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Survey on Study Partners Recommendation for Online Courses

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Abstract - *Massive open online courses (MOOCs) provide free learning occasion for worldwide learners. In MOOCs each student or learner complete interaction with the course material takes on the web. The xMOOCs can eliminate teacher student interaction and involve limited student student interaction. The xMOOCs use automated testing to check students understanding. The students can face problem during learning process like they could not be solved any problem or difficulties by discussing with classmates. The task of study partner recommendation for students based on both content information and social network information they help for improving the completion rate. By analyzing the content of messages posted by learners in course discussion, help to investigate the learner behavior features. The proposed topic model used to measure learners course knowledge responsiveness and to compute similarity over topics among learners. The recommendation of study partner depends on the high topic similarity and high relationship strength to target learner. The recommendation will help to improve the chance to solve problems which encounter during learning process and keep their learning interest.*

Key Words: **MOOCs, xMOOCs, Topic Model, Behavior Model, Recommendation.**

1. INTRODUCTION

Massive Open Online Courses (MOOCs) is an open courses provide free learning occasion for worldwide learners without barriers to entry, cost education criteria. Currently, there are two different types of MOOCs: cMOOCs and xMOOCs. The c in cMOOC stands for connectivist in which learning happens within a network and the learners use digital platforms such as social media platforms like blogs, wikis for making connections with course content. The learners can create and construct knowledge by themselves. The xMOOCs help to eliminate teacher-student interactions and involve limited student-student interactions. xMOOCs focus on targeted short- length videos rather than full-length lectures and use automated testing to check understanding of students as they work through the content. Millions of different professional backgrounds and motivations learners can gather together from different countries in the same classroom. In MOOCs the learners can face problem like low compilation rate with large enrollment. The Many reasons can cause the low completion rate such as insufficient time for learners and language barrier for non-native speaking learners. Researchers in higher education eld try to use social network analysis to help solve problems which occur in there higher education[5]. These methods focused on how to improve teaching quality by importing social networking into traditional teaching classrooms or analyzing relationship between students in the same class. The aim of this topic is to provide methods to recommending study partners for students in the same xMOOCs course. To establish a behaviour model which describe learners behavior features by analyzing their course activities such as posts and comments[11].

A topic model with term dictionary which helps to compute the similarity over topics among courses. A social network for all active students constructed through communication among learners in the course forum. To recommended study partners with high topic similarity and high relationship strength to the target learner. The recommendation will help to improve the chance to solve problems which learners encounter during the learning process and then keep their learning interest.

2. METHODS OF FRIEND RECOMMENDATION

Recommendation systems can be divided into two areas: object recommendation and link recommendation [15]. To recommend study partners to a course learner is similar to recommend a friend to a user in social network. A "friends-of-friends" (FOF) method is most widely used in link recommendation.

There are three main methods in the friend recommendation system.

2.1 Collaborative Filtering Based :

Collaborative filtering (CF) recommendation suggests items for people based on users who are alike with them. The friends-of-friends method can base on the ideas in collaborative filtering. The reason why one person adds a new friend is complicated. For example, one may accept a new friend because there same school or same city or similar interests and so on. CF-based friend recommendations system based on personality matching. A CF-based framework offers a list of friends to the user by leveraging

on the preference of like-minded users, with a given small set of people that the user has already labeled as friends[13].

Collaborative Filtering is the process of filtering items using the opinions of peoples. This filtering is done by using profiles. Collaborative filtering techniques collect data from profiles, and determine the relationships among the data according to similarity models. The data in the profiles include user preferences, user behavior patterns, or item properties.

Advantages:

1. Collaborative filtering not requires contents to be analyzed.
2. Collaborative filtering Algorithms does not spend time on developing language, analyzing document, it focus on the clustering algorithms.

Disadvantage:

1. Setting threshold for rating if the value of rating is greater than the threshold.
2. The rarely-rated entities are adjusted by pulling them closer to an expected mean.

The collaborative filtering algorithms are categorized as:

1. Memory based Recommendation:

Memory based Recommendation based on data at the time of making memory based learning. In memory based learning users are divided into groups based on their interest. If new user comes into system then to determine neighbors of users to make predictions. Memory based recommendation uses sample of user item database to make predictions[12].

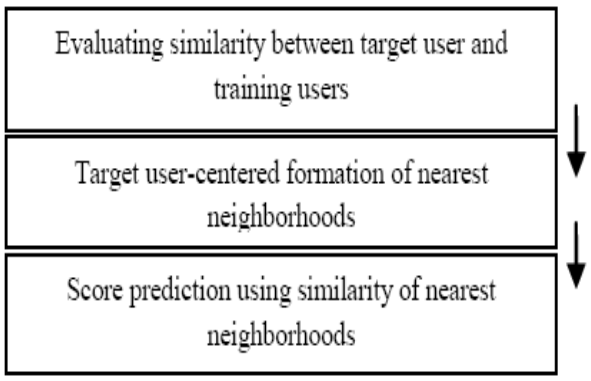

Fig. 1 Block Diagram Memory based Recommender system

Advantages:

1. Selected neighbours are combined with rating to make prediction.
2. Recommendation Based on the users interest.

Disadvantages:

1. The rating must be accurate for making prediction

2. Model based collaborative filtering:

Model based collaborative filtering is a two stage process for recommendations.

1. In the first stage model is learned offline
2. A recommendation is generated for a new user based on learned model.

The model based collaborative filtering based on MDP based algorithms and latent semantic models.

A) MDP based collaborative filtering:

Recommendations are viewed as a sequential optimization problem in MDP based collaborative filtering algorithms. It uses Markov decision processes (MDP) model for generating recommendations.

B) Latent semantic collaborative filtering models:

Latent semantic collaborative filtering models used latent class variables in a mixture model to discover the user communities and prototypical interest. The decomposition of user preferences performs using overlapping user communities. Latent semantic collaborative filtering models technique achieves high accuracy and scalability as compare to memory based methods[9].

3. Hybrid collaborative filtering techniques:

The hybrid collaborative filtering system is combined with other recommendations techniques like content based filtering. Content based recommendation system based on the content of textual information like URLs, logs, item description and profiles. Demographic recommendation system based on user profile information such as occupation, gender to make recommendations Utility based recommenders and knowledge based recommendation system based on knowledge about how a particular object satisfies user needs.

A) Hybrid recommenders combining collaborative filtering algorithms:

Hybrid collaborative filtering recommendations is combination of memory based collaborative filtering algorithms and model based collaborative filtering algorithms. The performance Hybrid collaborative filtering algorithms is better that than memory based and model based collaborative filtering algorithms.

B) Hybrid Recommenders Incorporating CF and Content-Based Features:

The content boosted collaborative filtering algorithm is based on naive bayes classifier. The classifier classifies content and fills in the missing values of rating matrix with the predictions of the content predictors. The boosted collaborative filtering recommendation performance is better than memory based and model based collaborative filtering algorithms.

2.2 Content Based Recommendation :

A content-based recommendation approach analyze a set of documents of items previously rated by a user, and build a model or profile of user interests based on the features user. The profile of user represents user interests, adopted to recommend new interesting items. The recommendation process consists in matching up the attributes of the user profile and the attributes of a content object[6].

CONTENT ANALYZER:- Item descriptions coming from Information Source are processed, that extracts features from unstructured text to produce a structured item representation, stored in the repository

PROFILE LEARNER :– To collect data of user and generalize this data, in order to construct the user profile. The user interest check starting from items liked or disliked in the past.

FILTERING COMPONENT – In this module the user profile suggest relevant items by matching the profile representation against that of items to be recommended.

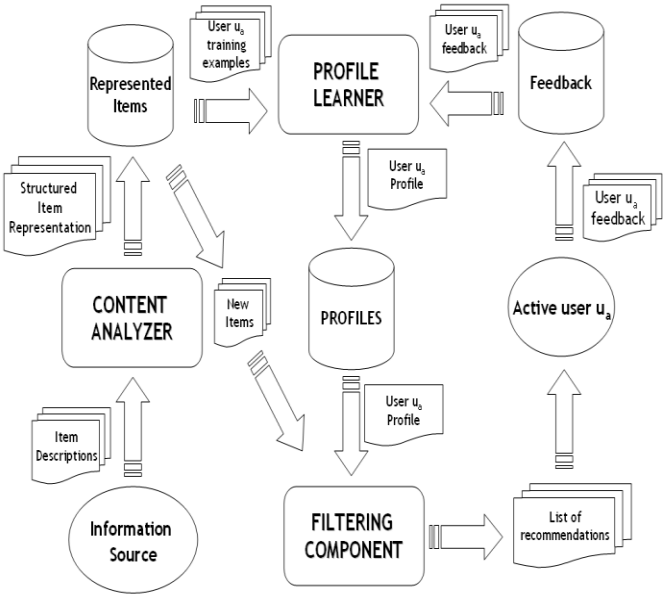

Fig. 2 Architecture of a Content-based Recommender system

Advantage:

1. User independence.
2. Content transparency.

Disadvantage:

1. Limited content analysis
2. Content-based recommenders have no inherent method for finding something unexpected.

2.3 Graph Based Recommendation:

Graph based recommendation approach is based on friends local features or global features of graph such as common neighbor, Jaccards coefficient, shortest path, and Katz coefficient in the graph. This method helps to predict users home locations based on users social graph, profile and compared several local similarity measures[4].

The relationship between learners represented by weighted directed graph. The simple network of learners is –

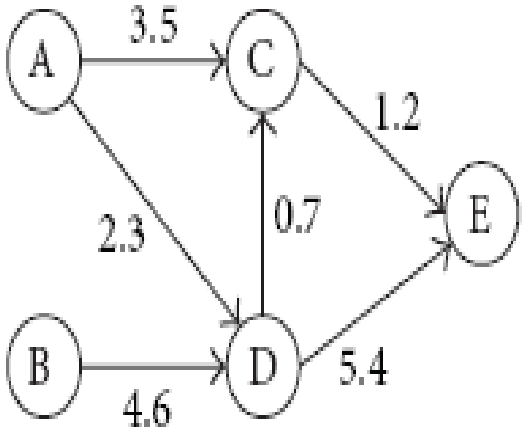

Fig.3 Simple network graph

In graph the student C and D connected directly to neighbor E, and student A and B are in-direct neighbor of E. Unlike the FOF recommendation node E is connected by A's both friends and user B is the best recommendation because of its strong connection with user D.

Advantages:

1. Recommendation based on the network graph so no need to any techniques.

Disadvantages:

1. The weight and score depend on the graph.
2. Constructing the graph for each user must be needed.

III. LATENT DIRICHLET ALLOCATION (LDA) MODEL:-

Latent Dirichlet allocation (LDA) is a topic model that generates topics based on word frequency from a set of documents. LDA is particularly useful for finding reasonably accurate mixtures of topics within a given document set.

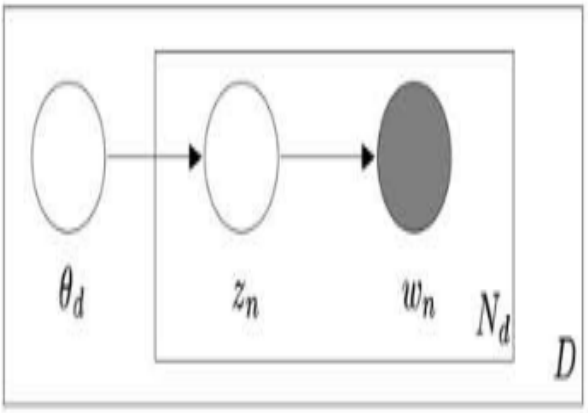

Fig.4 Graphical presentation of LDA

Figure makes clear, this model is not a simple Dirichlet-multinomial clustering model. In such a model the innermost plate would contain only Wn . the topic node would be sampled only once for each document; and the Dirichlet would be sampled only once for the whole collection[7].

Iv. CONCLUSION

The study partner recommendation in xMOOCs courses help students to finish their learning process, improve the course completion rate create learners interest. The LDA model with term dictionary can produce quality and relevant friend recommendations than LDA model, in addition to provide individuals behavior feature and understanding of course concept. The primary issue leading to not high enough recommendation accuracy is due to the lack of more specific behavior data of students.

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