Design and Analysis of Hybrid Online Movie Recommender System

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Abstract: *Recommender system is a kind of web intelligence technique to make information filtering for people on daily basis. The core technology to implement this type of recommender system includes content analysis, collaborative filtering and some hybrid approach. Since they all have certain strengths and weaknesses, and combining them may be an inspiring solution. In this paper, a hybrid online movie recommender system has been proposed in which content and collaborative filtering techniques are combined for enhanced and improved recommendations to the user.*

Keywords*: Recommender System, Collaborative Filtering*

1. Introduction

In this age of information overload on the Internet, users have various strategies to make choices, so it becomes difficult for them to choose the best one from variety of options [1]. This contributes to the emergence of new technology- recommender system [2]. Recommender Systems are software tool or technique which provides or suggests items to the users. These are being applied in several of fields

such as movie recommendations, songs recommendations, e-commerce [3] and many more.

A recommender system works by acquiring or procuring the knowledge of users either explicitly or implicitly [4] and of items and has the classification shown in fig.1 [5].

Collaborative filtering, content-based filtering, and hybrid filtering- combination of two or more

approaches are commonly used approaches for recommendation. Content-based filtering suggests items based on the correlation between the user preferences and the content of the items. Content-based recommender system has one common problem is that it can only recommend items scoring highly against the user profile. In collaborative filtering, new items are recommended to the user using the rating data given to such items as purchase history and the system calculates preference similarities among users from ratings.
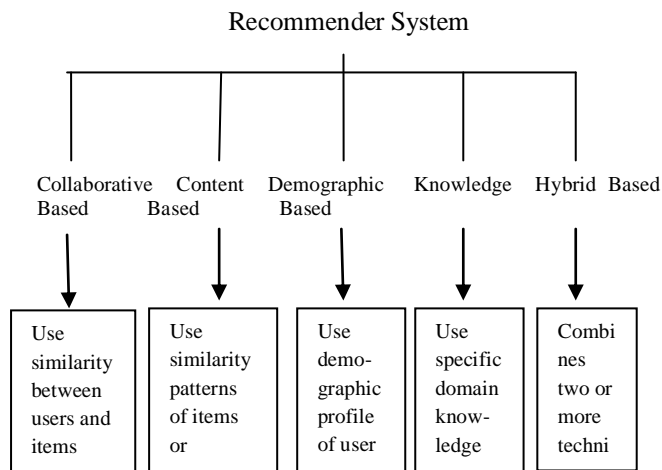
Fig.1. Classification of Recommender System

In this paper a movie recommender system is proposed, based on content and collaborative filtering. In content-based recommender system the recommendations are provided based on the profiles of users that are created at the beginning. A profile has information, such as age, gender, occupation, taste, etc. Taste is based upon how the items are rated by the user. For recommendation, the engine compares the items that were rated by the user with that are not rated by the user to calculate similarities. Items that are similar to rated items will be recommended to the user.

The proposed system using the collaborative filtering in which the focus is on relationship between users and items. Similarity of items is calculated by similarity of ratings of those items by the users who have rated both items. Consequently, enough information from users is required to make better recommendations. Though, users are often unable to assess all the information in the system, which lead to the 'rating sparsity' problem in collaborative filtering systems [8]. Another issues which have been identified as restrictions to the system are scalability and transparency [9].

This paper consists of five sections. Section 2 describes the related work. Section 3 describes the

methodology to be followed for recommending movies to the user. Section 4 and 5 wraps up this paper with its future work and conclusion.

2. Related Work

Many of the recommendation systems have been developed in variety of domains. These systems use different approaches [5]. Number of the online recommendation systems for various applications that recommends items to active users based on ratings provided by previous users with similar choices or interests. One such system was designed by Jung, Webster and Herlocker in 2004 to improve search results. The system encourages users to enter widen and more informative search queries, and collects ratings from users with reference to whether the search results meet their information need or not. This rating information is then used to recommend items to later users with similar interests.

Filtering techniques have been applied in many areas of applications, and the proposed system is not the first one to attempt to make predictive recommendations about movies. MovieLens, IMDB and many more are examples that implements recommender systems in context of movies. MovieLens is an online recommendation system in which the user is first invited to rate certain movies when login to the system first time. This information of ratings is then used to recommend movies to the users which have not seen. It uses collaborative filtering technique based on ratings by similar.

Contextual information is another facet that can be used for enhanced and improved recommendations. This is extremely helpful in recommendation or recommender systems where other factors such as the time, location, etc. also play a weighty role in user preferences. The systems which exploit such information in providing recommendations are known as context-aware recommender systems.

Today, when the mobile gadgets are getting popular in our day to day life, these sorts of recommender systems are especially important. GPS and other technologies can be used by recommender systems to quickly get any information about the location of the user and user itself. [10]

User preferences based collaborative filtering approach may cause some problems. First, there is sparsity problem that occurs when enough data is not available about user preferences. This problem affects the accuracy of the recommendation systems using collaborative filtering [12]. Second one is the cold-start problem that occurs when new user or

items are added without enough information [13]. This entails that a user without ratings cannot have a neighbour. The system cannot recommend an item to a new user who has no ratings. In other words, the system has to wait until all the users have enough ratings before recommending items [14].

Collaborative filtering which used in the field of recommender system is criticized for various reasons. Some authors claim that collaborative filtering would be ineffective in domains where more items than users exist. Others believe that users would not be spending time for explicitly rating research papers [15].

Several authors via research papers documented the benefits of use of collaborative tagging. Vander Wal [18] and Mathes [19] have discussed the potential benefits of tagging for personal information management. Vander Wal [18] has observed that in tagging systems there exists a powerful tool, allowing users to index their information resources with their own keywords [20].

From the literature survey we conclude that sometimes the recommendations are not applicable in our daily life. Only pre-analysis is performed for recommending items and also the data retrieval is not fast. This paper proposed a hybrid recommender system which provide more relevant recommendations and also fast retrieval of data with pre and post analysis. And we are using this system for movie recommendation.

3. Proposed Work

This paper proposed a hybrid recommendation system which provides movie recommendations based on content and collaborative filtering techniques. The methodology to recommend movies has the following steps with explanation:

a) Initially the when the new user sign in its profile information will be stored in user database.

b) In second step the system will fetch the ratings of the movies and store this information in movies database.

c) In the next step relevant features have to be gathered to use in movie recommendation system.

d) Then we collect those users who shared common movies with the active user i.e. determine the neighbour set for active user.

e) In next step the system find the movies with maximum ratings.

f) Then a list of recommendations will be generated.

Step 1: Collect user information

For the new user, the system requests to register him an account to gather his personal information and also the ratings of a set of movies.

Step 2: Create movie database

Collect the movie information such as title, actors, director, release date, ratings etc. for recommendations.

Step3: Movie Recommender

This phase recommend movies to the user and use following steps for recommendation:
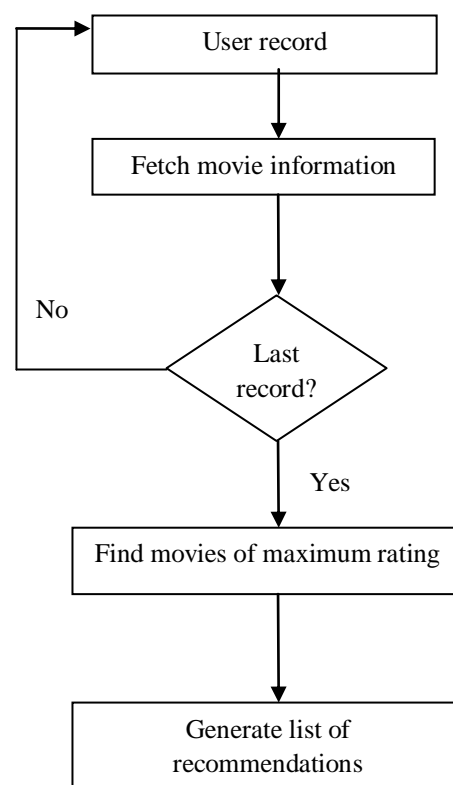
Fig.3. Flowchart for updating recommendations

4. Discussion and Future Work

Finding the pertinent information from immense data available online is very difficult. Recommender systems provide solution to this problem which

suggests relevant items to the user. Wrong recommendations assigned to the user tend to decrease the efficiency of the system but this problem is reduced by using our hybrid system and optimal recommendations are provided to the user. The proposed system use hybrid filtering technique for movie recommendations and further we can add more datasets available online. Also we can use social tagging and to enhance the system and its performance.

5. Conclusion

This paper proposed the system to recommend items to new users by collecting taste information of new users (preferences) and comparing their tastes with many users. This system help users by providing relevant movie recommendation based on user feedback using simple GUI. This system will help users to deal with information overload by giving them better recommendations. The simplicity of the design prevents any confusion. Layouts and menu are fluid and easy to use. The system becomes self-learning as more people use the system and gives their knowledge to the system and ultimately its capability to return related research parameters helps to solve users' problems.

References

[1] F Ricci, L Rokach, B Shapira, "Introduction to recommender systems handbook," Springer US, 2011.

[2] P. Resnick and Hal R. Varian, "Recommender Systems. Communications of the ACM," 40(3):56-58, 1997.

[3] J. Ben Schafer, J. Konstan, and J. Ri edl, "Recommender Systems in E-Commerce," pp. 158–166, 1999 In Proceedings.

[4] K. Choi, D. Yoo, G. Kim, and Y. Suh, "A hybrid online-product recommendation system: Combining implicit rating-based collaborative filtering and sequential pattern analysis," *Electron. Commer. Res. Appl.*, vol. 11, no. 4, pp. 309–317, Jul. 2012.

[5] R. Burke, "Hybrid Web Recommender Systems," Springer Berlin Heidelberg, pp. 377–408, 2007.

[6] G. Groh and C. Ehmig, "Recommendations in Taste related Domains: Collaborative Filtering vs. Social Filtering," In *Proceedings of GROUP '07*, pp. 127–136, 2007. ACM.

[7] A. Said, E. W. De Luca, and S. Albayrak, "How Social Relationships Affect User Similarities," In *Proceedings of the 2010 Workshop on Social Recommender Systems*, pp. 1–4, 2010.

[8] H. Lee, H. Kim, "Improving Collaborative Filtering with Rating Prediction Based on Taste Space," Journal of Korean Institute of Information Scientists and Engineers, Vol.34, No.5, pp.389-395, 2007.

[9] P. Li, and S. Yamada, "A Movie Recommender System Based on Inductive Learning," IEEE Conf. on Cybernetics and Intelligent System, pp.318-323, 2004.

[10] W.Woerndl and J. Schlichter, "Introducing Context into Recommender Systems," Muenchen, Germany: Technische Universitaet Muenchen, pp. 138-140.

[11] G. Adomavicius and A. Tuzhilin, "Context-aware Recommender Systems," in Recommender Systems Handbook: A Complete Guide for Research Scientists and Practitioners, Springer, 2010.

[12] Huang, Z., Chen, H., & Zeng, D. D. (2004). Applying associative retrieval techniques to alleviate the sparsity problem in collaborative filtering. ACM Trans. Inf. Syst., 22, 116–142.

[13] Ishikawa, M., Geczy, P., Izumi, N., Morita, T., & Yamaguchi, T. (2007). Information diffusion approach to cold-start problem. In: Web intelligence/IAT workshops (pp. 129–132).

[14] Tang, T. Y., & McCalla, G. I. (2004). Utilizing artificial learners to help overcome the cold-start problem in a pedagogically-oriented paper recommendation system. In: Adaptive hypermedia and adaptive web-based systems, third international conference (pp.245–254).

[15] Gipp, Bela, Jöran Beel, and Christian Hentschel. "Scienstein: A research paper recommender system." In International Conference on Emerging Trends in Computing, pp. 309-315. 2009.

[16] Zheng, Nan, and Qiudan Li. "A recommender system based on tag and time information for social tagging systems." Expert Systems with Applications 38, no. 4 (2011): 4575-4587.

[17] Liang, Huizhi, Yue Xu, Yuefeng Li, and Richi Nayak. "Collaborative filtering recommender systems using tag information." In Web Intelligence and Intelligent Agent Technology, 2008. WI-IAT'08. IEEE/WIC/ACM International Conference on, vol. 3, pp. 59-62. IEEE, 2008.

[18] Vander Wal, T., "Explaining and Showing Broad and Narrow Folksonomies," Vanderwal.net,http://www.vanderwal.net/random/ent rysel.php?bl og=1635, 2005

[19] Mathes, A., "Folksonomies – Cooperative Classification and Communication Through Shared Metadata", Adam Mathes.com,USAhttp://adammathes.com/academic/c omputermediatedcommunication/folksonomies.pdf, 2004

[20] Bhatia, Kapil. "Collaborative Tagging for Software Reuse." Computer Science & Engineering Department, Thapar Institute of Engineering\ & Technology, Deemed University (2006).

[21] Triposo, Inc, www.triposo.com.Triposo Travel Guides, 2012

[22] Foursquare, Inc, foursquare.com.Building a recommendation engine, Foursquare style, March 2011

[23] G.Linden, B.Smith and J.York, Amazon.com Recommendations, Industry Report: IEEE Internet Computing, 2003 p.76-80

[24] A.Almeida, B.Coelho, and C.Martins.Intelligent hybrid architecture for tourism services. In max Bramer, editor, IFIP AI, volume 331 of Advances in Information and Communication Technology, pages 205-214.Springer, 2010.

[25] Michael D.Ekstrand,JohnT.Riedl and Joseph A.Konstan, "Colloborative Filtering Recommender Systems," Foundation trends in human-computer interaction,Vol.4.No.2(2010)81-173,2011

[26] "Content based filtering" http://recommender-systems.org/content-based-filtering/

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