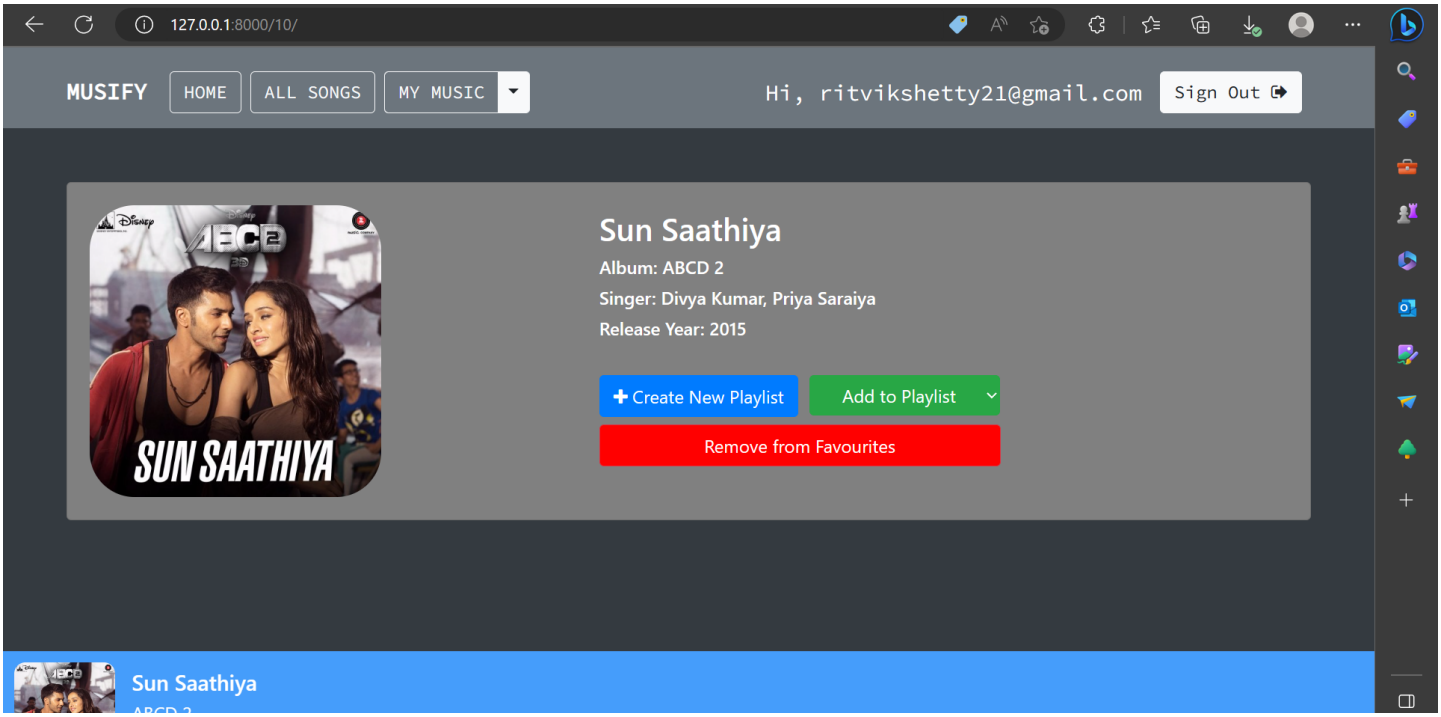

Figure 8.2: Song

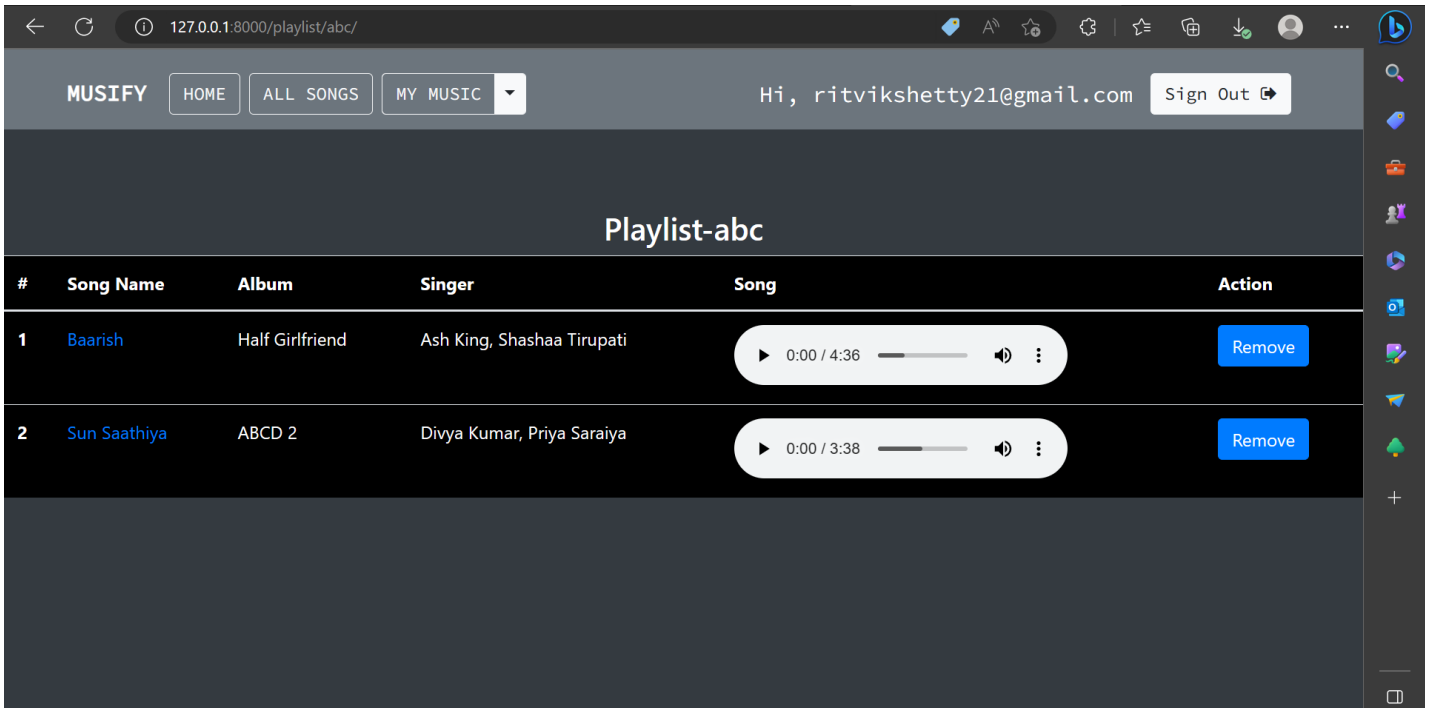

Figure 8.3: Song Playlist

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CONCLUSION & FUTURE SCOPE

Conclusion

In conclusion, music recommendation systems have become an essential tool for music streaming services and other digital music platforms. These systems use a variety of algorithms and data inputs to analyze user preferences and behavior patterns and suggest songs, artists, and playlists that users are likely to enjoy.

The effectiveness of a music recommendation system depends on several factors, such as the quality and quantity of user data, the algorithm used, and the accuracy of the system's predictions. However, when designed and implemented correctly, these systems can significantly improve the user experience, increase user engagement and satisfaction, and ultimately, increase the revenue of the music platform.

As the technology and data science behind music recommendation systems continue to evolve, we can expect these systems to become even more accurate, personalized, and effective, ultimately providing users with a more enjoyable and immersive music experience.

Future Scope

The future scope of music recommendation systems is promising, with continued advancements in technology and data science likely to improve their accuracy and personalization. We can add features

like Contextual Recommendations, Incorporation of more data sources, Integration with voice assistants, Cross-platform integration, Enhanced privacy, and security. Here are some potential areas of growth for music recommendation systems:

Overall, the future of music recommendation systems is exciting, with continued advancements in technology and data science expected to improve their accuracy and personalization, making them more valuable tools for music streaming services and users alike.

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REFERENCES

[1] https://towardsdatascience.com/part-iii-building-a-song-recommendation-system-with-spotify-cf76b52705e7

[2] https://www.enjoyalgorithms.com/blog/music-recommendation-system-using-ml