Integrated Intelligent Research (IIR)

International Journal of Computing Algorithm
Volume: 03, Issue: 01 June 2014, Pages: 80-83
ISSN: 2278-2397

Impact of Different Genre of Tamil Cine Music Using Combined Disjoined Block Fuzzy Cognitive Maps (CDBFCMS)

A. Victor Devadoss, S. Aseervatham
Department of Mathematics, Loyola College, Chennai, India
E-mail:aseerambro.math@gmail.com

Abstract - The subjective nature of listening knowledge of human to different genre of music perception suggests that fuzzy logic is a more appropriate tool for an unsupervised data. Because listening mood, environment, personality, age, cultural background etc, can decide that what kind of music we hear mostly. This paper is organized as follows. In Section1, we introduce the general ideas in music and its different genres. The proposed method of fuzzy logic (CDBFCMs) is given in Section2. Section3 gives the description of the problem and hidden pattern and the conclusion in Section4.

Keywords:Music, Fuzzy Cognitive Maps, Combined Disjoined Block FCM.

I. INTRODUCTION

Musical art is a sounding phenomenon, taking place through time, it is neither the score itself, nor its initial concept. We have primarily focused on listener's sensitivity to the song of their own culture. Choice of listening to music is an extremely subjective, aural experience. Some sounds perceived by us as pleasant and some others as unpleasant. What is considered pleasant or unpleasant can be quite personal, based on our specific culture, exposure to particular kinds of music. Our musical tastes are indeed developed. As we grow up, and discover music from other cultures or newer musical styles, our tastes too change. Most people agree that an important aspect of music is the communication of emotions. Different composers may use various genre of music to evoke emotions. The composers define the music, so the genre of music itself may be adapted to the feeling that seems to suit the song.The different genres of music are western, Indian Classical and Folk music.

Western music is 'harmony-based'. 'Harmony' is produced when several instruments play different melodies or pieces simultaneously like in an orchestra. Harmony is also produced when more than one tone is produced at the same time. Western classical music, most musicians have music notated on sheets of paper and 'read' it when performing.Chords are a major aspect of Western music and producing harmony via chords is a natural consequence of the equally tempered (geometric series) arrangement of the keys. The Indian song seems to involve a lot of vocal acrobatics and nuances and not just go through piano-like jumps. The piano produces just twelve frequencies in one octave and that is enough to compose a lot of Western songs whereas, to make Indian music, twelve keys are not enough in an octave. This is the main difference between the Indian and Western music. Thus it is often said that Indian music is 'melody-based'. Indian music is always played by 'ear'. Since microtones are so important in Karnatic and Hindustani music and very few instruments can produce all the frequencies in an octave, the best enunciation of Indian classical music is in vocal singing. Many instruments like the violin, ChitraVeenaand even the simple bamboo flute can produce a lot of gamakams, of course. Orchestration and 'harmony' are absent in Indian classical music. People have tried out orchestration of Indian classical music time and time again with limited success.

Hindustani classical music where two instruments or even two vocalists are featured together, the musicians usually follow the same melodic pattern one after another with minor variation rather than play different melodiessimultaneously. Karnatic is the hard core classical music, which is divided into two broad areas. The first one is the realm of pre-composed music and the second one is improvisation or creative music. In Indian terminology, the pre-existing compositions are called 'Kalpita' (literally meaning 'that which is taught') and the creative (improvisation) aspects are called 'Manodharma'. Every performing artiste learns both the aspects of classical music. Folk music is usually traditional or typical of a particular community or nation which is accompanied by the percussion of Dappankoothu. It is characterised as a fast beat song, with less emphasis on meaning, sung at a celebration.Here we have taken the Tamil songs from these genres of music and implemented in our work. By the way that we made questionnaire among listeners in which, what type of music they used to hear mostly. So that Music is an excellent domain in which to apply fuzzy logic.

II. METHOD: FUZZY COGNITIVE MAPS

Fuzzy cognitive maps (FCMs) are more applicable when the data in the first place is an unsupervised one. The FCMs work on the opinion of experts. FCMs model the world classes and causal relations between classes. FCMs are fuzzy signed directed graphs with feedback. The directed edge $e_{ij}$from causal concept $C_i$to concept $C_j$measures how much $C_i$causes C_j. The time varying concept function C_i (t) measures the non-negative occurrence of some fuzzy event, perhaps the strength of political sentiment, historical trend or military objective. The edges e_{ij}take values in the fuzzy causal interval [–1, 1]. e_{ij}= 0 indicates no causality, e_{ji}> 0 indicates causal increase, $C_j$increases as $C_i$increases (or $C_j$decreases as $C_i$decreases). e_{ji}< 0 indicates causal decrease or negative causality. $C_j$decreases as $C_i$increases (or $C_j$increases as C_i decreases) Simple FCMs have edges values in {–1, 0, 1}.

International Journal of Computing Algorithm
Volume: 03, Issue: 01 June 2014, Pages: 80-83
ISSN: 2278-2397

2.1. Definition
An FCM is a directed graph with concepts like policies, events etc. as nodes and causalities as edges. It represents causal relationship between concepts they are called as fuzzy nodes.

2.2. Definition
FCMs with edge weights or causalities from the set {–1, 0, 1}, are called simple FCMs.

2.3. Definition
Consider the nodes/ concepts $C_1, \ldots, C_n$of the FCM. Suppose the directed graph is drawn using edge weight $e_{ij} \in \{0, 1, -1\}$. The matrix E be defined by $E = (e_{ij})$ where $e_{ij}$is the weight of the directed edge C_iC_j. E is called the adjacency matrix of the FCM, also known as the connection matrix of the FCM. It is important to note that all matrices associated with an FCM are always square matrices with diagonal entries as zero.

2.4. Definition
Let $C_1, C_2, \ldots, C_n$be the nodes of an FCM. $A = (a_1, a_2, \ldots, a_n)$ where $a_i \in \{0, 1\}$. A is called the instantaneous state vector and it denotes the on-off position of the node at an instanta$_i$= 0 if $a_i$is off anda_i= 1 if $a_i$is on for i = 1,2,…, n.

2.5. Definition
If the equilibrium state of a dynamical system is a unique state vector, then it is called a fixed point.

2.6. Definition
If the FCM settles down with a state vector repeating in the form $A_1 \rightarrow A_2 \rightarrow \ldots \rightarrow A_i \rightarrow A_1$then this equilibrium is called a limit cycle.

2.7. Definition
Finite number of FCMs can be combined together to produce the joint effect of all the FCMs. Let $E_1, E_2, \ldots, E_p$be the adjacency matrices of the FCMs with nodes $C_1, C_2, \ldots, C_n$then the combined FCM is got by adding all the adjacency matrices $E_1, E_2, \ldots, E_p$. We denote the combined FCM adjacency matrix by $E = E_1 + E_2 + \ldots + E_p$. Suppose $A = (a_1, \ldots, a_n)$ is a vector which is passed into a dynamical system E. Then AE = $(a_1', \ldots, a_n')$ after thresholding and updating the vector suppose we get $(b_1, \ldots, b_n)$ we denote that by $(a_1', a_2', \ldots, a_n') \hookrightarrow (b_1', b_2', \ldots, b_n')$. Thus the symbol '↪' means the resultant vector has been thresholded and updated.

2.8 Definition
Let $C_1, C_2 \ldots C_n$ be n distinct attributes of a problem *n* very large and a non-prime. If we divide *n* into *k* equal classes i.e., *k/n* and if *n/k=t* which are disjoint and if we find the directed graph of each of their classes of attributes with *t* attributes each then their corresponding connection matrices are formed and these connection matrices are joined as blocks to form a $n \times n$ matrix.The $n \times n$ connection matrix forms the combined disjoined block FCM of equal classes.

If the classes are not divided to have equal attributes but if they are disjoined classes we have $n \times n$ connection matrix called the combined disjoined block FCM of unequal classes / size. Here we approach the problem through attributes using Combined Disjoined Block Fuzzy Cognitive Maps (CDBFCMs) that are basically matrices which predict the feelings of all the attributes under certain conditions. Before we proceed to apply CDBFCMs to this problem we define a set of 10 attributes. We work with analyzing them using directed graph and its connection matrices.

III. DESCRIPTION OF THE HIDDEN PATH USING COMBINED DISJOINED BLOCK FUZZY COGNITIVE MAPS

By expert opinion and explanation we take following as attributes related to Different genres of Music.
C_1: Pop: It is usually being pleasurable to listen rather than having much artistic depth. Pop music is generally thought of as a genre which is commercially recorded and desires to have a mass audience appeal.
C_2: Disco: A music which is played in discotheque. These songs employ the use of electronic instruments such as synthesizers.
C_3: Jazz: A musical art form rooted in Western African cultural and musical expression and in the African American blues tradition, with diverse influences over time, commonly characterized by blue notes, syncopation, swing, call and response, polyrhythms and improvisation.
C_4: Rock & Roll: Any of various genres of popular music employing electrical amplification. This evokes unique dance step in itself.
C_5: Semi-Classical: Songs which based on Carnatic Ragas with instruments like guitar, bass, orchestration and Western Rhythmic structure.
C_6: Ghazal: is an originally Persian form of poetry. In the Indian sub-continent, Ghazal became the most common form of poetry in the Urdu language and was popularized by classical poets like Mir Taqi Mir, Ghalib, Daagh, Zauq and Sauda amongst the North Indian literary elite. Vocal music set to this mode of poetry is popular with multiple variations across Iran, Afghanistan, Central Asia, Turkey, India, Bangladesh and Pakistan. Ghazal exists in multiple variations, including semi-classical, folk and pop forms.
C_7: Khyal: It literally meaning "thought" or "imagination" in Hindustani, is unusual as it is based on improvising and expressing emotion. A Khyal is a two- to eight-line lyric set to a melody. The lyric is of an emotional account possibly from poetic observation. Khyals are also popular for depicting the emotions between two lovers, situations of ethological significance in Hinduism and Islam, or other situations evoking intense feelings.
C_8: TheruKoothu: Koothu is an informal dance structure, Artists are trained to sing in their own voice and in a high pitch to reach entire crowd, since no technology available at earlier days. It is a street dance or street play or street dramasince it will be performed in the village squares.
C_9:Dandiya: It is the traditional folk dance form of Vrindavan, India, where it is performed depicting scenes of Holi, and lila of Krishna and Radha. Along with Garba, it is the featured dance of Navratri evenings in Western India.
C_{10}: Gana:It is a type of Tamil song, often accompanied by the percussion of Dappankoothu. It is characterised as a fast beat song, with less emphasis on meaning, sung at a celebration. Initially, this was very popular with Indians from Chennai to relax while doing stressful work. It gained further popularity

International Journal of Computing Algorithm
Volume: 03, Issue: 01 June 2014, Pages: 80-83
ISSN: 2278-2397

when a few songs were used in Tamil cinema.We have given the Table1 belowwhich consists of the songs under the composition of above genres of music.

We take three experts opinion on the three disjoined unequal classes. Let the disjoint classes be B_1, B_2, B_3 such as B_1= { C_1, C_3, C_5, C_{10} }, B_2 = { C_2, C_6, C_9 } and B_3 = { C_4, C_7, C_8 }.

The directed graph is given by the first expert C_1, C_3, C_5, C_{10} which forms the class B_1.

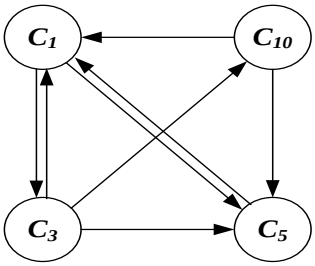

Figure 1

The related connection matrix is given by the first expert opinion as follows.

$C_1C_3C_5C_{10}$

$$M_1 = \begin{matrix} C_1 \\ C_3 \\ C_5 \\ C_{10} \end{matrix} \begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$

The directed graph is given by the second expert C_2, C_6, C_9 which forms the class B_2.

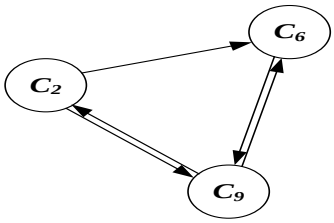

Figure 2

The related connection matrix is given by the second expert opinion as follows.

C_2C_6 C_9

$$M_2 = \begin{matrix} C_2 \\ C_6 \\ C_9 \end{matrix} \begin{bmatrix} 0 & 1 & 1 \\ 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

The directed graph is given by the third expert C_4, C_7, C_8 which forms the class B_3.

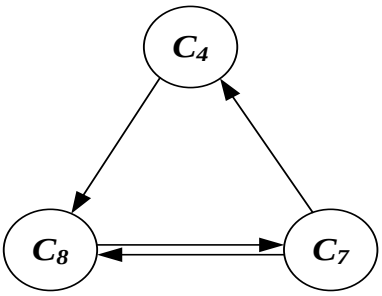

Figure 3

The related connection matrix is given by the third expert opinion as follows.

C_4 C_7 C_8

$$M_3 = \begin{matrix} C_4 \\ C_7 \\ C_8 \end{matrix} \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

Now we give the combined block disjoint fuzzy cognitive map (CDBFCMs) which forms the class S given as follows

C_1 $C_2C_3C_4C_5C_6$ C_7C_8 C_9C_{10}

$$S = \begin{matrix} C_1 \\ C_2 \\ C_3 \\ C_4 \\ C_5 \\ C_6 \\ C_7 \\ C_8 \\ C_9 \\ C_{10} \end{matrix} \begin{bmatrix} 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Table 1: Different genres of music and corresponding Tamil songs

Western	**Pop**	**Disco**	**Jazz**	**Rock & Roll**
	Maya Machindra, Kadhal yAnaikal, Konjum Nilavu	Hey unnai ThAnae, I'm a disco dancer, Kannum kannum Nokia	Adiyae adiyae, Aaromalae	Ram Ram Ram Aarambam
Carnatic	**Semi-Classical**			
	Nenjinilae Nenjinilae, AyyankAru Veettu Azhakae, Katril Varum Keethamae, Kannodu KaanpathelAm thalaivA			
Hindustani	**Ghazal**		**Khyal**	
	KaNNAlanae enadhu kannai		Varaha Nadhikkaraiyoram	
Folk	**Therukoothu**	**Dhandiyaa**	**Gana**	
	OoroorA Puliyamaram	DhAndiyA AttamumAda	Otra SollAla Yen, Adi PonA Avani Nee	

International Journal of Computing Algorithm
Volume: 03, Issue: 01 June 2014, Pages: 80-83
ISSN: 2278-2397

Let us consider the state column vector / initial vector be P_1 = (1 0 0 0 0 0 0 0 0 0).

P_1S = (0 0 1 0 1 0 0 0 0 0)
↪(1 0 1 0 1 0 0 0 0 0) = P_2

P_2S = (2 0 1 0 2 0 0 0 0 1)
↪(1 0 1 0 1 0 0 0 0 1) = P_3

P_3S = (3 0 1 0 3 0 0 0 0 1)
↪(1 0 1 0 1 0 0 0 0 1) = P_4 = P_3which is the fixed point for S.

IV. CONCLUSION

Based on our study we conclude that Pop, Jazz, Semi-Classical and Gana songs have popularity among people while listening to different genre of music. Most of the listeners used to hear these genres of music among the above mentioned ten from South part of India particularly in Tamilnadu. The composers have given these songs with variety of music structure such as rhythm patterns, style of handling ragas, percussion styles in Gana songs which influences listeners to hear again and again . And these genres of music lead to get enjoyable moments and relaxation.

ACKNOWLEDGEMENT

This research is supported by UGC scheme MANF. Award Letter ID: F1-17.1/2011/MANF-CHR-TAM-7467/(SA-III/Website).

REFERENCES

[1] A.Victor Devadoss, S.M.A Shahul Hameed, “A Study of the Attitudes of Road user using Combined Fuzzy Cognitive Maps(CFCMs), International Journal of Computer Applications, Volume 59, No. 13, December 2012

[2] A. Victor Devadoss, S. Aseervatham, “A Comparative Study Between Properties of Carnatic Ragas and Emotions of Devotional Songs using Bidirectional Associative Memories (BAM)”, International Journal of Engineering and Research Technology (IJERT), Vol. 2 Issue 6, ISSN: 2278-0181, June – 2013.

[3] Bart Kosco, “Neural Networks and Fuzzy System: A Dynamical System Approach to Machine Intelligence”, Prentice Hall of India,1997.

[4] Bart Kosco, “Fuzzy Cognitive Maps”, International Journal of Man-Machine Studies”, January, 1988, pp.62-75.

[5] Laura-Lee Balkwill and William Forde Thompson, “A Cross-Cultural Investigation of the Perception of Emotion in Music: Psychophysical and Cultural Cues”, Music Perception, Fall, 1999, Vol.17, No.1, pp.43-64.

[6] Mahadevan Ramesh, “A Gentle Introduction to South Indian Classical (Karnatic) Music”, Indian Melody, webmaster@indianmelody.com.

[7] MrigankaSekhar Chakraborty, “Indian Musicology - Melodic Structure”, Firma KLM Private Limited, 1992.

[8] Raymond Elliott, “Fundamentals of music”, Prentice Hall.

[9] W. B. VasanthaKandasamy and FlorentinSmarandacheMay, “Analysis of Social Aspects of Migrant Labourers Living with HIV /AIDS using Fuzzy theory and Neutrosophic Cognitive Maps with Special Reference to Rural Tamilnadu in India”, Xiquan, Phoenix, 2004, USA.

[10] W.B. VasanthaKandasamy, FlorentinSmarandache and K.Ilanthenral, “Elementary Fuzzy Matrix Theory and Fuzzy Models for Social Scientists”, Automaton, Los Angeles, 2007, USA.

[11] Wendy Suiter, “Toward Algorithmic Composition of Expression in Music using Fuzzy Logic”, Proceedings of the 2010 Conference on New Interfaces for Musical Expression (NIME 2010)”, Australia,2010,p.319-322.