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Musical Instruments Encyclopedia Application Using Wolfram Alpha

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Abstract This paper shows the mechanism of android application where musical instrument informations to be displayed in the hand held device in which it will raise intents to Wolfram Alpha and Hornbostel – Sachs classification apps; therefore their availability is assumed on the target device. The application will be targeted for Android devices only. MI also assumes Internet connectivity .Wolfram Alpha will generate details like complete technical description of the "queried" instruments using Hornbostel-Sachs classification, image, and sample sound.

Keywords: clustering, Instrument Detection, Music information Retrieval.

1. INTRODUCTION

A musical instrument is a device created or adapted to make musical sounds. In principle, any object that produces sound can be a musical instrument. It is through purpose that the object becomes a musical instrument. The history of musical instruments dates to the beginnings of human culture. Early musical instruments may have used for ritual: such as a trumpet to signal success on the hunt, or a drum in a religious ceremony. Cultures eventually developed composition and performance of melodies for entertainment. Musical instruments evolved in step with changing applications. The date and origin of the first device considered a musical instrument is disputed. The oldest object that some scholars refer to as a musical instrument, a simple flute, dates back as far as 67,000 years. Some consensus dates early flutes to about 37,000 years ago. However, most historians believe that determining a specific time of musical instrument invention is impossible due to the subjectivity of the definition and the relative instability of materials used to make them. Many early musical instruments were made from animal skins, bone, wood, and other non-durable materials. Musical instruments developed independently in many populated regions of the world. Missing -Feature Algorithm for musical instrument recognition, handling unreliable features with bounded marginalization. [6] Feature extraction and selection for instrument classification using machine learning techniques. [4] However, contact among civilizations caused rapid spread and adaptation of most instruments in places far from their origin. MIR helps in automating the process of labeling the songs with metadata and also search the music based on the actual content. We can find lot of research works focusing the techniques, methodology for efficient content retrieval of Western music. [1]

1.1. MI Encyclopedia

The application will raise intents to Wolfram Alpha and Hornbostel – Sachs classification apps; therefore their availability is assumed on the target device. The application will be targeted for Android devices only. Based on the Music Genome Project, that suggests songs to users based on similarity of songs that the user is interested in. [9][11]MI also assumes Internet connectivity. For interpreting the results of key characteristics of musical instruments being searched, a master is maintained which will capture the Classification Code, Description, Image and Sound. The MI will leverage the REST(Representational State Transfer) Application Programming Interface API to obtain the details about the instrument using Wolfram Alpha computational knowledge engine .Wolfram Alpha will generate details like complete technical description of the "queried" instruments using Hornbostel-Sachs classification , image, and sample sound. In order to use Musical Instrument, user will be required to download the application on their Smartphone. The solution has to be developed using IBM Worklight Studio and will be displayed on IBM WAS, DB2 and Work light server. The target device will be an Android phone. The development will follow the IBM's Rational Unified Process.

Wolfram Alpha is a computational knowledge engine or answer engine developed by Wolfram Research, which was released on May 15; 2009.It is an online service that answers factual queries directly by computing the answer from externally sourced "curated data", rather than providing a list of documents or web pages that might contain the answer as a search engine. Users submit queries and computation requests via a text field. [2]Wolfram Alpha then computes answers and relevant visualizations from a knowledge base of curated, structured data that come from other sites. Alpha thus differs from semantic search engines, which index a large

number of answers and then try to match the question to one. Using the Mathematical toolkit, Wolfram alpha can respond to natural language questions and generate a human readable answer. It can only provide robust query results based on computational facts, not queries on the social sciences, cultural studies or even many questions about history where responses require more subtlety and complexity. Wolfram Alpha is written in 15 million lines of Mathematical code and runs on more than 10,000 CPUs. The database currently includes hundreds of datasets, such as "All Current and Historical Weather". The datasets have been accumulated over several years.

The curated datasets are checked for quality either by a scientists or other expert in a relevant field, or someone acting in a clerical capacity who simply verifies that the datasets are "acceptable". One example of a live dataset that Wolfram Alpha can use is the profile of a Facebook user. If the user authorizes Facebook to share his or her account details with the Wolfram site, Alpha can generate a " personal analytics" report containing the age distribution of friends, the frequency of words used in status updates and other detailed information. Within two weeks of launching the Facebook analytics service, 400,000 users had used it. Wolfram Alpha is used to power some searches in the Microsoft Bing and DuckDuckGo search engines.

1.2. RESTful API

Representational state transfer (REST) is an architectural style consisting of coordinated set of constraints applied to components, connectors and data elements, within a distributed hypermedia system. REST ignores the details of component implementation and protocol syntax in order to focus on the roles of components, the constraints upon their interaction with other components, and their interpretation of significant data elements. REST has been applied to describe desired web architecture, to identify existing problems, to compare alternative solutions, and to ensure that protocol extensions would not violate the core constraints that make the Web successful. REST is used to design HTTP (Hyper Text Transfer Protocol) and URI(Uniform Resource Identifiers), also applied to the development of Web services as an alternative to other distributive-computing specifications such as SOAP.

2. DESCRIPTION

It is an android app for the purpose of musical lovers and kids those who are interested to learn music. It is an education and fun application designed keeping both adults and kids in the mind. When each instrument is selected its sample sounds are played at the background. We are using Eclipse software and IBM worklight for our project. Xml files are used for the front end user interface. Java files are used to represent the backend. Musical Instruments is an education and fun application designed keeping both kids and adults in mind. You will see pictures of most popular musical instruments and on touching the picture will get the authentic sound of that musical instrument. After a lot of deliberation it was decided to create a mobile encyclopedia of musical instruments. This will provide music enthusiasts a place to learn about various musical instruments right from their mobile phones. The application was named "MI" – Musical Instruments; "mi" is also third note of a major scale! The MI will leverage the REST API to obtain the details about the instrument using Wolfram Alpha computational knowledge engine. It will generate details like complete technical description of the "queried" instruments using Hornbostel-Sachs classification, image, and sample sound. In order to use MI, user will be required to download the application on their Smartphone.Hornbostel–Sachs (or Sachs–Hornbostel) is a system of musical instrument classification devised by Erich Moritz von Hornbostel and Curt Sachs, and first published in the Zeitschrift fur Ethnologies in 1914. An English translation was published in the Galpin Society Journal in 1961. It is the most widely used system for classifying musical instruments by ethnomusicologists and organologists (people who study musical instruments).

3. LITERATURE SURVEY

In this paper the mechanism about how to develop a basic musical application using Eclipse is described.

In this paper the author described about how to frame the background music to android application. In order for media to be played in the background of your app location when the use.

In our paper, we are analyzing the clustering of instrument which is a part of MIR for Carnatic music. [8]

In this paper the mechanism about how to create an audio player application in android is explained. When playing a note a new thread is started and put into the map. Notes are only played if they are not already playing.

This paper reports on a survey conducted in the autumn of 2006 with the objective to understand people's relationship to the musical tools. The survey focused on the question of embodiment and its different modalities in the fields of acoustic and digital instruments. The aim of this project was to gain an overview of the digital musical instruments which have been designed and built in recent times. This task consisted of two survey tasks.

A musical instrument is a device created or adapted to make musical sounds. In principle, any object that produces sound can be a musical instrument—it is through purpose that the object becomes a musical instrument. The objective of this paper is to do a comparative study to detect and classify music files automatically based on its genre by using various classification algorithms. [12]. Music is inherent in human nature. Every culture, however primitive, possesses unique musical manifestations. A simile could be drawn between music and speech.

4. PROPOSED SYSTEM

In this Project Music Information Retrieval (MIR) focuses on retrieving useful information from collection of music. [1]The objective of research work in this paper is to explore clustering approaches which can be useful in automatically mining the content from Carnatic instrumental music. [7]The content to be retrieved is the instrument that is primarily used to play the song. Carnatic music songs with ten different instruments namely, Flute, Harmonium, Mandolin, Nagaswara, Santoor, Saxophone, Sitar, Shehnai, Veena and Violin are considered as input. Mel Frequency Cepstral Coefficients (MFCC) and Linear Predictive Coefficients (LPC) features are used for representing music information. [2][3][10]. In the first step, visualization technique is used to explore the capability of different features in distinguishing Carnatic music with different instruments. Then different clustering techniques are used for understanding natural way of grouping among this instrumental music. A discussion on the comparison of instrument clustering results with different algorithms, combined with various features is also presented. [5].Instrumental songs are also considered as most melodic and there are many who are interested in listening and practicing music in a particular type of instrument. [7]

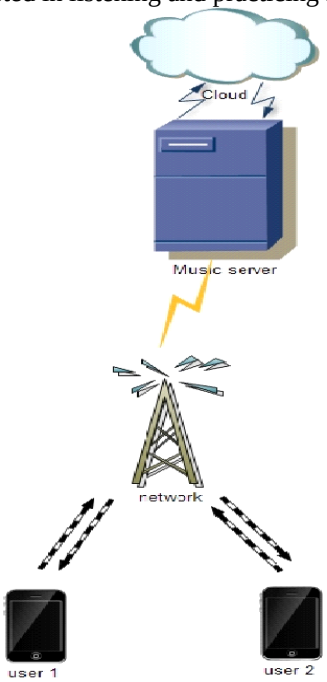

Fig 4.1.Architecture diagram

4.1. SYSTEM ARCHITECTURE

MI will be a "native" application. Its high-level architecture is illustrated through the following diagram that highlights the key system components and their interactions. This will be a native mobile app and will not require any server-side Components to be developed. MI will leverage Wolfram Alpha's REST API to pull the basic information about the queried Musical instrument. It will use Hornbostel-Sachs classification to display the music instruments details. This will also be accomplished using Android Intents. As a first step, understand the musical instrument classification as per Hornbostel-Sachs classification. Use this resource to set up a master for Musical Instrument Classifications. After this decide in which order will the text about the instrument be displayed. E.g. Its shape, sound, genre or it will be genre, shape and sound. There is only single use case for the scope of this project. The high level functional requirements for the MI Mobile App are outlined in this section. Instrumental songs are also considered as most melodic and there are many who are interested in listening and practicing music in a particular type of instrument. [7]

4.2. AUTHENTICATION

As this application only fetches public information from wolfram alpha, it is recommended to bypass the use of passwords to log into this application.

Note: In a commercial grade application, for fetching information from a paid website, authentication is usually carried out by storing the pass code as a MD5hash.

4.3. WOLFRAM ALPHA

Wolfram Alpha is an answer engine that works on proprietary knowledge sources. For responding to queries on various subjects in an easy to comprehend manner. It uses natural language to respond to Questions on various subjects like computer algebra, symbolic and numerical computation, visualization, and statistics capabilities. The most appealing aspect of the response is its presentation of curated content. Unlike most of the search engines, displaying links to web pages.

5. REFERENCES

[1]. T. Zhang "System and Method for Automatic Singer Identification" Proceedings of the IEEE Conference on Multimedia and Expo, vol. 1, 2003.

[2]. A. Mesaros J. Astola "The Mel-Frequency Cepstral Coefficients in the Context of Singer Identification" Proceedings of the International Conference on Music Information Retrieval 2005.

[3]. N Chetry Sandier "Linear Predictive Model for Musical Instrument Detection" IEEE Conference on Acoustics Speech and Signal Processing vol. 5 2006.

[4]. A. Zlatintsi P. Maragos "Multiscale fractal analysis of musical instrument signals with application to recognition" Audio Speech and Language Processing IEEE Transactions vol. 21, 2013.

[5]. D. Giannoulis E. Benetos A. Klapuri M. D. Plumbley "Improving instrument recognition in polyphonic music through system integration" Acoustics Speech and Signal Processing 2014 IEEE International Conference 2014 May.

[6]. B. Raj R. M. Stern "Missing-feature approaches in speech recognition“ IEEE Signal Process. Mag.vol. 22, Sep. 2005.

[7]. C. Joder S. Essid G. Richard "Temporal integration for audio classification with application to musical instrument classification" IEEE Trans. Audio Speech Lang. Process. vol. 17, Jan. 2009.

[8]. J. G. A. Barbedo G. Tzanetakis "Musical instrument classification using individual partials" IEEE Trans. Audio Speech Lang. Process.vol. 19, Jan. 2011.

[9]. R. Hg T. V. Sreenivas "Multi-instrument detection in polyphonic music using Gaussian Mixture based factorial HMM" Acoustics Speech and Signal Processing 2015 IEEE International Conference 2015 April.

[10]. Lee Chang- Hsing “ Automatic music genre classification based on modulation spectral analysis of spectral and cepstral features .” IEEE Transactions on Multimedia, 2009.

[11]. GTZAN Dataset : “ Musical genre classification of audio signals ” by G. Tzanetakis and P. Cook in IEEE Transactions on Audio and Speech Processing 2002.

[12]. “A Comparative Study of Classifiers for Music Genre Classification based on Feature Extractors” by Pradeep Kumar D, Sowmya B J, Chetan, K G Srinivasa 2016.

6. CONCLUSION

Thus we have developed an android application which can be very useful for the music lovers to know about information of their favourite musical instrument. The application uses internet connectivity for the process. The application get the information about the about the required musical instrument from Wolfram Alpha search engine. The information collected from the database sent to the server through JSON. In order to use Musical Instrument, user will be required to download the application on their Smartphone. The target device will be an Android phone. The result of feature extraction shows that the MFCC and LPC coefficients are promising feature for this kind of data. Thus the application achieved its mechanism.

