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Study Partners Recommendation for Online Courses

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ABSTRACT

Massive Open Online Courses (MOOCs) provide free learning opportunity for any learners. The online learning system can provides many courses for learners to learn any specific course as they want. The online learning system can include two types of MOOCs that is cMOOCs and xMOOCs. In cMOOCs the learning will be happen within the limited area. The cMOOCs learners can used digital platforms or social network for learning. The xMOOCs can focuses on teacher-student interaction and limited student-student interaction. The automated testing and quies compitions used to check students understanding. The study partner recommendation system can help learners to solve their problems or any difficulties by discussing with partner which encounter during learning process. The recommendation system based on behaviour of learners and topic similarities between learners.

Keywords : MOOCs, xMOOCs, Behavior model, Topic Model, Recommendation.

I. INTRODUCTION

The online courses provide free learning system for any learners in the world without any barriers like education criteria or entry cost. xMOOCs and cMOOCs are the two types of MOOCs learning system. The cMOOCs learning can happen within the network or group. The cMOOCs learning system provide only limited courses and the limited students can enrolled for particular courses. The learners can used digital platforms or network for learning online courses. In xMOOCs the number of learners can complete their courses from provided universities. The MOOCs is Massive Open Online Course they provide free learning online courses for any student without any cost or education criteria. The students can face problems during learning process they cannot solve these difficulties or problems by discussing with others. The recommendation system can helps learner to solve their problems by discussing with partners which is recommended as study partner[7].

The recommendation can depends on type of student behaviour like Question-learner, Answer-learner or Normal-learner. The behavior model can represent the behaviour of students. The topic model is used to calculate topic similarities between the all users and targeted user. The millions of learners from different qualified backgrounds and different areas gathered together for learning online courses. The low completion rate is the main issue in online learning system. The reasons of low completion rate are not enough time for learners and language difficulty for non-native speaking learners. The study partners recommendation system focused on how to improve teaching quality & how to improve completion rate by solving learners difficulties[4].

The topic model with term dictionary helps to compute the topic similarity over topics among course learners. A social network graph depends upon the communication between the learners in online learning system. Finally to recommend the study partners with high topic similarity and high relationship strength to the target learner. The recommendation system helps to improve the completion and keep learners learning interest.

II. LITERATURE REVIEW

Student experience in learning process through the analysis on Twitter feedback about classroom teaching, it provides a work flow for analyzing social media data for educational purposes that overcomes the major

limitations of both manual qualitative analysis and large scale computational analysis of user-generated textual content[1].

The latent offline friendship between students who enrolled in the same course is an important relationship that can affect online discussions on course problems. To analyze profile visit histories to study questions of user popularity and reciprocity for profile browsing behavior and the link between latent profile browsing and active comments. A deep understanding of user interactions in OSNs can provide important insights into questions of human social behavior and into the design of social platforms and applications[2].

In a MOOC, each student complete interaction with the course materials takes place on the Web, thus providing a record of learner activity of unprecedented scale and resolution. They provide interesting patterns of interaction, in which students engage not just with the course material but with each other.[3]

The evolution of co-operation is a central problem in biology and the social science. The theoretical work using the integrated prisoners dilemma (IDP) shown that the co-operation among non-kin. The co-operative strategy readily emerge and persist in a range of noisy environment with successful cliques maintaining medium term memories for partners and low threshold for acceptable cooperation[4].

A FOF-based friend recommendation algorithm in a campus social network system is explainable and efficient. On one hand, to take multiple relationship factors into account for recommendation. On the other hand, use incremental relationship data instead of the entire relationship data to generate latest recommendation list and detailed explanations. Ultimately, it achieves better performance in complexity and scalability[5].

The developers of the original MOOC concept, proposed a theory of connectivism whereby students learn to become astute and autonomous consumers in finding information rapidly through a technological and social network of multiple connections and experiences. However, these investigators recognized that students with a limited educational background might be at a disadvantage in online learning environments, particularly in managing the requisite technology.[6]

In an examination of the teaching and learning practices in 24 university-level MOOCs, Toven-Lindsey and colleagues found all courses used the one-way instructional approach common to face-to-face learning, where the instructor (the expert) transfers information to the learner (the novice). In some of the courses with specified start and end dates, students moved through the course at the same time and these courses included collaborative activities to facilitate student engagement. Across MOOCs, the online discussion boards again proved to be a valuable tool to encourage peer interactions and threaded conversations, often in response to open-ended posts from the instructor [8].

III. SYSTEM ARCHITECTURE

In system architecture, there are three main modules.

1) Data Collection Module
2) Feature Extraction Module
3) Recommendation Module

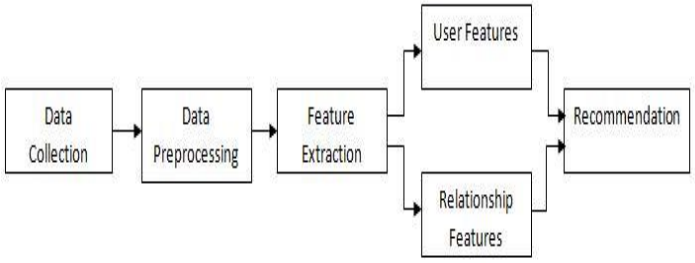


Figure 1. System Modules

A.Data Collection Module:

In data collection module the dataset collected from coursera site through API.

1. Course Data:

Course dataset contains the most important content related with courses. The data is all messages posted in the course discussion forum, including threads, posts, comments and their posted user, posted date, and posted text.

2. User Data:

User data contains the content relative to a user in Coursera site such as user ID, user name, user role, and user location.

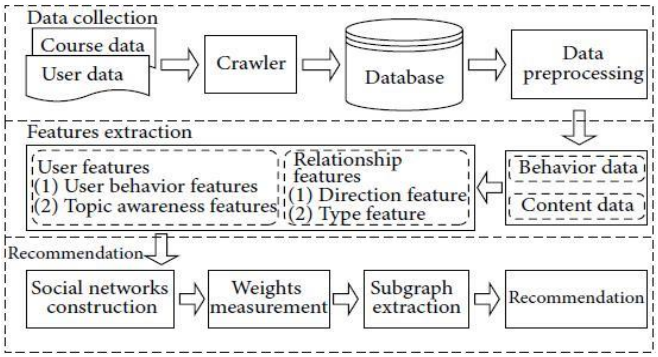


Figure 2. System architecture

B. Feature Extraction Module:

To extract the features from pre-processed data. The two major features extracted are listed as follows.

1. User Features:

To select the useful information from users profile and user generated content and then propose a user behavior model to generate user behavior feature vector f_B. And also propose a user topic model to generate user topic awareness feature vector f_T.

The user features are represented by these three measures as follows: UF_u = (f_B; f_T)

2. Relationship Features:

The relationship between users is established while discussing each other. The relationship features are direction features type features.

C. *Recommendation Module:*

After user feature vector and relationship features are extracted, to construct a relationship network among all active students who are involved in the course discussion forum. A social network is constructed through communication among the users. Every user in the same course can treated as node and one conversation represents an edge.

IV. ALGORITHM

1. Datasets
2. Data Pre-processing
3. Classifying the learners based on behavior model i.e. Q- learner, A-learner and N-learner
4. LDA model:-
To measure the learners course concept awareness
5. Construct social network graph according to learner activities
6. Calculate the weight
7. Calculate the score between selected user and target student
8. Sub-graph extraction
9. Recommend the study partner to target user

V. MATHEMATICAL MODEL

Let Y be the system, it represent mathematically using set theory,

$$Y = \{F, I; H, R, E, C, Tn; Ts\}$$

1 .Input Set:

Let *I_input* set of courses and users

$$I\_input\ I = \{C, U\}$$

Let *C_input* set of courses

$$C\_input\ C = \{c1.c2, c3, ..., cn\}$$

Let *U_input* set of users

$$U\_input\ U = \{u1.u2, u3, ..., un\}$$

2. User features are represented as:

UF_u = (f_B,f_T)

Here f_B is behavior model and f_T is topic Feature vector

3. Students question index Pu is:

$$Pu = 1/3 \sum Ki * Qai / Mai * (Qui / Mui)\text{^}2$$

Student messages=Mui here, i is the message category.

4. The weight of directed edges u and v is:

$$weight(uv) = \alpha \Pi i = 1\text{^}lT(u, v) + \beta \sum j = 1\text{^}3$$

5. Calculate the score between selected user and target student

3.OUTPUT SET:

Recommended study partners to targeted user.

VI. IMPLEMENTATION

In implementation phase first pre-process the given datasets. After pre-processing data classify into three classes by using behavior model. The behavior model exact the behaviour features from students messages. In

next phase to implement the topic model, used to calculate topic similarities of learners. Finally to recommend the study partners. The recommendation based on behavior model and high topic similarities. To recommend the videos link for student related to their topics.

VII. EXPERIMENTAL RESULT

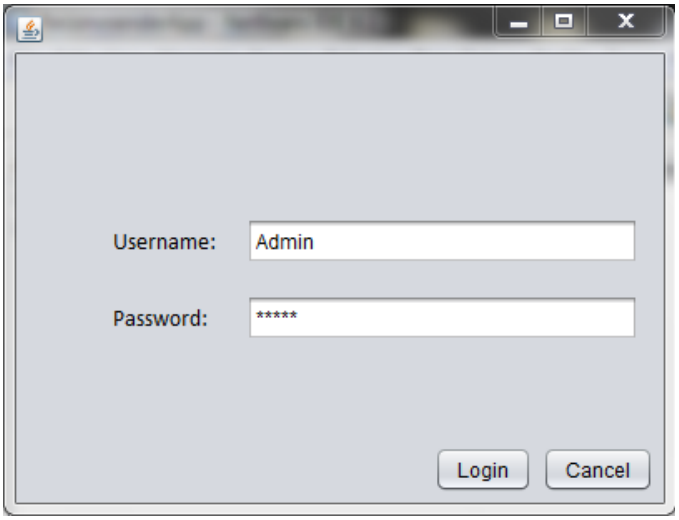
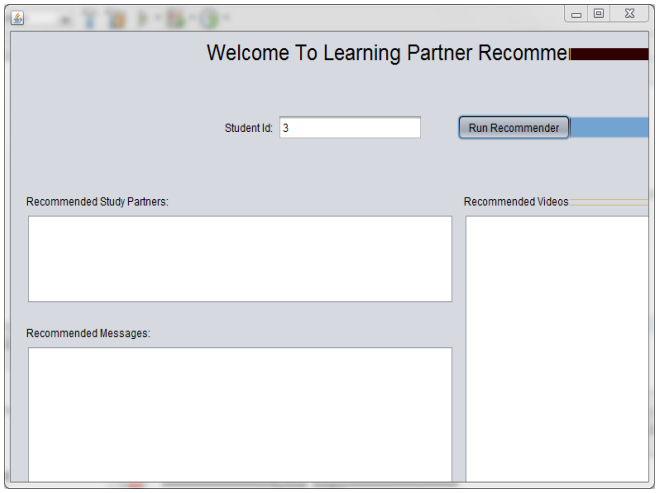


Figure 3. Student Login Form



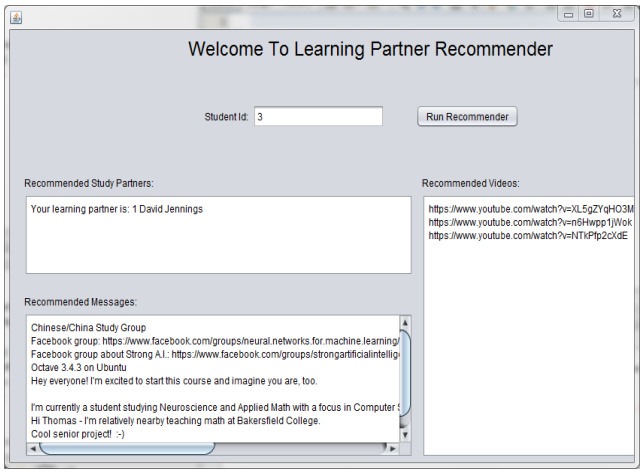


Figure 4. Recommended Partners and Videos

A .Data table Discussion:

Table 1. Input Data

Sr. No.	Pu index	Behavior of Student	Topic Similarities	Recommended Partner
1	0.3	A	0.4	6,2
2	0.12	Q	0.6	4
3	0.45	N	0.14	5,1,7
4	1.3	Q	0.3	2,3
5	0.9	A	1.09	7

The input dataset contains user data and course data. User data is related to learners which contains messages of users. The course data describes the total courses and courses attended by particular learner.

B. Results

The result table describes recommended partners based on the high topic similarity and behavior of learners. The pu index is question index of learners. The videos are also recommended for learners related to their topics.

Table 2. Result Data

Sr. No.	No. of Students	Total No. of courses	No. of Courses Attend
1	1	10	3
2	2	10	6
3	3	10	5
4	4	10	1
5	5	10	2

VIII. CONCLUSION

The study partner recommendation for online courses can help student to finish their learning process, improve the course completion rate and increase learner interest. The LDA model used to calculate topic similarity of students. The recommendation based on the topic similarity and the weight of students.

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