



STUDYING ABOUT THE DIFFERENT FORMS OF MUSIC

THRESIA K X

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ABSTRACT

This thesis focuses on understanding the unique characteristics of Carnatic music for designing feature extraction algorithms, which are then used in the identification of music content. Indian music differs from its Western counterpart in being just tempered, having varying intervals of the octave, and possessing Gamakas. Indian music is broadly classified as North Indian Hindustani music and South Indian Carnatic music. Both the systems of music follow a Raga scheme and a Tala scheme, employing a drone or tanpura for rendering; but the styles of using these Raga and Tala Components and of rendering the music differentiate one system of music from the other. In this work, Carnatic music has been analyzed and its characteristics have been used to design feature extraction algorithm. These features are then used to identify the characteristics of the Raga, Tala, and other non-music components like, the Singer, the Genre, the Instrument and the Emotion.

Keywords: - Music, Art, Medium, Sound, Culture.

I. INTRODUCTION

Music is an art form and its medium is sound. The definition of music varies according to culture and social content. Music organises sounds in a fashion that follows definite natural principles and provides an inner feeling of happiness. Indian music is generally classified into two - South Indian Carnatic music and North Indian Hindustani music. Both these systems of music are rich in their own style. But Carnatic music is more complex in the way the notes are arranged and the way it is rendered, compared to any other type of music. The complexity of Carnatic music is

mainly because of the use of gamakas (the sequence of swaras in the ragas) is not fixed and various improvisations called gamakas are allowed. A detailed analysis on each raga of Carnatic music is made using 49 different musical parameters. In this paper an attempt is made to analyze the relationship between the musical parameters and the structure of various musical notes of each of the 72 Melakarta ragas.

II. NEED FOR MUSIC PROCESSING

We live in an era of the widespread use of the Internet, for almost all information search activities. The information available on the web is of many types, including text, audio and video. In the area of entertainment, the challenging task of extraction of audio and video is of prime importance. Audio extraction can be classified into speech and music. The search for music on the Internet is increasing day by day. The web availability of Indian music, both Hindustani and Carnatic, has also grown many folds in the last decade. One simple way of searching and retrieving music from the web is by means of manually providing the textual metadata about a particular piece of music. However, in order to automatically index the music, there is a need to intelligently process and represent the music signal. The content of Indian music includes musical components, such as the Raga and the Tala, and nonmusical components, such as the Singer, the Instrument, the Genre and the Emotion. These components can be used as key values to perform automatic indexing in a music information retrieval (MIR) system and for subsequent retrieval based on these key values.

III. COMPARISON OF WESTERN MUSIC WITH INDIAN MUSIC

Before discussing the specific characteristics of Carnatic music, the general characteristics of different systems of music in relation to Carnatic music are discussed.

Music is typically classified based on genre (Tzanetakis and Cook 2002) or as being classical or non-classical. One way of classifying music is to divide it into Western and Indian systems; however other systems of world music like Chinese, Indonesia, Persian, etc. exist. In this thesis, we consider the Western and Indian music systems for comparison. The musical notes in Western music are denoted as C, D, E, F, G, A, and B whereas in Indian music they are denoted as swaras S, R, G, M, P, D, and N. In Western music the typical characteristics are melody and rhythm, indicating the patterns of notes and beat structure of music respectively. In Indian music the notes are arranged in a pre-defined sequence forming Ragas while the rhythm with differing beat structures indicates the Tala. In addition, the two systems basically differ in the style of rendering, the presence or absence of chords, and the number of intervals per octave. Table 1.illustrates the differences.

Table 1. Comparison between Western and Indian Music

Western Music	Indian Music	Inference
Chords, Orchestration, Harmony Present – Refers to the presence of more than one frequency at a time or one melody at the same time	Chords, Orchestration, Harmony are absent	Only one frequency is present at a time in Indian music
Vertical Arrangement of Notes – overlapping of notes	Horizontal – One Note follows the other	Some Instruments are typical for Indian music to allow for this horizontal arrangement – eg. Veena
Even Tempered system of notes	Just Tempered system of notes	Any frequency can be used as the starting note in Indian music and the frequency of a note is continuous rather than discrete
Semitones	Microtones / Semitones	Intervals of an octave are flexible
Music is first composed and then the musician plays it – Little scope for improvisation	Melody is fixed and then the musician plays it – a lot of improvisation possible	Introduces the concept of Raga and the swaras of the Raga can be improvised to do ornamentation to the Raga
Improvisation in semitones is not possible	Improvisation in Raga is a key to convey Emotion	

Sound is thought of as blocks or pieces of music	Sound is not thought of as blocks of notes, but as a thin wire of flow	
Western Music	Indian Music	Inference
Absence of Gamakas and Meends	Presence of Gamakas and Meends	Gamakas refer to pitch inflexions, where a swara is continuous rather than discrete / Meends is a slower Gamaka.

Due to these differences between both systems of music, it is difficult to use the algorithms designed for Western music directly in processing Indian music, and expect similar results. Characteristics, such as the just-tempered system of notes, the presence of Gamakas, and the presence of microtones in addition to semitones, need to be incorporated in the design of new algorithms for processing Indian music.

IV. COMPARISON OF HINDUSTANI MUSIC AND CARNATIC MUSIC

Section 1.2 of this thesis outlined the differences between Western and Indian music in general. However, Indian music can further be broadly classified into North Indian Hindustani music and South Indian Carnatic music. The fundamental differences and similarities between these two systems of music are specified in Table 2. This table is based on the characteristics of the two systems of music as described by Carnatic and Hindustani music literature.

Table 2. Comparison between Hindustani and Carnatic music

Hindustani	Carnatic	Inference
Raga follows the Thaata scheme	Raga follows the Melakarta scheme	The combination of swaras are different for some Ragas but are similar for some
Uses Semitones to derive the Raga	Uses Microtones to specify the swaras in the Raga	This results in 72 combinations for Carnatic music which has all swaras

Raga can be a morning Raga or an evening Raga – Use of Time to classify the Raga	Raga is Parent and child having a hierarchical relationship	
Meends are present to ornament the Raga	Gamakas are specific to every Raga and are stricter in deciding which note to be given Gamaka	Pitch inflexions are Gamakas. Meends is a slow Gamaka given to the Raga in its totality as against ornamenting a swara in a Raga
The focus of a musical concert is only on a few Ragas	The focus of a musical concert is rendering many Ragas emphasizing on the Emotion	Musician specializes in only 3 or 4 Hindustani Ragas as compared to singing all Ragas in Carnatic music
Uses Kyal – Unstructured rendering of the Raga	Uses Kalpanaswaram – alaap may or may not be present	
The mathematical relationship between the notes is not strict.	Strict mathematical relationship between notes exists	Fixed ratio of swaras with ‘S’
Use of another swara occasionally is allowed to ornament the Raga	Use of another swara that does not belong to a Raga is not acceptable	Considered ‘Abaswaraa’ in Carnatic music but the usage of this swara is considered intelligent in Hindustani music

V. CONCLUSION

The work we have carried out on content extraction from Carnatic music, by exploiting the Carnatic music specific characteristics, is the first of its kind in this area. Major modules of the music processing system, namely, segmentation, feature extraction and model construction, all exploited Carnatic music characteristics in their design. Moreover, a difficult problem in music processing – the determination of the tonic was found absolutely necessary for Raga and Singer

identification in Carnatic music. Therefore, we designed an on-the-fly tonic determination algorithm, based on the concept of neutral mutation adapted from biological sciences. Since Carnatic music components are heavily influenced by tonic and the Carnatic Octave interval, we found that Cepstral features needed to be defined, based on these two aspects rather than using either the speech specific MFCC or the Western music specific OFCC. Hence, we defined a new set of coefficients – the Carnatic Interval Cepstral Coefficients (CICC) incorporating these two aspects.

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