PITCH ANALYSIS FOR MUSICAL INSTRUMENT USING CEPSTRUM

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ABSTRACT

Music has been more than just a sound that entertains humans from time immemorial. The pitch determination plays the vital role for many musical processing algorithms. . Repetition is a core principle in musical process. a new approach for automatically characterizing the pitch and tempo of music and audio. Musical information retrieval relates to the identification of perceptually extracts the fundamental frequency characteristics of a piece of monophonic audio clip. The search can then be carried out to find pieces of music that are similar in terms of melodic character by giving the audio clip as its input. This paper discuss the role of frequency based pitch determination for the finding of interestingness in the musical information retrieval.

Keywords: music information retrieval, pitch tracking, tempo, corpus, spectrogram and harmonic.

1. INTRODUCTION

Due to large amount of data stored in web, the multimedia data explosion created an overload. This may cause information pollution problem because the user may not get the proper data or may get irrelevant data. In multimedia data like image, video etc, the audio plays an important role. Music information retrieval which is also called as Musical audio mining relates to the identification of perceptually important characteristics of a piece of music such as melodic, harmonic or rhythmic structure[8]. The popular audio search engines like musipedia [9] and shazam [11] offer few ways for searching audio data based on the melodic contour, based on pitches and onset times, based on the rhythm alone or based on audio fingerprinting.

Though they help in identifying pieces of music through various input methods, they do not support raga based music retrieval. Moreover the searches in the existing system are carried out by manually labeled filename or Meta data. These searches do not concentrate on audio feature. This is reliable but not scalable. Because some of them are either supervised or semi-supervised methods that require human input for tagging .So the content based approach should extract the information from audio without prior tags. Pitch detection is important for the content based audio retrieval.

2 .LITERATURE SURVEY

The existing audio mining tools include speech and music processing techniques [4]. The speech processing techniques are mostly used in the field of biometrics. The music processing techniques play its role in music information retrieval. It works by categorizing the audio data by means of keywords, metadata, manual audio tags and separated tracks [5]. Some highly trained audio retrieval systems focus on chord estimation, melody extraction, frequency estimation & tracking and structural segmentation [6]. But all music lovers and researchers in music who just don't consider music just as entertainment require a music/audio retrieval system based on melody or ragas [7]. A music teacher or scholar thus teaches or learns ragas (melody), thalam (rhythm), and swara (note) primarily as it forms the back bone of music. This is because, most of the ragas have the strength to control our body, refresh our minds, cure mental illness, enrich our environment, motivate us and also entertain us. Many works are going on to find how different music (ragas) reaches different human body parts [8]. For example, some music reaches our hands and we start to clap. Some music

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reaches our legs and we start to make rhythms with our legs. Some music reaches our entire body and that is reason that we have the feeling for dancing.

The popular audio search engines like musipedia [9] and shazam [10] offers few ways for searching audio data based on the melodic contour, based on pitches and onset times, based on the rhythm alone, or based on audio fingerprinting. Though they help in identifying pieces of music through various input methods, they do not support raga based music retrieval. These search engines has the ability to identify ragas but when it comes in searching for a melody from a larger database matching an input tune one by one is very expensive. This is because the available online audio databases are clustered based on manual tags, context, genre, instrumental, etc., but not on tunes.

3. DEMERITS OF EXISTING SYSTEM AND ADVANTAGES OF PROPOSED SYSTEM

The musipedia [11] and shazam [13] searches audio data based on pitches, onset and offset detection and audio fingerprinting, rhythmic structure. Though it retrieves audio, it does not support on raga based information retrieval which are very much helpful for classical music lovers. They help in identifying pieces of music through various input methods, they do not support raga based music retrieval. Moreover the existing retrieval uses manual tags and meta data mainly, not on the notes[2]. The proposed system deals with only audio input and cluster the audio clips which of same raga based on the musical instrument used in the audio clip. This eradicates the manual tagging and text based audio search using meta data.

4. PITCH DETECTION

Pitch is the associated with the periodicity in audio. Periodic sounds are made by repeated frequencies of which are all multiples of a common fundamental frequency . The Fundamental frequency is denoted as F0 [8]. Pitch can be detected in three ways namely 1. The time domain approach 2. The

frequency domain approach and 3.Spectral/temporal approaches [12].

In frequency domain approach, this paper discuss about the Cepstrum based algorithm for frequency extraction.

1.Time domain approaches: To measure the distance between the zero crossing points of the signal. waveforms which are composed of multiple sine waves with differing periods. the signal with other segments offset by a trial period to fin a match. they can give quite accurate results for highly periodic signals.

2.Frequency domain approaches: Usually utilizing the periodogram to convert the signal to an estimate of the frequency spectrum. It requires more processing power as the desired accuracy increases although the well known efficiency of the harmonic spectrum. to improve on pitch estimate derived from the precision analysis.

3.Spatial domain approaches: the spatial features of a key frame are not enough to characterize the two scenes, and thus causing poor performance in the classification. And the spatial features of a frame are suitable to detect pitch scenes, whereas temporal features should be included in the detection of outfield and infield scenes. So the , k-means clustering scheme that employs color features of a frame is used to detect the pitch scene first. Then the remaining scenes are classified into infield or outfield scenes using a SVM classifier, which utilizes the temporal features of a shot.

4.1.CEPSTRUM BASED ALGORITHM

The cepstral analysis technique is an important pitch tracking for frequency based approach used for musical instrument pitch extract . The Cepstrum is calculated for the instrument by taking the DFT of the log of the magnitude spectrum[10],[7].. Then, the Cepstrum is examined by a peak obtained in the signal.

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5.CONCLUSION AND FUTURE ENHANCEMENT

This paper discusses only the pitch extraction of the monophonic instrument .This can be further extended to polyphonic. By extracting the major orchestra instruments of the Indian classical music, the pitch can be tracked and it can further be clustered for musical information retrieval.

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