Research on Model Design about Result Prediction and Learning Intervention Based on Dynamic Data Mining

Zhao chengling[1,a], *Li Min[1,b]

[1]Institute of Education and Information Technology, Center China of Normal University, Wuhan 430079, China

[a]zhcling@mail.ccnu.edu.cn, [b]1272240185@qq.com

Keywords: Data mining, Result prediction, Learning intervention, Model design

Abstract: Predicting the academic performance of online learners and promptly intervening and guiding them is an effective way to improve the effectiveness of online learning. How to predict the academic performance and behavior of online learners, implement academic early warning based on prediction results, and provide evidence for teaching decision-making is one of the problems that network education needs to solve, and also an important research issue in educational big data research. This study uses the decision tree method in data mining technology to predict the learning behavior and performance of online learners, and constructs adaptive learning outcome prediction and intervention models. The application scenarios of the model are analyzed from the perspective of curriculum developers, teachers and students.

1. Introduction

The network learning system stores a large amount of data according to learners 'learning paths and interactive processes., how to mine and analyze the data, and predict academic performance and behavior. Implementing academic early warning based on prediction results and providing a basis for teaching decision-making is one of the problems that network education needs to solve, and it is also an important research issue in educational big data research.

2. Research basis

According to the definition of the website of the International Working Group on Educational Data Mining, Educational Data Mining refers to exploring data types in specific educational environments by means of developing methods and technologies, and extracting useful information to help teachers understand students well. And improve the environment they learn, and provide services for administrators, educators, learners, and other educators [1] .Data collection and pretreatment, data analysis and result interpretation are included in the process of educational data mining[2]. At present, a relatively complete study are carried out by the foreign scholars. For example, to find out the students with similar learning characteristics, and judge whether the students have made progress according to the classification results , Divna et al.[3] analyze the learning data of the Moodle platform; to predict the factors affecting students' academic performance, decision tree algorithm are used by Huseyin et al.[4], and constructed a educational data mining system using multi-model views.

3. Design of Learning Intervention Model

Due to the special attributes of the network learning system stores and the process of educational data mining, this study constructs an educational data mining model for performance prediction and intervention in the process of the network learning system stores as shown in Figure 1. Data must be pre-processed after collected, deleting redundant data, processing lost data, and numerical conversion are included.
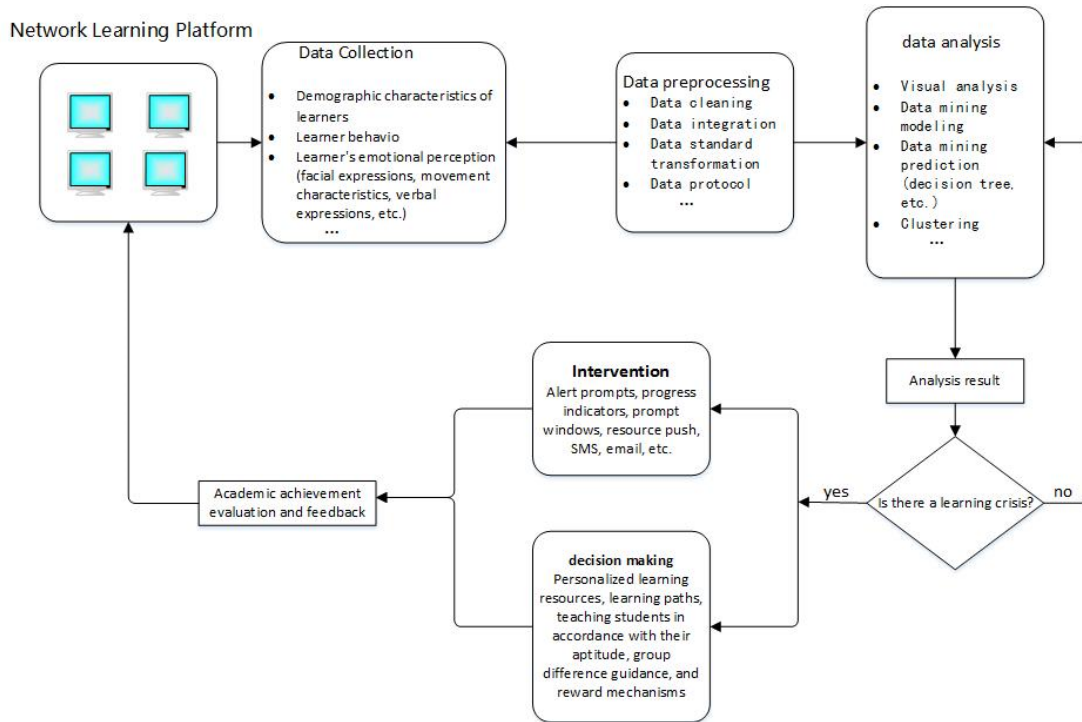

Fig. 1 Prediction and intervention model of learning outcomes in online learning process

3.1 Data collection

In order to ensure the availability of large data, we must first control the quality of the data at the source, and do a good job of pre-processing from the original data to high-quality information. Compared with traditional education data, the sources of big education data are more diversified. The data of package system, Internet and Internet of Things are not only huge in quantity, but also of different quality. Therefore, in order to facilitate the storage, management and application of follow-up education data, it is necessary to standardize the data format and carry out preliminary pretreatment in the process of education data acquisition. In order to build a learner model, a large amount of learner information data must be collected and preprocessed.

3.2 Data preprocessing

Data preprocessing is an important link in the early stage of data mining, which can not be ignored. According to statistics, in the whole data mining process, data preprocessing accounts for about 60% of the time, and follow-up mining only accounts for about 10% of the total workload. Data preprocessing mainly includes four important steps: data cleaning, data integration, data standard conversion and data specification. Data cleaning, that is, processing noise data, irrelevant data, missing values, dirty data, outliers in the original data. Data integration, which stores data from two or more data sources in a consistent database. Data transformation is suitable for data mining, including data generalization, data standardization, feature construction, data discretization.

3.3 Data analysis

After the completion of data preprocessing, it enters the core link of educational data mining -- selecting mining methods, analyzing data and obtaining results. To understand the network learning time distribution and preference page of learners. in the network learning platform, for the learning process monitoring, statistical analysis and visualization methods are used. Researchers can use association rules to understand the association between learners' e-learning attributes and academic performance[5]. By using cluster analysis to classify the learners, and according to the classification results teachers can supervise different types of students in different forms.

3.4 Intervention and decision making

Predicting the academic performance of online learners and promptly intervening and guiding them is an effective way to improve the online learning effectiveness. In the network learning environment, it is feasible to retain student learning traces and process data, which provides a powerful basis to monitor students' learning process online learning. With the aid of technology, the warning information is timelier, the target scope is more precise, and the teaching intervention can play a greater role. Using learning analysis technology to predict students' future learning and teaching guidance on possible problems is an effective means to improve students' learning effect, and will play an important role in both formal and informal learning.

4. Model application scenarios

4.1 Course Developer Perspective - Creating an Adaptive Learning System for Learners

Through data mining results, we can create adaptive learning system for learners and build learning intervention model in adaptive learning system. Traditional learning management systems usually present the same curriculum for all learners, regardless of learners 'individual characteristics, circumstances and needs. Adaptive learning system provides the possibility for exploring personalized and adaptive learning intervention. The learning intervention model in the adaptive learning system is constantly updated, real-time analysis and recycling. Once there is learning crisis, timely and appropriate intervention should be given to achieve effective learning and improve learning effect.

4.2 Teacher Perspective - Teaching Students in Accordance with Their Aptitude

First of all, teachers should implement different teaching strategies such as group guidance, teaching according to their aptitude and reward and punishment mechanism. The advantage of the network learning system stores is to achieve autonomous learning, but its drawbacks are weak control, including weak control of learning qualification acquisition, weak control of management, weak control of teaching process, weak control of teacher-student relationship, weak control of assessment methods, etc. The network learning system stores makes learners lack time cognition, makes learners prone to inertia, lags in interaction, and plagiarism in submitted assignments. These phenomena will not only affect learners 'behavior, but also affect the effectiveness of the network learning system stores. Therefore, to give full play to the leading role of teachers, teachers should promptly reply to the learner's message, and can arrange instant exchange time or live broadcast; actively regulate the behavior of learners; use a variety of ways to stimulate learners' motivation.

4.3 Learner Perspective - Consciously Improve Learning Strategies

First of all, it is recommended that learners consciously improve the participation of online learning, increase the learning time span, develop a good habit of recording reflective notes, increase the number of repeated learning for complex knowledge, and actively participate in discussion and exchange. On the one hand, it can improve their sense of belonging and immersion in online learning, on the other hand, they can improve their own learning effects. Second, it is recommended that learners consciously improve their learning strategies. First, it is recommended that learners complete the learning tasks step by step according to the teacher's teaching schedule. Before the network learning, establish clear learning objectives, formulate clear learning plans (especially the study time, learning content, etc.), and strictly follow the study plan. Complete the learning task; Second, it is recommended that learners actively regulate their emotional experiences.

5. Conclusion

This study designs an educational data mining model for predicting and intervening in network learning process, and provides a variety of mining methods to mine and analyze students' online learning process, in order to provide useful reference for the supervision and evaluation of online learning process and the mining of educational data. The method and basis of network learning. This research needs to be further developed, and an analytical system needs to be generated in time to provide real-time analysis and feedback for all teachers and students who need it.

6. Acknowledgment

References

[1] International Educational Data Mining Society. Educational data mining [OL]. http://www.educationaldatamining.org

[2] Romero C, Ventura S. Educational data mining: A survey from 1995 to 2005[J]. Expert Systems with Applications,2007,(1):135-146.

[3] Krpan D, Stankov S. Educational data mining for grouping students in E-learning system[C]. Proceedings of the ITI2012 34th Int. Conf. on Information Technology Interfaces, 2012:207-212.

[4] Guruler H, Istanbullu A. Modelingstudent performance in higher education using data mining[J]. Educational Data Mining, 2014,(1):105-124.

[5] Chen J , Zhao J . An Educational Data Mining Model for Supervision of Network Learning Process[J]. International Journal of Emerging Technologies in Learning (iJET), 2018, 13(11).