

Generating Optimal Result with Adaptive Learning

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Abstract

Adaptive learning is widely used in educational field to know and understand user's learning pattern so that system can adapt to user's behavior and recommend a suitable learning content to him. The system studies and adapts to user's behavior, interaction, responses to particular questions and modifies, generate or suggest appropriate content. This adaptive learning approach helps a user to find out suitable course. In this I am proposing an approach in which required details collected from user as input and based on user's response a pattern will be generated and system will adapt itself to the user's response. This pattern will be compared with the current patterns available in a database with the help of Data mining Techniques i.e. classification algorithm is applied to classify the pattern which will result in optimal recommendation for user. Furthermore, Association Rule is applied to suggest the best pattern which will result in the best recommendation for user

Index Terms

Adaptive Learning, Recommender systems, C4.5, Top-K

1. INTRODUCTION

Adaptive learning is a new trend in e-learning which with the help of machines as interactive teaching devices and to accompany the allocation of resources according to the different needs of different user. System adapts to user's need by collecting data as given by their answers to questions. Adaptive learning covers many fields such as along with computer science.

Adaptive learning is another branch of e-learning, which adapts to user's interests to learn particular module or subject. People with different interests will require different content or result. A challenge for adaptive learning approaches is the necessity of an effectively well-designed system that meets the requirements and need of better recommendation to intended user.

To implement adaptive Learning User's interaction path while using system or accessing content needs to be tracked. For adaptive learning path, user's behavior should be considered for providing an adaptive environment based on his characteristics. As the information flows among various modules or subjects, the system could track user's understanding dynamically and make recommendations in order to give intelligent response with the help of Data mining Techniques. The paper presents an approach to generate optimal result for user with the adaptation of user behavior. In section 2, the literature survey of the past work in presented. Proposed system is discussed in section 3. Finally, paper is concluded in section 4.

2. LITERATURE SURVEY

This section lists the relevant past literature that use the various approaches for adaptive learning. Most of the approaches study user's past behavior and predict the solution.

Chih-ping Chu and Yi-chun Chang [1] propose a mechanism to predict the adaptive learning content for each student. The implementation for the proposed approach has been done in scalable E-learning Environment to increase the usability and availability. Peer to peer technology is used to provide the desired content to student, prediction mechanism used is based on k-NN Classification.

Taiki Kurisu, Shimpei Matsumoto, Tomoko Kashimaz and Masanori Akiyoshi, [2] focuses on the approach which will deliver learning contents automatically to each user's mobile device, and constructs learning system based on multiple choice tests. By collecting all users' historical data through the operational experiment of this developed system and getting feedback of subjective evaluation, this paper examines practical effectiveness of item response theory for user adaptive learning. Additionally it also gives discussion for realizing e-Learning service with learner adaptation functionality.

The approach proposed in this project uses adaptive learning in a different context where system learns from user's interaction where user answers some of the questions asked, by which system can analyze the generated pattern. This Pattern will be classified using a classifier. Classified pattern will be recommended to user as a solution for which user interacted to the system. The approach goes ahead with recommendation in the form of more choices to user by using association rule techniques. Association algorithms are used to give more options to user which can be beneficial to support user's decision making process to select desired solution to his problem.

As in [3] Abinash Pujahari and Vineet Padmanabhan have proposed that In order to recommend system has to learn the user preferences from the user's past behaviors so that it can predict new items/things that are suitable for the respective user. The task of recommender systems is to help user to find out items according to his/her preferences from a wide range of items. The systems learn user's preferences from user's previous interactions using machine learning algorithm and predict new items/things for the user using the learned preferences. This paper introduces an approach in which system will learn rules for user preferences using classification based on decision lists.

Recommendation systems can follow content based, collaborative filtering or hybrid approach. P Anjali Devi and L.Anitha[4] focused on the attack on collaborative filtering. In this paper they have study a special kind of Neural Network called Kohonen Net clustering. User-based Recommendation process is based on the input provided by users. Due to this reason the system is highly susceptible to attacks

In order to generate recommendation system has to study user behavior. Kosuke Takano and Kin Fun Li [5] have proposed a recommender system for e-learning by utilizing a hybrid feedback method that extracts user preference and user browsing behavior. So that system can recommend learning content of potential interest to user and also the likely web browsing action on the current item using a novel similarity measure approach. The system will adapt individual user preferences and changing interest in learning activity. The system is capable to acquire knowledge from user feedback and web browsing behavior and provide personalized recommendation adaptively.

Recommender systems intend to provide in time, context aware, personalized information. Kyo-Joong Oh, Won-Jo Lee, Chae-Gyun Lim, Ho-Jin Choi [6] focuses on Recommender systems which are becoming an essential part of smart services now a days. This system is proposed to build a news recommender system, hence special features are considered different from other recommender systems.. This paper aims to propose a new model, which is based on deep neural network, to understand user preference. The model extracts interest keywords to characterize the user preference from the set of news articles read by that particular user in the past. The model utilizes characterizing features for news recommendation, and applies those to the keyword classification for user preference. Deep neural network is used for online preference analysis, because adaptive learning is necessary to track changes of hot topics sensitively.

With the advancements in Internet technologies user can access any data from anywhere but sometimes the content received may not be as per the individual's need. Maryam Yarandi, Hossein Jahankhani, Abdel-Rahman H. Tawil [7] This study presents an ontology-based approach to design Decision support system which includes adaptive features which will overcome the limitation explained above. Item response theory has been used to track and analyzed user activities and learning process. System also tracks learners' activities and tests during the learning process. In this study, the proposed system is implemented to improve the learning process with the adaptive capabilities.

3. PROPOSED SYSTEM

We proposed an idea to recommend a desired solution to user by getting response from user in the form of answers given to some questions asked by the system. By asking questions system tries to identify the pattern generated by decision tree formed already from the data stored in the database. Dataset consists of the data collected at institute level. Once system analyze the pattern, is then classified using C4.5 classifier and recommended to user.

The proposed approach consists of three phases:

1. Extraction of user preferences
2. Classification and recommendation of extracted pattern
3. Applying association rule techniques

3.1 Extraction of user preferences

This phase analyzes the input given by user in the form of answers to questions asked by system; these are multiple choice questions which are asked to get an idea of what are the values which can be used to find out the pattern

3.1.1 : Constructing a decision tree

The training dataset is arranged in hierarchical structure in which a condition on the attribute value is used to divide the data. This division of the dataset is done recursively until the leaf nodes contain certain minimum numbers of records which are used for the purpose of classification. Dataset consists of Data about different institutes is collected and added in the database. A decision tree is constructed from the condition on the attribute value. These parameters are defined from the questions which are asked to user.

3.1.2 : Traversing the tree:

Here the sequence of answers tracked by traversing the tree to reach the final pattern. The system follows the user interaction and adapts to his behavior.

3.2 Classification and recommendation of extracted pattern

This module accepts the concluded pattern and C4.5 classifier. Decides whether to recommend this pattern as a solution to user or not based on a threshold value. [9] C4.5 is a successor of ID3, uses an information gain known as gain ratio.

$$\text{Gainratio}(A) = \frac{\text{Gain}(A)}{\text{Splitinfo}(A)}$$

3.3 Applying Association Rule technique

Association rule is a method for identifying interesting association between different variables in large databases. Its goal is to find strong rules in databases using some measures of interestingness.

The association algorithms used in the implementation are Apriori and TOP-K. [9] Apriori is used to find out frequent item sets. It uses prior knowledge of frequent item set. If an Item set doesn't satisfy the minimum support value then it's not added to frequent item set else its added.

Another association rule mining algorithm used is TOP-K. Philippe Fournier-Viger¹, Cheng-Wei Wu² and Vincent S. Tseng² [8] have proposed an algorithm to mine the top-k Association rules, where k is the number of association rules to be found and is set by the user. The algorithm utilizes a new approach for generating association rules named rule expansions and includes several optimizations. Experimental results show that the algorithm has excellent performance and Scalability and that it is an advantageous alternative to classical association rule mining algorithms when the user wants to control the number of rules generated. By using these two associations rule techniques user is being provided with more options along with the comparison of both.

4. CONCLUSION

In this paper, we proposed an adaptive learning recommender system which learns from the user's past data and behavior, adapts itself with user's interests. The goal of the system is to provide an optimal recommendation. Furthermore, an attempt is made to apply association rule mining along with the evaluation of algorithms. As the data set considered for this implementation is an educational data. In future this system can be extended to other domain where user needs a good result.

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