Music Recommender system

Team Kitkat

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**Dataset(Slide 3):**

We have used movielens Database, the primary reason for using this database was that it provided the perfect information to implement our solution for the recommendation. It consisted of 100000 ratings given by 933 users to 1682 movies. Our main focus was on user, item, rating matrix and information of each item(movie) on the basis of genre. Also, the same solution can be implemented to music if data was provided for the same.

**Model Used(Overview):**

We have used a hybrid model to improve the solution of the problem. Initially, we have applied user-user based collaborative filtering and predicted the ratings matrix. Upon this, we have implemented genre based learning which will tweak the predictions given by collaborative filtering on the basis of user liking for the genres. In-depth information is explained later in the document.

**Collaborative Filtering(Slide 4):**

Explained basic user-user based Collaborative Filtering. What it does to predict the user ratings.

**Cosine Similarity(Slide 5):**

Type of similarity that we have used to calculate the similarity between two users and also explains the formula for the same.

**Prediction Computation(Slide 6):**

In this slide, we have explained the formula used for predicting rating of item i by user j based on the similarity of that particular user j with all the users that have given ratings to that particular item i.

Next slide(number 7) has the RMSE of collaborative filtering.

**Genre-Based Learning(Slide 8):**

In this slide, we have explained how the user learning for genre takes place. It is based on item’s description and user’s preference profile. Also, the user will get personalized experience as it does not depend on other similar users. Each user will have a scale of

1 -10 for every genre(there are 19 genres defined in our database) so there will be an array of 19 elements initially 5 for each user. Now the increase and decrease in genre preference will solely depend on the reward and penalty function that we have designed for the system.

**Reward/Penalty Function(Slide 9):**

In this slide, we have explained the equations and graphs of reward and penalty functions. It can be clearly seen that initially, the learning of the user for a particular genre would be more intense i.e. If a user has discovered an item of a particular genre for the first time and rates it higher than the genre liking for that particular genre will increase more as compared to the genre already discovered and prefered. Take an example that if a user likes a genre for the first time then it will increase the genre preference of that genre by 0.5(Note:- Taken for understanding purpose it depends on the equations shown in the slides) while if his/her genre liking is already at 7 then it will increase it by only 0.2(For understanding purpose). Also, information about all the parameters included in the formula is there on the slide.

**Hybrid Model(Slide 10):**

Now how the hybrid model works is we already have predicted rating matrix from collaborative filtering. Now we will inculcate the genre based learning of every user and tweak the prediction rating matrix by the function explained in next slide.

**Error Correction Function (Slide 11):**

Here we have explained how the rating will change according to the user liking of genres. As in the graph, we can see there are four curves now each curve represents how the prediction will change when the user liking for that genre is higher. For example, if a user likes a genre(7 on the scale of 1-10) than prediction change would be different when he likes a genre(8 on the scale of 1-10). Same goes for the lower genre preference. Also, information about all the parameters included in the formula is there on the slide. Now changing beta would result in how much you want to change the prediction matrix.

Next Slide(12) contains the RMSE of the Hybrid system and we were successfully able to bring down the error by 0.1072

**Recommendation (Slide 12):**

In our system, we have recommended the user 6 movies on the basis of the prediction matrix higher the rating higher are the chances to be recommended. 2 on the basis of global rating and 2 movies to surprise and discover movies that he has not explored.

The last slide contains the output of the system.