

## EMERGING TECHNOLOGIES AND MUSIC EDUCATION

**Dr. S. Seethalakshmi**

Assistant Professor, Department of Music, School of performing Arts and Fine Arts, Central University of Tamilnadu

### Abstract

Technology supports a lot towards Music. The online mode of communication is the appropriate mode of communication being used now. Many emerging technologies support the teaching and learning of practical aspects of music. Though there are various external systems like Skype, Whatsapp, Googlemeet, etc., there are many hidden technologies, the support of which plays a major role towards Music Education. This paper lays emphasis on the interface or the systems and applications that support the Music Education like Big Data, Music Representation Techniques supporting as input for Artificial Intelligence, Cloud Computing and other applications.

**Key words:** Emerging Technologies, Music Information Retrieval, Music Education

### INTRODUCTION

This is a Technology world where everything is done through online just by a person sitting at their place. It is also an advantageous in many aspects where the end user can enhance the skills at one go. In this situation where we are unable to meet each other physically, emerging Technologies support a lot towards Music Education. There is lot of emerging Technologies like Big Data, Machine Learning, Artificial Intelligence, Cloud Computing, Internet of things. etc.

### BIG DATA

Big Data is the input that needs to be cleaned, sorted out, structured and integrated. ETL – Extract, Transform and Load is the process that is used for this purpose. Some of the tools of Big Data are Hadoop, Tera Data, Hive, Autosys etc., Big Data is one of the Technology that has been widely used for identifying the interest of individuals towards Music which is developed using Streaming Algorithms. Through this process, data is extracted from the system, structured in the required format using the appropriate tools; jobs are executed at specified time by the system on specified days through job scheduler. The data is then verified at the intermediary level using the Structured query Language (SQL) whether it is parsed appropriately in the respective interfaces and systems. Interfaces are those systems that are connected together. The data gets loaded back into the system which can be used as integration to various sources. For

example, Data from various sources about all composers can be extracted, the data can then be categorized Ragawise, Talawise, composerwise and can be formatted well. This data can be fed into the system to retrieve the details related to specific Raga, Tala, composer, special attributes of the composition, etc.

Another example is recommendations made to the music listeners based on the regular patterns of listening to Music. The melody of the song, tonal quality, rhythm, Artist performing the composition etc., from the information gathered through the listener helps to provide similar recommendations to the user. In this manner Big data supports a lot towards enhancing the listening skills of the end user.

### **CLOUD COMPUTING**

Cloud Computing is another concept which is more prevalent these days. This helps teachers to upload learning materials and students to access the details through internet connection. Each University or College has their own platform where Study materials can be shared using MOOC platforms and assignments can be provided, corrected and remarks shared using the system. This saves lot of money on data storage; time is saved as details can be fetched quickly whenever required. This also helps teachers to carry on teaching using synchronous and asynchronous method. This implies that recorded material or you tube links can be shared to the students. Based on that, assignments or explanations can be provided in online class.

Artificial Intelligence is a set of process programmed to carryout the activities performed by Human. Alexa developed by Amazon is an example of Artificial Intelligence tool. The information is taken up by Alexa using Alexa Voice Service and it responds to the input accordingly. For example, the tool 'Alexa' can also be used to play the song as per the request of the user.

### **HUMAN INTELLIGENCE AND COMPUTER SYSTEM**

Human being has potential to sing, play and learn compositions based on the emotions, listening capability, interest towards specific composer/ composition/ Raga/ Tala of the composition. However, the system can be tuned to facilitate only one or two of these abilities.

## APPLICATION FOR SUPPORTING MUSIC EDUCATION

There are several applications supporting Music Education. One of them is RiyazApp which is developed by Mr. Gopala Krishna Koduri along with his team members.

This was experimented with senior musicians from Carnatic Music field and trial sessions of the same were conducted. The features of the software are as follows:

- Selection of Hindustani/ Carnatic Music
- Selection of Sruti, and age range of the individual - Child, Adolescent and Adult, Choosing the language of their choice for learning
- 2 Minutes warm up/Practise with Tambura
- For Carnatic Music Learners – it is pre-loaded with Basic Sarale Varisai, Pillari Geetha, Lakshana Geethas – Preloaded with Raga Devamanohari, Kalyani and Mohana, Swarajathis – preloaded with Raga Harikambhoji and Kannada and few Varnams in Ragas Todi, Nalinakanthi.
- Similarly for Hindustani Music learners, it is pre-loaded with details of Raga Yaman, Raga Brindavana Sarang, Bhimpalasi, Raga Jaunpuri and Raga Bhagasri with details of Aroh, Avroh, Sapaat, Nyas Svar, Vadi – Samvadi, Chalan, Aalap and few compositions in the Ragas.
- The algorithm is based on C++, Computer language which does not require internet for the processing. This is operated based on the Native instructions and can be operated using mobile.
- This Application also has the feature of linking a student with mentor where the student can assess the proximity of his rendering with the recording given by the mentor. This is similar to the client-server mechanism.
- From students especially beginners who are learning music for the first time, this application is useful in the following aspects:
  - If they are singing aligning the Sruthi
  - To self judge their performance using the recorded exercises
  - When the learner tries to sing using this RiyazApp, it shows the % of proximity of rendition to the original recordings.

- Basic details of few of the Ragas and sancharas (Phrases of the raga) are loaded which are well used by students where they can sing along with the recordings
- From the Teachers perspective, this application is useful in the following aspects:
  - To identify number of times practised by the student
  - To verify if the student practised adequately
  - To verify if a particular phrase was wrongly practised by the student every time
  - Proximity of his rendering to the original recording at one go.

### **MUSIC REPRESENTATION TECHNIQUES TOWARDS COLLECTING DATA FOR ARTIFICIAL INTELLIGENCE**

Music Information Retrieval or Music Representations form a part of preparatory work to do Artificial Intelligence activities. If a composition is in a particular raga and there are need for Artificial Intelligence System which would convert the data, Artificial Intelligence System needs to be fed data about the Ragas and also about composition structures. Data Preparation plays an important role for Artificial Intelligence. For Data Preparation requiring appropriate representation and Data collection, Notation is useful. Notations are the representation of music in writing using various signs and symbols.

The website 'www.patantara.com' provides the facility to develop Notation. This application was developed by Dr. Srikumar Subramanian who has indepth knowledge in Music and software applications. It has the following features:

- The Teachers can prepare lyrics of the compositions using diacritical marks, notations and also have the same provided in various languages.
- Notations on compositions of various Talas can be easily developed using this system by following specific formats mentioned in the website.
- If the overall Aksharas of the composition is 14 – Kanda Jathi Ata Tala for instance – with the Tala Pattern being 1<sub>5</sub>1<sub>5</sub>0<sub>2</sub>0<sub>2</sub> – Two Laghu followed by 2 Druta. The cycle of overall 14 aksharas, is defined as 2 counts per akshara.

- Once the Talas are defined very clearly in the initial stage, the development of notations for the remaining portions becomes very easy.
- The Upper and Lower Sthayi can also be clearly defined in the notations very easily
- This system has the ability to have audio tracks integrated with music notation. This would be of great use to Teachers, researchers and students of Carnatic music.

Sample of the notation developed through the application:

### Sāraya sārāya - Karaharapriya - Ādi

Rāgam: Kharaharapriya

Tālam: Ādi

Composer: Parama Pūjya Śrī Śrī Śrī Ganapathy Sachchidananda Swamiji

Ārōhaṇam

S R g m P D n Ṣ

Avarōhaṇam

Ṣ n D P m g R S

Pallavi

1) || S , , , , Rg , m , , , P , Dn | Ṣ , , , n Dn P | n D , n Ṣ , , , ||  
 || sā , , , , rāya sā , , , rā ya | ṣaḍ ja mu | dā rān ||

|| Ṣ n Ṣ n , D , P Dn Ṣ n , , , | n DDP P mg , | mg P m mg RS ||  
 || san ta ta ma gnē , , , sva ra vi stā rān ||

### CONCLUSION

Thus many system, interfaces and Applications (Apps) are developing these days. It is imperative to make use of these devices, acquire the necessary skills and use them effectively. However, system cannot exactly replace human efforts, efforts are being made to replicate some of the features those which the students can listen and sing alongwith. Providing awareness of the required skills to students also would help in making them Tech Savvy and use the resources effectively.

### REFERENCE

Interview with Mr. Gopala Krishna Koduri, Developer of RiyazApp

Interview with Dr. SS. Subramanian, Developer of the application 'www.patantara.com'