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Content Based Music Information Retrieval Using Humming System

[#1]Kishor Mane, [#2]Vishal Thorat, [#3]Vishal Kolhe, [#4]Yogesh Tawale,
[#5]Prof. S.M.Bhadkumbhe

[1]kishor.mane4161@gmail.com
[2]vishalkolhe1994@gmail.com

[#1234]Department Of Computer Engineering
[#5]Prof. Department Of Computer Engineering

PDEA's College of Engineering, Manjari (Bk)
Hadapsar, PUNE 412307.

ABSTRACT

In this paper a humming method for music information retrieval is presented. Many applications have been developed by increasing use of smart devices. Such as listening music is one of the facilities provided by the application. User can use the application when their daily chores like while exercising or driving etc. When the user can search the song they can use the voice recognition systems or user can just type the name of the artist or genre or title of the song. But in this paper we can implement search the song using tune of the song. In this we can use QBH (Query by Humming) system where the user can hum the tune and with the help of signal processing, the system will recognize and rank the results obtained based on Personal Hybrid Ranking Method. Also we can use remarkable accuracy, throughput and response time. The system showed a good performance on all music.

Keywords: QBH system, Personal Hybrid Ranking

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I. INTRODUCTION

In recent years, along with the development of Internet, people can access to a huge amount of contents like music. The traditional information retrieval systems are text-based but this might not be the best approach for music. There is a need for retrieving the music based on its musical content, such as humming the melody, which is the most natural way for users to make a melody based query. Query by humming systems are having a great expansion and their use is integrated not only in computer but also in small devices like mobile phones. A query by humming system can be considered as an integration of three main stages: construction of songs database, transcription of users' melodic information query and matching the queries with songs in the database. From the first query by humming system to nowadays, many systems have appeared. Most of these systems use Midi representation of the songs, or they process the songs to obtain a symbolic representation of the main voice or, also, these systems may use special formats such as karaoke music or other humming's to obtain the Midi or other symbolic representation of the main voice of the songs in the database. In all the cases the main voice or main melody must be obtained because it is the normal content of the humming. Somehow, the normal query by humming systems are based on the melody transcription of the humming queries to be compared with the main voice melody obtained from the songs in the database. The approach employed in this paper is rather different from other proposals that can be found in the literature. The database contains real stereo songs (CD quality). These songs are processed in order to enhance the main voice. Then, the humming as well as the signal with the main voice enhanced, follow the same process: fingerprints of the humming and of the main voice are obtained. In this process, it is not necessary to obtain the onset or the exact tone of the sound, so, this fingerprint is a robust representation for the imprecise humming or main voice enhancement.Our method is divided in to two phases. The first contains the possible search results. The second method contains the musical preference of the user to rank the possible search result. In the implementation of the system we can use Genetic algorithm, music database.

Query by humming is the method of searching a song in the database of song can be searched by queries. The user hums a melody into a microphone that is connected to any handled device and the QBH system searches the database of the songs which are similar to input query and returns the result to the user as a list of songs that match.
Recommendation system cannot be integrated into query by humming /singing system.

II. GOAL AND OBJECTIVE

- To detect start and end note of segment sung by user.
- To compare segments hummed by the user with the files stored in the database.
- To perform ranking by similar queries and ranking by user preference.
- To provide an optimized result to user.

II. SYSTEM ARCHITECTURE

The existing QBH system improves search accuracy through audio processing. But, it is rarely used to calculate result based on the previous history. In the proposed system we can add the hybrid recommendations to search the result in the QBH system because the existing system have implemented query by singing/humming.
The Singing/humming Signals Process. It contains the conversion of .wav of query recorded form into midi files, because the digital music recorded in large quantities and distributed over the Internate.

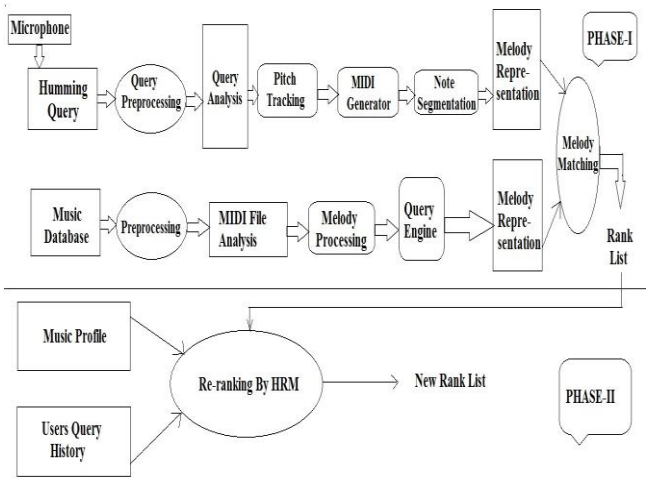

Fig 1: System Architecture

Methods to retrieve quickly a song have been an important research in the area of music information retrieval (MIR).Proposed the first complete system for query by singing/humming. They use a string to represent the pitch difference between the melodies of each song in the music library. In this the comparison can done between the human voice and the music library of the melodies are converted into the strings. A dynamic programming algorithm is used to edit the distance of two melody sequence to save time.

In the proposed system we can add the recommendations to search result in QBH system. In case of large library, the recommendation system can filter the song and then song can be selected which the user is inserted in the list. The recommendation system can common methods used like content-based filtering, collaborative filtering, and hybrid recommendation methods.

MODULES IN THE PROJECT

1) Module recognizing and processing query song by user.
2) Doing basic matching of user query and data in music database
3) Re-ranking based on Similar Queries, Ranking by User's Preference
4) Ranking through Similar Users' Records, Personalized Weight Adjustment Calculation.

Data Flow Analysis

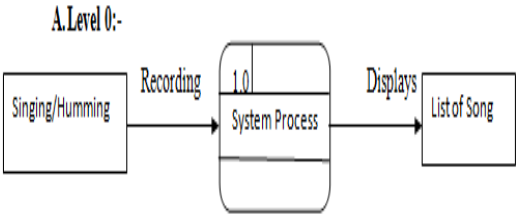

Fig 2: Data Flow diagram

The segments sang/hummed by a user are compared with music files in the database. These music files are in an appropriate format in order to perform the comparison. Possible search results are output based on the calculated matching rate. Using this method, many music files from genres that are impossible to be queried, are displayed. In addition, the actual music file required may be positioned further back in the search results, causing inconvenience during operation. And thus as a output we get a list of songs.

III. SIGNAL PROCESSING

We then use a pitch-tracking algorithm to convert the pre-processed audio signal into pitches (fundamental frequencies). This is used to analyze the variations of the melody sang/hummed by the user. The pitch-tracking algorithm can be divided into three methods, namely, time-domain, frequency-domain, and spectral/ temporal approaches. For example, the average magnitude difference function (AMDF), the average squared mean difference function (ASMDF) and the other autocorrelation function based methods are time-domain approaches. The popular frequency domain approaches include: the harmonic product spectrum and cepstral analysis. These methods typically utilize the period gram to convert the signal to an estimate of the frequency spectrum. Although the frequency-do-main approach provides better accuracy for pitch detection, it requires increased calculation time. The spectral/temporal approach uses time- and frequency-domain approaches to calculate the pitches. This requires the highest level of computational requirements yet also offers good accuracy for pitch detection. A well-known method is known as

YAAPT. In the client side of our system, mobile devices with relatively poor calculation power are used. We transfer the signal sang/hummed back to the server via the Internet for processing. The YAAPT method is then used to perform the pitch tracking. A series of fundamental frequencies are obtained after processing the signal sang/hummed using the YAAPT algorithm. To make comparison with the music in the database easier, the frequency information for signals sang/hummed are represented in the form of notes. Note A4 means the frequency of the note is 440 Hz. Frequencies of other notes are converted based on the number of semitones away from A4. The conversion formula is

$$Fn=2^{n/12}*440\ HZ$$

Where is number of semitones away from A4. Notes higher than A4 are positive, and notes lower than A4 are negative. The audio signal sang/hummed cannot constantly stabilize on a particular frequency. The frequencies of each sampling point in the audio signals are matched to the frequencies of then earnest notes. For example, if the input audio frequency is 115 Hz, note A2 is 110 Hz and note is 116.54 Hz, the input signal is classified as. Segmentation of notes is already performed on the input audio signal. After converting every sequence of the input audio signals into notes, the segment with the largest number of notes is chosen as the notes representing this segment.

IV. RESULTS

Our initial motivation for this research was due making difficult to display a large number of search results on the same page. Our work attempts to minimize the need to use multiple pages, so system will first detect successfully, start and end note of segment sang by user. Then it will match segments sang/hummed by the user with the files stored in the database and will perform ranking by similar queries and also ranking by user preference. Finally it will provide an optimized result. This system will give the 76.3% accurate results.

V. CONCLUSION

The method of querying by singing/humming is the most natural and simple technique to perform music search. An individual does not need to know the title of the song or name of the artist to perform the search. In our study, we use previous search histories of the users as well as users from similar backgrounds to perform probability calculations in order to estimate potential music genres for the user. This improves the rate of success.

Here we conclude that our system provide the good quality result. We also design very simple to handle the all users for performing the Content Based Music Information Retrieval Using Humming System.

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