

# E-learning Recommendation System using Fuzzy logic and Ontology

Fulpagare Vaishali, Gogade Archana, Gedam Monika ,Gavit Vidya and Prof. Madhura Sanap

**Abstract**— Recommender system is defined as technique that attempts to recommend item by predicting users interest. learning recommendation system provides better resources for learning. . To accommodate effective learning,fuzzy tree based algorithm is used . Unfortunately, Many system have learning style problems. Due to more and more learning material it is hard to guide students. To overcome this problem proposed system introduces idea of fuzzy tree matching method by using ontology reasoning, M-tree creation, fuzzy logic, Pearson's correlation.

**Index Terms**— M-tree creation, Fuzzy tree matching, Ontology reasoning and Pearson's correlation

## I. Introduction

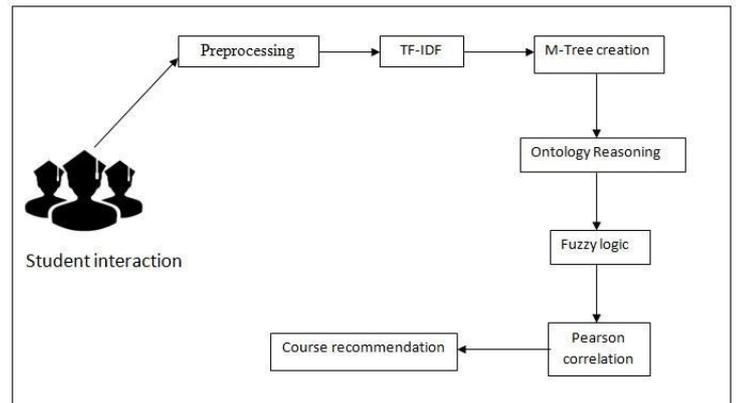
In educational establishment E-learning systems are very popular. Because of web based information and communication technologies. Proposed system provides recommendation based on users interest. Most of the fact that many of the recommendation system are providing recommendation for the fired query. But very few are recommending by having continuous stream of exercises for the user to guide them properly. So proposed methodology put forwards an idea of E learning system by M tree hierarchy which is powered with ontology for semantic relationship by using fuzzy logic. This approach takes advantage of knowledge based and collaborative filtering based recommendation approaches. Considers both semantic and collaborative filtering similarities between learners. When calculating collaborative filtering similarities the ratings of matched learning activities, rather than the exactly common learning activities between to users are used. By analyzing learning sequences and modeling learning activities precedence relations between learning activities can be handled. A learners requirement usually described in terms like "highly required or very important". Fuzzy sets techniques are suitable to deal with these uncertain category data. The tree structured learning activities and learners profiles are therefore represented as fuzzy trees.

This method develops a recommendation approach to support learner's n selection of most appropriate learning activities in e-learning environment. For taking the decisions based on fuzzy classification fuzzy logic is used. M-tree creation forms tree based on semantic relations. Ontology reasoning supports to provide semantic relation for words .collaborative recommendation is conducting through Pearson's correlation. Support vector Machine, Bayesian classifier, Random forest are similar techniques like fuzzy tree matching based algorithm but comparatively fuzzy tree matching based

algorithm gives proper and effective recommendations as it is interacting with user properly.

## II. Proposed Methodology

To enhance learning recommendations many methodologies are supporting like TF-IDF[1],M-tree creation[2],Ontology reasoning[3],Fuzzy logic[4], Pearson's correlation[5]



[1] Introduces concept of TF-IDF stands for term frequency inverse document frequency and TF-IDF weight is a weight often used in information retrieval and text mining then this weight statistical measure used to evaluate how important a word is to document in a collection. The importance increases proportionally to the number of times a word appears in the document but is offset by the frequency of the word in the collection. The TF (Term frequency) can be calculated as following:

$$TF = (\text{No of times term } t \text{ appears in document}) / (\text{Total no of terms in the document})$$

And IDF (inverse document Frequency) can be calculated as following:

$$IDF = \log_e (\text{Total no documents/No of documents with term } t \text{ in it})$$

[2] Narrates the idea of M-tree. It is designed for supporting wide range of applications. The common basis is regional mesh tree where each node represents region of domain and its sub-trees are sub-regions overlaying the region of parent node. Operations over M-tree can be divided into first order and higher order operations. The first order operator perform basic query and update on each node of M-tree, the higher order operators abstract commonly used patterns of parallel adaptive computations.

[3] Describes the method of Ontology reasoning. Which is used for the classification. While the learner is answering quiz it predicts the pair of student and course. This pair will be send to fuzzy logic for further operations.

[4] Explains the technique of Fuzzy logic. It is an approach to computing based on "Degree of truth" rather than usual true or false(0 or 1) Boolean logic on which modern computer is based. Fuzzy logic seems closer to the way our brains work. We aggregate data and form a number of partial truths which we aggregate further into higher truths .and taking the decision based on fuzzy classification.

[5] Proposes the concept of Pearson's correlation coefficient. This is used to measure the linear correlation of one set of data with another. For example, if the query thrown by two users are same . Then there is no need to compute or go through the system again and again.by using Pearson's correlation it finds the relation between results of query to the previous one. And if it is matched, it directly recommends the course.

### III. Literature survey

A. E-Learning recommendation System [1] Collaborative filtering which is chosen as primary recommendation system. It analyzes requirement of web based e-learning recommendation system. It works well in other recommendation system lie recommending CDs or movies. Pearson correlation is used to calculate proximity between learners. System workflow is divided in 5 sections data collection, data ETL, model generation, Strategy configuration and service supply.

B. Using ontology for providing content recommendation based on learning styles inside E-learning [2] Describes concept mapping between student characteristics and categories by using Felder Silverman learning style and appropriate content inside a Moodle based e-learning. This mapping is represented in ontology and then implemented in Moodle based e-learning system. This mapping are clearer and more detail when represented in form of ontology.

C. Some challenges for context aware recommender systems[3] Narrates concept of context aware recommender system that incorporates contextual information into recommender system. Context is any information that can be used to characterize situation of entity. Context aware recommender system improves performance accuracy and user satisfaction by utilizing contextual information. Some main challenges for this field, the most pressing issues in our opinion that should be addressed.

D. Hybrid filtering recommendation in E-learning environment [4] Explains the concept of hybrid filtering method which put forward and approach to recommend right learning resources for learners with different learning needs. User profiles built based on common interest group detection and text analysis. Learning resources introduce to user by collaborative filtering and content based filtering. Updating of user profiles with time is major advantage of this method.

E. Fuzzy cognitive agents for personalized recommendation [5] Proposes concept of fuzzy cognitive agents which are design to give personalized suggestions based on learners current personal preferences, other users common preferences and experts domain knowledge. Fuzzy

cognitive agents are flexible and effective for e-commerce applications. A prototype of fuzzy cognitive agents are implemented using JADE (Java agent design).

The rest of this paper is organized as follows. Section I illustrates the introduction related to the works and some background information. Section II introduces the proposed methodology. Section III presents literature review which defines the background study of topic. Conclusion offered in Section IV.

### IV. Conclusion

Proposed system successfully scrutinizing the user requirement more semantically using ontology and according to this the decisions is taking using Fuzzy tree combination. Then finally the a hybrid recommendation will be provided using collaborative filtering which is powered with Pearson correlation and content based recommendation successfully to the user with high precision results.

### References:

1. Huiyi Tan, Junfei Guo, Yong Li,"E-learning recommendation system", International Conference on computer science and software engineering,2008
2. Sri Suning Kusumawardani, Robertus Sonny Prakoso, Paulus Insap Santosa, "Using ontology for providing recommendation based on learning styles inside e-learning", Second International conference on artificial intelligence, modelling and simulation, 2014
3. Zhang Yujie, Wang Licai, " Some challenges for context aware recommender systems", The 5<sup>th</sup> International conference on computer science and education Hefei, China august 24-27, 2010
4. Lianhong Ding, Bingwu Liu, Qi Tao, "Hybrid filtering recommendation in E-learning environment", Second International workshop on education technology and computer science, 2010
5. Chunyan Miao, Qiang Yang, Haijing Fang, Angela Goh, "Fuzzy cognitive agents for personalized recommendation" , Proceedings of the 3rd International conference on web information systems engineering (WISE 02), 2002
6. Osmar R. Zaiane, "Building a recommender agent for e-learning systems", Proceedings of the 3rd International conference on computers in education(ICCE 02), 2002
7. Ming Mao, Yefei Peng, Daqing He, "Ontology based content management and access framework for supporting e-laering systems, "Proceedings of the 2006 IEEE/ACM International conference on web intelligence and intelligent agent technology (WI-IAT 2006 workshops)(WI-AT W06),2006
8. Saman Shishehchi, Seyed Yashar Bannihashem, Nor Azan Mat Zin, "A proposed semantic recommendation system for e-learning", 978-1-4244-6716-7/10/10/\$26.00, 2010 IEEE

1. Fulpagare Vaishali is pursuing her Bachelors of Engineering in Computer Sciences from Savitribai Phule Pune University.
2. Gogade Archana is pursuing her Bachelors of Engineering in Computer Sciences from Savitribai Phule Pune University.
3. Gavit Vidya is pursuing her Bachelors of Engineering in Computer Sciences from Savitribai Phule Pune University.
4. Gedam Monika is pursuing her Bachelors of Engineering in Computer Sciences from Savitribai Phule Pune University.