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# Music Recommendation in Artificial Intelligence Using Genetic Algorithm

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*Abstract*— **Music recommendation appears to be as something that has been easily established in the industry what with the rapid, ever-growing development in technology. However, while true to the extent of recommending similar genres, a song suggesting approach based on musical properties is uncommon. Due to enormous amounts of music- related data in music streaming platforms, a system to filter out specific tunes based on the user's current playlist on his/her device needs to be devised in order to make searching for new music easier. In this project, we propose an approach that considers the music on the user's device(s) and extracts its properties such as genre, culture, moods, language, rhythm, and tempo. In the field of *Artificial Intelligence (AI)*, *Genetic Algorithm (GA)* is a searching, heuristic, solution that mimics the process of natural selection, commonly used for solving optimization and search problems. The algorithm begins with a set of solutions (user's song preference) that is used to form a new set of solutions consisting of music types resembling ones that the user has played the maximum number of times or is currently playing now. The resulting suggestions are then displayed on the user's screen for them to try.**

***Index Terms*—Artificial Intelligence (AI), Genetic Algorithm (GA), Music Recommendation.**

## I. INTRODUCTION

Currently, majority of the industrial systems provide means for contextual manual search, based on information about artist names, album names or track titles. Using this information, music collections are searchable by textual queries and tags. [1]

This, however, is where the problem arises. It is hard for a user to discover music he/she likes from a database of billions of tunes based on textual searches. Different songs share many similarities; therefore, simply restricting music recommendations based on genre alone is not only common but also overused. Several properties of sound may overlap in different genres of music, thereby not entirely classifying them under the same category. We can extract these properties from the songs available in the database for this project. The common properties extracted from songs are: Pitch, Dynamics, Key, Tempo, etc. [4,5,6]. A set of tools called the CLAM tools is used to extract the sound characteristics. These characteristics are then passed through a *Recommender System.* The recommender system compares this to the attributes of the songs that are available in our database. This comparison is done by using Genetic Algorithm.

## II. EXISTING SYSTEMS

SPOTIFY:

They are one of the biggest competitors in the digital music industry having more than 18 million users. They offer a free, limited service and a premium, unlimited service

Free users are given trial periods for up to 6 months after which they have to opt for premium service or continue with limited usage.

Limited usage restricts their music listening to less than 10 hours a month.

They can only stream music in low quality with advertisements.

Premium services provided offer unlimited music listening, offline usage, and High quality music, on a monthly fee.

Other features provided by Spotify include lyrics widget, like-based recommendations, Content based searching, and

tag based searching. They also allow you to share your music via Facebook.

Gaana.com:

It is a commercial music streaming services developed by Times Internet mainly for the Indian population. They provide both Indian and international music.

Gaana.com Features music from 21 major languages like Hindi, English, Marathi, Punjabi, Tamil etc.

However they only offer tag based searching which is a bit tedious and time consuming.

They too have a free version and a premium service (Gaana+ Plan)

The free version allows only streaming of music in standard quality. This version also has a lot of ads

The premium plan allows users to download music for offline use, High Definition streaming, Ad-free music. This is at the cost of Rs. 999 per year.

Gaana.com could not live up to its hype because it is not user friendly and it does not provide a lot of songs due to copyright issues

## III. Issues with Existing System

We discuss the issues of the existing systems (discussed in the previous section) in this section).

Spotify is a major player in the music recommendation market but does not offer services outside US, UK, and Canada, therefore missing out on the huge market that is India. Spotify also gives limited services for free. Services like High Quality music, Offline use, ad-free experience is only provided to the premium users.

Gaana.com only offers tag based searching of music, hence cannot provide recommendations as well as other competitors. Furthermore gaana.com provides very low quality music to free users. Premium services are provided only for paid customers.

## IV. Proposed System

Given a database, music can be recommended based on available metadata: information such as the artist, album and year of release. Unfortunately, this will lead to predictable recommendations. Recommending songs by artists that the user already knows is not particularly useful.

To solve this problem, an android application is proposed which assists the customers in searching music data and provides an outcome, which matches the user's preference. [3] This system if first extracts the unique properties of music like pitch, chord, tempo, and timbre from the music file using a CLAM annotator software tool. This extracted data is then stored in the database. Each stored property is analyzed using content based filtering and interactive genetic algorithm. After acquiring records, the system recommends items appropriate to user's own preference.

## V. Design

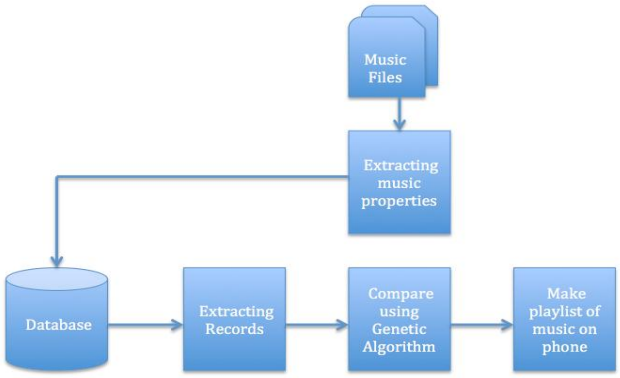


**Fig 1: Block Diagram of proposed system**

On downloading the application, we first ask the user to sign up using Facebook or twitter. This allows us to access the user's credentials. Also, once the user signs up, we can store all his/her data on the cloud for anytime access. The user then gets a few options to select from. The user may select more than one option. The options may include various things like different genres, instruments, artists etc. placed randomly so the algorithm gets initial values to make a playlist. The user then listens to these songs and selects one of the two options "Like" or "Dislike". Based on his response, the algorithm will get more data using which it can give better recommendations.

The application UI is made using Android Studio (Development module provided by Google). For back-end storage we are using XAMP server and MySQL. All the properties along with the song metadata will be stored in the

dummy database. To extract the properties from songs we will be using CLAM software [2]. Each stored property is analyzed using content based filtering and interactive genetic algorithm. The final step after applying genetic algorithm is to display the results, which are closest to the songs that the user is listening to. Using Euclidean distance formula, we find the nearest possible music features, which are matching the one generated by the crossover step of genetic algorithm, are matched and given as output for recommended items. These items are then added to the playlist for the user to listen to on his native music application.

## VI. CONCLUSION

To summarize, we have learned about all the existing systems which included Spotify, gaana.com, and Saavn. We found out ways in which these systems can influence our system. Spotify helped us understand how to use content based analysis in an effective way. Gaana.com helped us understand how to attract our target audience, and Saavn helped us understand what kind of features we can add to our system. We decided to build a system to implement content-based music recommendation on Android OS. In this system, the user will get generated playlists based on his likes and dislikes. This data of the user will help our algorithm further to make the recommendations better.

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