

Research on Student Learning Result System based on Data Mining

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Summary

The student learning result evaluation system is an essential tool and approach for monitoring and controlling the learning quality. From the perspective of data analysis, this paper conducts a research on student learning result based on data mining. It is aimed at putting forward a rule-discovery approach suitable for the student learning result evaluation and applying it into practice so as to improve learning evaluation skills and finally better serve learning practicing.

Key words:

Learning result evaluation; data mining; decision tree

1. Introduction

With the accelerating development of society and the well-known knowledge explosion in modern times, learning is taking on a more important role in the development of our civilization. Learning is an individual behavior as well as a social phenomenon. For a long time, people limited learning to the transfer of culture and knowledge; research on learning was confined to the fields of education research within the existing traditions of classroom learning. To understand learning within the new context of the 21st century, we need professionals from psychology, sociology, brain science, computer science, economics, to name a few. We must extend our understanding about human learning from macro levels to micro levels, and from history to current conditions. At present, the most urgent need is to synthesize all the findings on human learning and integrate them into a united framework to guide the practice of learners. Research on learning result evaluation from the perspectives of philosophy and culture has emerged as a major challenge to educators, and invent a new and integrated learning culture.

It is a difficult task to deeply investigate and successfully develop models for evaluating learning efforts with the combination of theory and practice. University goals and outcomes clearly relate to “promoting learning through effective undergraduate and graduate teaching, scholarship, and research in service to University.” Student learning is addressed in some following university goals and outcomes related to the development of overall student knowledge, skill, and dispositions [1]. Collections of randomly selected student work are examined and assessed by small groups of faculty teaching courses within some general education categories [2]. Education

reform for the 21st century has generated various models of learning result evaluation that have emerged over time. The assessment of student learning is an essential component of University’s efforts in evaluating overall institutional effectiveness.

The value of research on student learning result evaluation system is to help teachers and students surpass the ivory-towered and alienating traditional classroom teaching model, and face the rapidly developing real-life environment and the ill-structured learning environment and adapt to current teaching realities.

The remaining sections of the paper are organized as follows. In Section II we describe the data mining and decision tree algorithm. In Section III we describe Student Learning Result Evaluation System and verify the efficiency of this system. Section IV concludes the paper.

2. Data Mining

Data mining is a powerful new technology with great potential to help companies focus on the most important information in the data they have collected about the behavior of their customers and potential customers [3]. Data mining involves the use of sophisticated data analysis tools to discover previously unknown, valid patterns and relationships in large data set. These tools can include statistical models, mathematical algorithm and machine learning methods. It discovers information within the data that queries and reports can't effectively reveal.

Decision tree is a decision support tool in the field of data mining that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility [4]. Decision trees are commonly used in operations research, specifically in decision analysis, to help identify a strategy most likely to reach a goal. Another use of decision trees is as a descriptive means for calculating conditional probabilities. Each node in a decision tree represents a feature in an instance to be classified, and each branch represents a value that the node can assume. Instances are classified starting at the root node and sorted based on their feature values.

The basic algorithm for decision tree induction is a greedy algorithm that constructs decision trees in a top-down recursive divide-and-conquer manner. The algorithm is shown in fig.1.

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create a node N
if
  samples are all of the same class C
then
  return N as a leaf node labeled with the class C
if
  attribute-list is empty
then
  return N as a leaf node labeled with the most common class
  in samples
  label node N with test-attribute
for each known value ai of test-attribute
  grow a branch from node N for the condition test-
  attribute=ai
  let si be the set of samples for which test-attribute= ai
if
  si is empty
then
  attach a leaf labeled with the most common class in
  samples
else
  attach the node returned by Generate_decision_tree (si,
  attribute-list_test-attribute)
    
```

Fig. 1 Algorithm for decision tree .

3. Student Learning Result Evaluation System

Student Learning Evaluation System(SLRES) is composed of five parts. Data Collection Module collects data. Data Processing Module converts rude data to the regular mode. Data Analysis Module use Decision Tree to compute regular data and give the corresponding result. Graph Visualizing Module is used to show data analysis result through graphic mode. Database is used to stored rude data, regular data and data analysis result. The structure of SLRES is shown in fig.2.

Fig.3 shows the Decision Tree used in SLES. Each internal node tests an attribute, each branch corresponds to attribute value, each leaf node assigns a classification. Table 1 shows the form of training data. 1000 student score records are used for training. Fig.4 shows the accuracy of decision tree learning.

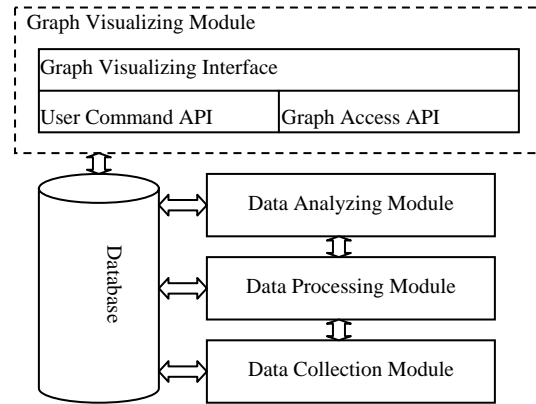


Fig. 2 Structure of SLRES .

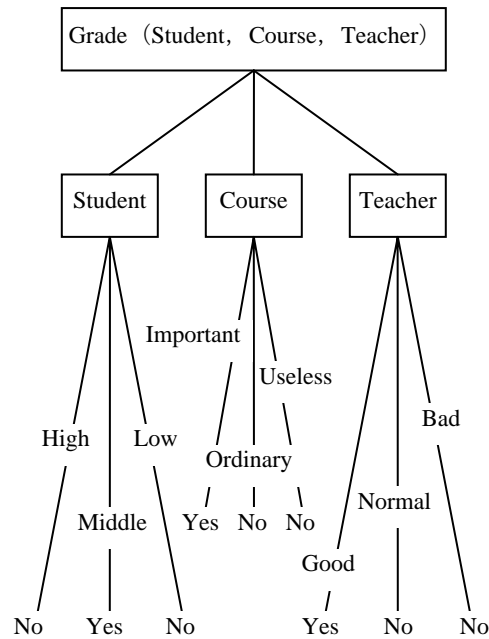


Fig. 3 Decision tree used in SLRES .

Table 1: Form of training examples

No	Student	Course	Teacher	Grade	Result
1	Dick	DB	Marry	68	No
2	Sunny	Operation System	Sue	75	No
3	John	PS	Marry	89	Yes
4	Smith	Math	Linda	97	Yes
...

n	Tom	Chinese	Peter	69	No
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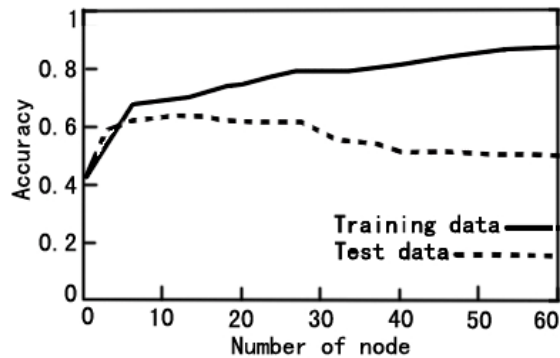


Fig. 4 Accuracy of decision tree leaning .

- [6] R.A.Burnstern and L.M. Lederman, "Comparison of Different Commercial Wireless Keypad Systems", The Physics Teacher, Vol.41, Issure 5, 2003, pp.272-275.
- [7] D.English, "Audiences Talk Back: Response Systems Fill Your Meeting Media with Instant Data", AV Video Multimedia Producer, Vol.25, No.12, 2003,pp.22-24.



Hongjie Sun received the Ph.D degree in Computer Science and Technology from Harbin Institute of Technology in 2007. Her research interests include the theory and technique of computer network and information security, parallel computing.

5. Conclusion

The Student learning result evaluation system for assess learning environments is an image of what makes sense today. As time goes on, new features will be added and others dropped. With this model in practice, student learning can become more energetic, more interesting, more challenging, and more suited to the times.

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References

- [1] Sally A. Gauci, Arianne M. Dantas, David A. Williams, and Robert E. Kemms, "Promoting Student-Centered Active Learning in Lectures with a Personal Response System," Advances in Physiology Education, vol. 33 (March 2009), pp. 60-71.
- [2] Margie Martyn, "Clickers in the Classroom: An Active Learning Approach," EDUCAUSE Quarterly, vol. 30, no. 2, (April-June 2007), pp. 71-74.
- [3] Y. Lindell and B. Pinkas Secure Multiparty Computation for Privacy-Preserving Data Mining Journal of Privacy and Confidentiality, Vol. 1, No. 1, pp. 59-98, 2009.
- [4] T.C. Fu and C.L Lui, "Agent-oriented Network Intrusion Detection System Using Data Mining Approaches," International Journal on Agent-Oriented Software Engineering, Vol. 1, No. 2, pp. 158-174, 2007.
- [5] Sang,X.M.: On the Edge of Learning Theory and Practice in the Digital Age. China Central Broadcasting and TV University Press, Beijing, 2000.