Current Trends In E-Learning

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Abstract: E-learning is the buzzword of today’s era and a large number of e-learning resources are available in online and offline mode. However, to derive useful pattern from this abundant pool of e-learning resources is a very tedious task. Various data mining approach can be used to generate interesting patterns from this enormous repository. The data analytics helps in analyzing the information access pattern of the users. The information access pattern can be helpful in identifying the learning behavior traits of an individual. Moreover, machine learning along with data mining has opened up new avenues. The combination of data analytics and machine learning may be used to generate targeted recommendations.

Index Terms: Data Mining, E-learning, Machine Learning and Sentiment Score

1. INTRODUCTION

Technology has become an important component of learning these days and it has made e-learning a global phenomenon. A large amount of information is available pertaining to any topic on the internet. The recommender system can be helpful in searching relevant information with minimum efforts. The recommender system consists of learner’s profile. The profile of an interested student will be created based on parameters such as current academic achievements, demographic information of a students, etc. There will be a list of courses from which a user can opt. The recommendation system compares the profiles of user and the courses. A recommendation will be made based on the basis of similarity index between the profile of the user and the attributes of the potential courses. The two recommendation systems which have been successfully implemented are “Guess You Like: Course Recommendation in MOOCs” implemented in China and “A Case Based Recommender System for MOOCs” implemented in Saudi Arabia. This can act as a foundation for future work in this area of research.

2. RELATED WORK:

2.1 Data Mining Based Recommender Systems:

Joeran Beel Docear [1] et. al investigated that there are more than 80 approaches to recommend a particular course to a potential student. It was highlighted that accuracy is not the only criteria for a recommender system but user satisfaction also plays significant role in acceptance of any recommender system. Out of the total recommendation systems, 55% of the recommendation system uses Content-based filtering, 18% use collaborative filtering, 18% uses graph-based recommendations and the rest 16% uses item-centric recommendations and hybrid recommendations. Amer Al-Badarenah [2] et. al proposed that the working of Collaboration based recommendation system uses the criteria of similarity end dissimilarity to identify user’s inclination towards a particular topic. The method used in this paper uses association rule based mining techniques to discover patterns of interest between courses and user’s interest.

Collaborative recommendations were made on the basis of k-nearest-neighborhood algorithm. Association rule mining has been used to generate confidence and support and Mat Lab has been used to generate visualization. Aleksandra Klasnja-Milicevic [3] et. al. proposed personalization of the e-learning systems according to the learner’s needs and knowledge. The aim is to facilitate personalization of a learning content. Collaborative and social tagging techniques could be used for this Tensor factorization technique and it has been modified to gain the most efficient recommendation. This model is named as Intelligent Tutoring System (ITS) for programming course. Rakesh Kumar Arora [4] et. al. worked on education sector data and analysed the data for high drop-out rate, poor achievement ratios and higher rate of unemployment rate even after completion of certain high skilled courses. Analysis of Pre-Post course enrolment factors was done. Performance measured using association analysis algorithm. WEKA tool has been used to generate prediction using the data. WEKA tool can be used for predication. The user data must be available in the form of flat file or relation. WEKA application is very easy to use and it has visual interface; even a novice user can easily identify hidden information. The following studies were performed:

I. Pre-Post assessment for each course
II. Skill acquired after learning the subject

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Figure 1: Case base recommender system [5]
Few attributes of course: course’s title, location (University), language, availability of course and fees (paid course or free course) are assigned weights in descending order. Learner’s attribute: Current educational level, interest in a particular course, online profile. This system identifies similarity between course attribute and learner’s attribute from the available resources. A higher degree of closeness will provide a better match. Xia Jing [6] et. al studied Chinese MOOCs XuetangX known as “Guess you like” has 1000 courses and 60 lakh users in China. XuetangX, if a learner’s profile is incomplete, then this system can fetch the user’s profile from LinkedIn and generate a nearest match. This can solve the issue of cold-start in online mode. This system works in both online as well as offline mode.

The recommendations are generated on the basis of closeness between users profile and the attributes of course. F.O. Isinkaye [9] et. al proposed a multi-agent based e-learning framework. This recommender system provides a personalized experience to the learner. The recommendations are generated according to learner’s requirements, goals and caliber. MATLAB is used to simulate recommender agent. A multi-agent system can be designed using Prometheus Development Toolkit (PDT).

2.3 Analysis Based Recommender System:
K. Mohankumar [11] et. al studied that while using online social networking sites, the users share their ideas or emotions with the help of text data, with the help of pictures and in even with the help of emojis. To create a group of similar users the text content is interpreted. Similarity is calculated as linear Support Vector Machine (Linear SVM). Walaa Medhat [12] et. al studied Sentiment Analysis (SA) with the help of text mining in this paper. Sentiment Analysis is performed by studying the opinion of the users toward any particular topic. The topic may be expressed in the form of an entity such as e-learning. The sentiment analysis can be divided into document-level sentiment analysis, sentence-level sentiment analysis and aspect-level sentiment analysis. The inclination of a user towards a particular topic is calculated as polarity based on sentiment analysis. Sowmya Kamath S [13] et. al proposed a framework which works by including user’s reviews, comments and various other points of interest such as events and locations. The purpose of this framework is to personalize the recommendation and generate ranks according to user preferences. To further optimize the search query result, machine learning and sentiment analysis techniques. This framework better results and avoid redundancy also.

3. LIMITATIONS
The study of the above research and review papers clearly high-light certain shortcomings of the existing recommender systems. The major shortcoming is Issue of cold-start (off-line mode). The majority of the paper has discussed this in detail and major emphasis need to be given for solving this problem. The other major challenge is that the users are not keen in providing ratings for all the online courses and this lack of
complete information result into sparse rating. Decision based on sparse ratings can result into erroneous recommendation. It is also observed that there is a big difference between the numbers of students registering for a course to number of students completing the course. The above study provides enough scope to review the current course material and to analyse at what stage the students are losing interest in the course. This may improve the course completion ratio of students. Although Ontology based Recommender System provide reusability and efficiency but it is a complex and time-consuming task. Human opinion is not taken into consideration in existing recommender systems. However, by incorporating opinion in recommendation, we can develop a better recommender system.

4. FUTURE SCOPE
The objective of the above study is to develop a recommender system which will incorporate opinions as an attribute with the help of sentiment score. The proposed system will enhance the accuracy of the existing recommender system in terms of recommendation score and effectiveness. Many researchers have cited the issue the issue of cold start as a major bottleneck in the early stages of any recommender system. Efforts will be made to overcome this issue. Sparsity matrix is another lacuna of recommender systems. Efforts will be made to reduce the impact of cold start and sparsity matrix so that better recommendation can be generated. Eventually, all these efforts will lead to better recommendations and the number of students completing the course successfully will increase.

5. CONCLUSION
The recommender systems are used in all walks of life in today’s era. The humongous availability of e-learning data has opened up a great scope for recommender systems. The sentiment analysis will add another useful dimension in the recommender systems. The recommender systems assist the user in searching the desired information from the vast availability of resources. Personalized recommender systems are a winning proposition for the users. The recommender system applies content-based techniques, collaborative techniques on educational data to generate useful recommendation.

REFERENCES