Real Time Recommender System for Music Data

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Abstract
Recommender 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 tempo of each music using Myrsyas Tool. Then we are applying BLX- α crossover to a extracted feature of each music track. User favorite and user profiles are included. This system have been emerging as a powerful technique of e-commerce. The majority of existing recommender systems uses an overall rating value on items for evaluating user's preference opinions. Because users might express their opinions based on some specific features of the item, recommender systems could produce recommendations that meet user needs. In this paper we presented a Real time recommender system for music data. Multiuser Real time recommender system 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 We can also share the favorite songs to other user hence it give better result and better user system.

Keywords:
Recommender system, Interactive Genetic algorithm, Content Based filtering BLX- α

1. Introduction

The amount of information on ecommerce sites are increasing day by day. it becomes difficult for ecommerce users to choose the desired product from such an bulk of information. Recommender systems are an effective solution for it. Recommender System[1] are normally an information filtering technique that predicts the user items according to users personalized information obtained from results of algorithm. In case of music website different categories of music may be available recommendation in this type of application will include recommending every user music according to the rating of the song and user profile and preferences.

2. Scope of the Project:

The proposed system has great scope since this system can be used in almost ecommerce sites for music .we have chosen music since unlike other products one cannot just view and select the product.listening to all music may be tedious task.so this system can be of a great use in such cases.since this system is a dynamic one. Recommendation results for each user changes with the user preference.

3. Proposed Work:

This system first extracts unique property of music tempo from the music file using a MYRSYAS TOOL This is Music Analysis and Retrieval Systems for Audio Signals. Myrsyasusesibt to find the value of tempo of each song. This extracted data is then stored on the database. Each stored property is analyzed using content based filtering[2],[3] and interactive genetic algorithm. The final step after applying genetic algorithm is displaying the items that are closest to the items which the user has given the highest rating. Using Euclidean distance formula the nearest possible music feature which are matching with the one generated by crossover step of genetic algorithm are matched and given as out for recommended items. Here a separate recommendation page is displayed where the top ten similar records matching which the two off springs generated is displayed.

Genetic algorithm procedure:

1. [Initialization] Randomly generate an initial population of solutions and evaluate the fitness function.
2. [New population] Create a new population by repeating the following steps .
   2.1[Selection] Select two parent solutions from a population according to their fitness (the better fitness, the greater the chance to be selected)
   2.2[Crossover] With a crossover probability cross over the parents to form a new offspring. If offspring is exact copy of parents then no crossover is performed.

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2.3[Mutation] With a mutation probability, At each position mutate new offspring.

2.4[Acceptance] Place new offspring in a new population.

3. [Evaluation] Compute the fitness values for the new population of N solutions.

4. [Test] If the stopping criterion is met, stop, and return the best solution in current population.

3.1 Related Work

Recommender systems are internet-based software tools provides user with intelligent suggestions recommender systems for music data produce a list of recommendations. 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. 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 and the collaborative filtering approach.

In the content base filtering is based on the information and characteristics of the items that are going to be recommended.. In this various candidate items are compared with items previously rated by the user and the best matching items are recommended.

However, the content-based system does not support the immediate changes in the potential interest of users. To eliminate these limitations, we combine the genetic algorithm approach and thecontent-based filtering in our proposed system .

Music Feature ExtractionMARSYAS (Music Analysis Retrieval and Synthesis for Audio Signals) is a free software framework for audio analysis, synthesis and retrieval The main goal of Marsyas is to provide an extensible framework that can be used to quickly design and experiment with audio analysis and synthesis applications.

IBT [4] was developed in C++ and is freely available, under GPL licensing, in MARSYAS .ibt–standing for INESC-Porto Beat Tracker – is a tempo beat tracking system. Which will give the value of tempo[5]. The slow tempos are at the rate of 63,72,and 80 these tempo are most effective on sad songs.The fast tempos very strongly affect the happy-gayandvigorious groups and at the rate of 102,104,112,152.

3.1.1 Interactive Genetic Algorithm:

A Genetic algorithm is a search technique used in computing to find true or approximate solution to optimization and search problems.Genetic algorithms[6],[7] 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.

4. 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 evaluate fitness value of candidate solution themselves. After the evaluation , our system can recognize and recommend items tailored with different user preferences.

The recommender system is divided into three phases: feature extraction phase, evolution phase, and interactive Genetic algorithm phase. The MYARSYAS software is provided with music file which extracts unique property of music tempo. This extracted data is then stored on the database. Using the content based filteringand interactive genetic algorithm the stored data is analyzed. After analyzing records, the system recommends items appropriate to users own favorite.

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

4.1 Phases of Genetic Algorithm

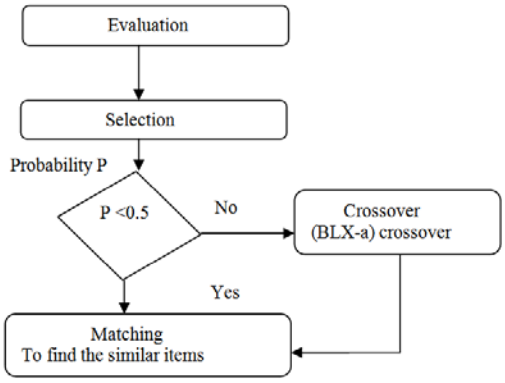

Fig 1 -The process of Interactive GA phase.

4.1.1 The following are phases of generic algorithm are as follows:

4.1.1.1 Selection phase

Using MYRSYAS software Music features are extracted . In this system Truncation selection [9] is used, Those records which fall below threshold value are not selected and are ignored. The selected ones form the initial population for the genetic algorithm, where these records value are used in the next phase of this application.

4.1.1.2 Crossover phase

TheBLX–α crossover algorithm is used since extracted features are real numbers. Hence crossover is performed with this algorithm resulting in new generation.

Blend Crossover (BLX-α) was proposed by Eshelman and Schaffer(1993).It is reported that BLX (α=0.5) performs better than BLX operators with other α value.This algorithm is used to generate new off springs after the crossover step.

Crossover Algorithm: BLX- α

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. fori = 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))-α*di, max(xi(t),yi(t))+ α*di>
6. xi(t+1)=u
7. Choose a uniform random real number u from interval <min(xi(t),yi(t))- α*di, max(xi(t),yi(t))+ α*di>
8. yi(t+1)=u
9. end do

4.1.1.3 Matching phase

This phase finds the similarity between music features stored in database to the newly generated music features. The system recommended itemswhich are similar .

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 have highest rating given by the user.

Euclidean Formula:

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

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

5. The Experiment

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

5.1 Proposed Implementation:

We incorporate with this system, which is implemented in .NET the information gathered from Feature Extraction Phase. We then construct a website providing an experimental environment to make it easy for the user .

The website provides essential information such as artist name, songs title category, user count, give rating and overall rating; user favorite and user profiles[10],[11],[12], 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[13][14]. 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. One user can share their favorite to the other user. Below table shows the experiment result as shown below diagram.

6. Result of The Praposed Work:

Song id	Artist	Title	Category	User Count	Tempo	Music
11	Sonu Nigam	Ai Zindagi	Sad	2	82.0000	Listen
23	Prakash	Govinda re	Dance	4	85.0000	Listen
35	Akon	dance floor	Pop/Remix	3	85.0000	Listen
10	Blaaze	Hosanna	Sad	9	86.0000	Listen
30	Neeti Mohan	Darbadar	Dance	2	86.0000	Listen
34	Sonu Nigam	Ramaiya	Romantic	4	91.0000	Listen
24	Avdut Gupta	Hey Lomboder	Happy/Fun	5	92.0000	Listen
33	Sayira	Ektha Tiger	Pop/Remix	3	92.0000	Listen
36	Sherya	Yarayara	Romantic	4	92.0000	Listen
6	Neha Basin	Dhunki	Dance	7	96.0000	Listen

Fig 2- Result of Experiment.

Conclusion

In this paper we presented a real time recommender system for music data. In this system is able to identifying the n-number of users preferences and adaptively recommend music tracks according to user preferences by applying BLX α 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. We can also share the favorite songs to other user hence it give better result and better user system. According to subjective decision This system enables n-user can register and give ratings hence it give better result and better user system.

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