Dynamic Music Recommender System Using Genetic Algorithm

Manjula Athani, Neelam Pathak, Asif Ullah Khan

Abstract- Web-based systems are popular in many different areas, with the users they tend to deliver customized information by means of utilization of recommendation methods.The recommender system also has to recognize and provide items corresponding with user favorites. In this paper we presented a dynamic recommender system for music data. This system is able to identifying the n-number of users preferences and adaptively recommend music tracks according to user preferences. we are extracting unique feature of each music track. Then we are applying BLX-a crossover to a extracted features of each music track. User favorite and user profiles are included. Multiuser dynamic recommender system for n-user combines the two methodologies, the content based filtering technique and the interactive genetic algorithm by providing optimized solution every time and which is based on user's preferences hence it give better result and better user system..

Keywords: recommender system: Interactive genetic algorithm; BLX-a crossover.

I. INTRODUCTION

When users browse through a web site they are usually looking for items by their interest. Interest items can consist of a number of things. A recommender system should also be able to provide users with useful information about the item that interest them. The ability of promptly responding to the changes in user's preference is a valuable asset for such systems. A Recommender system for music data[1] it proposed which assists customers in searching music data and provides result with items resulting in own user preference. This system first extracts unique properties of music like pitch, chord, and tempo from the music file using a CLAM annotator software tool. This extracted data is then stored on the database. Each stored property is analyzed using content Based filtering and interactive genetic algorithm. After acquiring records, the system recommends items Appropriate to user's own favorite.

This paper is organized as follows, In Section II reviews related works. Section III describes the structure of our recommender and explains how to operate the genetic algorithm in this system Section IV implementation of proposed system. V Result of the proposed work.finally Section VI Conclusion.

II. RELATED WORK

A Recommender Systems

The main task of recommender system is how to recommend items tailored with user's preferences from the resources. According to the user favorite the recommender system provide the items corresponding with the user favorite.

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To obtain useful information on product and service, the recommender system is viewed as a powerful system for people . The recommender systems also has to recognize and provide items corresponding with favorite of users. In order to resolve this matter there are two approaches in a recommendation system have been discussed in the literature i.e, content based filtering approach[2] and the collaborative filtering approach[3][4].

In the content base filtering is based on the information and characteristics of the items that are going to be recommended In other words, these algorithms try to recommend the items that are similar to those that are liked in the past[5].In this various candidate items are compared with items previously rated by the user and the best matching items are recommended.

In the collaborative filtering approach,the recommender system provides recommendation by collecting users profiles and discovers relations between each profile. After identifying correlation of each profile, the system classifies users having profiles that are similar to the others The system then recommends items derived from other profiles in the same group. The advantage of this approach, is that it has a high possibility to recommend items corresponding with user's preference by providing environments in which each user can share his own profile[5].

However, the content-based system approach has limitation such that it focuses on only the accessed items and is not prompt to immediate changes in the potential interest of users. To overcome these limitations, we combine the content-based filtering approach and the genetic algorithm in our proposed system .

Music Feature Extraction

Using the feature extraction technique that derives the properties from the specific data such as music.In our proposed system the content base filtering is used to aquire information from the music data.In the content base filtering technique the analysis of items is required step for filtering items. Using the CLAM annotator tool these properties are analyze.

Interactive Genetic Algorithm

A Genetic algorithm is a search technique used in computing to find true or approximate solution to optimization and search problems[6][7].Genetic algorithms belong to larger class of evolutionary algorithms which generates solutions to optimization problems[8]. algorithm use technique inspired by natural evolution, as inheritance, mutation, selection and crossover.

III. SYSTEM OVERVIEW

The recommender system described in this paper is based on the genetic algorithms. The content-based filtering technique is applied to generate the initial population of genetic algorithm. In the proposed system, we employ the interactive genetic algorithm so that the users can directly

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evaluate fitness value of candidate solution themselves. Due to the subjective evaluations, our system can recognize and recommend items tailored with different user preferences[9]. The recommender system is divided into three phases: feature extraction phase, evolution phase, and interactive Genetic algorithm phase. The clam software is provided with music file which extracts unique properties of music like pitch, chord, and tempo. This extracted data is then stored on the database. Each stored data is analyzed using content based filtering and interactive genetic algorithm. After analyzing records, the system recommends items appropriate to users own favorite.

The user is provided with a general list from which users can select the audio tracks, listen to it and give rating recommendation list and user favorite list where that user has given highest rating to the audio tracks.

Phases of Genetic Algorithm

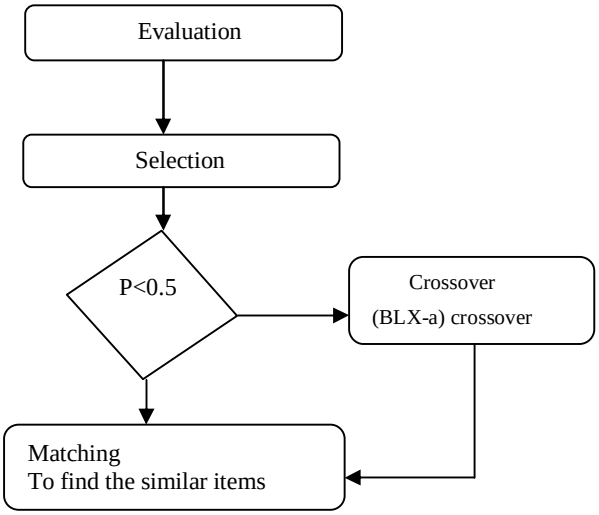

Fig:-The process of Interactive GA phase.

The following are phases of generic algorithm are as follows:

Selection phase –Using CLAM software Music features are extracted . In this system Truncation selection is used, Those records which fall below threshold value are not selected and are ignored [10][11]. The selected ones form the initial population for the genetic algorithm, where these records value are used in the next phase of this application.

Crossover phase –The BLX – a crossover[12][13] algorithm is used since extracted features are real numbers. Hence crossover is performed with this algorithm resulting in new generation. This algorithm is used to generate new off springs after the crossover step.

In this system, we do not consider mutation because we focus on finding items which are most appropriate to user preferences. Since the mutation operator would cause candidate solutions to deviate from the common pattern discovered by the evolution process, it should omit.

Crossover Algorithm: BLX-a

1. Select two parents X(t) and Y(t) from a parent pool
2. Create two offspring X(t+1) and Y(t+1) as follows:
3. for i = 1 to n do
4. di=|xi(t)-yi(t)|
5. Choose a uniform random real number u from interval <min(xi(t),yi(t))-adi, max(xi(t),yi(t))+adi>
6. xi(t+1)=u
7. Choose a uniform random real number u from interval <min(xi(t),yi(t))-adi, max(xi(t),yi(t))+adi>
8. yi(t+1)=u
9. end do

where: a – positive real parameter

Matching phase- This phase finds the similarity between music features stored in database to the newly generated music features. Once similarity is found those items are recommended to the user.

This phase uses Euclidean distance between two offspring and distance between each feature of the two offspring is calculated, resulting value is used to match the records stored in the database. Those records are compared with the resulting value which the user has given highest rating to he tracks.

Euclidean Formula:

$$dij = \sqrt{\sum_{k-1}^{n} \left(x_{ik} - x_{jk}\right)^2}$$

Where i and j are two items and k is the length of each music property.

IV. THE EXPERIMENT

In this section, we describe the implementation of our proposed system and experiment results of n-users can dynamically register and give ratings.

Proposed Implementation:

We incorporate with this system, which is implemented in .NET the information gathered in the previous step (*Feature Extraction Phase).* We then build a website providing an experimental environment to make it convenient for the user evaluation.

The website provides essential information such as artist name, songs title category, user count, give rating and overall rating; user favorite and user profiles are included. users can rate their preferences about each music item by clicking the corresponding icon. Each time a user evaluates a page of n-items. On any page any user can rate it and overall rating we get it. The initial page is statically generates according to database. The successive page is constructed based on the user evaluation. Dynamically n-number of songs can be added. Below table shows the experiment result as shown below diagram.

V. RESULT OF THE PRAPOSED WORK:

Artist	*Title*	*Category*	*User count*	*Give rating*	*Music*
Himesh	I love You	Romantic	36	★★★	Listen
A.R.Rehaman	Sadda haqq	Romantic	55	★★★	Listen
K.K	Mera bro ki Dhulan	happy/fun	26	★★★	Listen
Vijay	Govinada	Dance	32	★★★	Listen
Neha Basin	Dhunki	Rock	24	★★★	Listen

Fig:- Experimental Results.

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VI. CONCLUSION

In this paper we presented a dynamic recommender system for music data. Our proposed system is able to identifying the n-number of users preferences and adaptively recommend music tracks according to user preferences by applying BLX-a crossover to extracting features of each music track. Thus we incorporated the main Interactive genetic algorithm based engine with content based filtering method .In this system User favorite and user profiles are included. On any page user can rate and overall rating we get it. According to subjective decision This system enables n-user can dynamically register and give ratings hence it give better result and better user system.

REFERENCES

[1] Hyun-Tae Kim,Jong-Hyun Lee, Chang Wook Ahn :A Recommender system Based on Genitic Algorithm for Music Data Second International Conference on Computer Engineering and technolory v-6 415

[2] Balabanovic ,M.and Shoham,Y.(1997).Recommender as classification: Using Social and Content Based Information in recommendation. In Proceedings of National Conference on Artificial Intelligence,PP.714-720.

[3] Goldberg,D.,Nichols,Oki,B.M.,andTerry,D.(1992).Using Collaborative Recommendation.In Proceedings of European Conference on Research,7,pp 395-410.

[4] Balabanovic ,M.,Shoham Y.FAB: Content-based,Collaborative recommendation.Communications of the Association for Comuputing Machinery 40(3)(1997) 66-72.

[5] D.E. Goldberg and J.H. Holland. “Genetic Algorithm and Machine Learning” Machine Learning,vol 3,n0 2-3,pp95-99,1988.

[6] H. Takagi,” Interactive Evolutionary Computation: Fusion of the Capabilities of EC Optimization and Human Fvalution, ”Proceedings of the IEEEE, vol 89, pp.1275-1296,2001

[7] D.Thierens and D.Goldberg, “Elitist Recombination: An Integrated Selection Recombination GA, “ in Proceedings of the First IEEE Conference on Evoltionary Computation,pp508-512,1994.

[8] J.F. Crow and M. Kimura, “ Efficiency of Trucation Selection ,”in Proceedings of the National Academy of Sciences of the United States of America, vol 76, no 1 396-399,1979.

[9] F. Herrea,M.Lozano,and J.L. Verdegay, “Trackling Real-coded Genetic Algorithms : Operators and Tools for Behavioural Analysis, ”Artificial Intelligence Review, vol 12,265-319,318.

[10] R .Burke. “Hybrid Web Recommender Systems” Lecture Notes in Computer Science,vol.4321,pp 377-408,Sringer Berlin: Heidelberg,2007.

[11] M.J.Pazzani, “A Framework for collaborative, content-based and Demographic Filtering, ”Artificial Intelligence Review,vol.13,no 5-6,pp .394-408,1999.

[12] Elitist Recombination, An Integrated selection; Recombination GA ,In proceeding of the first of the first IEEE conferences on Evolutionary Computation ,pp 508-512,1994.

[13] J.F. Crow and M. Kimura,” Efficiency of Truncation Selection “ in proceedings of the National Academy, of science of the United States of Americal,vol,76 no 1 ,pp 396-399,1979.

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