

Association Rule Mining Algorithm and College Wushu Teaching Reform based on Multimedia Technology

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Abstract

With the rapid development of modern information technology, especially the development of the Internet, network brings a vast amount of data and information. The development of information technology has changed the education and learning methods, greatly improving our work and study efficiency. In this paper, the author analyzes the college wushu teaching reform based on multimedia technology. Based on multimedia platform, this paper constructs the martial arts teaching activities under the background of modern technology. This system realizes the combination of multimedia technology and the martial arts curriculum structure, content, and resources; it changes the traditional classroom teaching mode, and will improve the students' enthusiasm in wushu teaching.

Keywords: *Multimedia technology, Association rule, Teaching reform, Data mining algorithm, Wushu education*

1. Introduction

With the rapid development of modern information technology, the scale and scope of database applications are expanding, the amount of data available is increasing, and the types of data are increasing [1]. Especially the development of the Internet is to bring us a huge amount of data and information. In the face of such a large scale, and there is a noise in the sea of data, how to extract the hidden meaning of useful information or knowledge, to further improve the utilization rate of information, the information age become. A problem should be solved [2-3]. Data mining technology is in this context came into being, has become a very popular research area in the last ten years. Since twenty-first Century, the rapid development of information technology has not only changed our life and work, but also changed our way of education and learning, and greatly improves our work and learning efficiency [4]. With the deepening teaching reform in China, many achievements are directly used in the field of school teaching, multimedia technology one of them. The multimedia technology is intuitive, has its own efficient, vivid, interesting and to accommodate the information compatibility and comprehensive features, for our teaching provides an intuitive, efficient image, auxiliary means. With the development of Wushu, wushu teaching and scientific training is how to represent the general trend. All kinds of modern teaching media and traditional teaching methods combined, especially the multimedia technology into the classroom to meet the needs of the modern martial arts, martial arts teaching, is when before the development of martial arts teaching is an important issue.

Compared with traditional teaching methods, multimedia teaching has obvious advantages. Human access to information from 83% n% from vision, hearing, and 3.5% from 1.5% from the sense of smell, touch, taste from 1%. Multimedia technology can be seen and can hear, but also can be operated by hand [5-6]. At the same time, the individual can not only in the traditional teaching at the same time to accept the visual context (text) information and language information, comprehensive and have the ability

to accept language and image and event information, which provides a theoretical basis for multimedia teaching. In addition the proof, the presentation of information with two forms of visual and language, enhances the individual acceptance of information and the absorption [7-8]. A point of view to make the multimedia teaching compared with traditional teaching advantages to explain.

2. Data Mining and Association Rules Algorithm

Data mining also called knowledge discovery in database, it is from large, incomplete, noisy, fuzzy and stochastic large data in the extraction of implicit, previously unknown, potentially useful information and knowledge process. Simply said, data mining is to extract or extract from a large amount of data. In the face of the current massive data, trace information, the status quo, the important research branch of data mining association rules, as a kind of advanced and intelligent data processing and analysis technology is in the ascendant. Through association rule mining, we can get useful information which is implied in the mass data. The goal of association rules is to extract the most interesting patterns in an efficient way. The problem of mining association rules is to find out the association rules with the minimum support degree Min_{sup} and the minimum confidence Min_{conf} which are given by the users in the transaction database D . Association rules mining is generally divided into the following two steps:

- (1) To find all frequent itemsets in a transaction database.
- (2) To generate association rules with frequent itemsets, *i.e.* for each frequent item sets X , if Y in X , Y and γ , and $C(Y(X-Y)) = Min_{conf}$, a Y association rules $(X-Y)$.

2.1. Apriori Algorithm

Apriori algorithm is the first association rule mining algorithm, is also the most classical algorithm. It uses the iterative method of layer by layer search and find the relation between items in the database, to form rules, the process by the connection (class matrix) and pruning. The large set of algorithm (Itemset) is a set of concepts. A collection containing K items is a K item set. The frequency of the item set appears to be the number of transactions that contain the item set, called the set of frequencies. If a set satisfies the minimum support degree, it is called the frequent item set. Apriori algorithm generates frequent item sets of pseudo code, so that the C_k is a set of candidate k - item sets, and F_k for the collection of frequent k - item sets:

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1:k=1
2:Fk={i /i ∈I ∧ σ({i}) ≥ N*minsup}
3:repeat
4:k=k+1
5:Ck=apriori-gen(Fk-1 )
6:forper transaction t ∈Tdo
7:Ct=subset(Ck, t)
8:for each candidate item setc ∈Ctdo
9:σ(c)=σ(c)+1
10:endifor
11:endifor
12:Fk={c /c ∈Ck ∧ σ(c) ≥ N*minsup}
13:untilFk =φ
14:Result= ∪ F
    
```

Apriori algorithm based on a frequent item set of any subset is also a frequent item set of the nature, using a layer by layer search iterative method, k - item set for $(k+1)$ - item set. The algorithm is as follows: first traversal of the target database once appear to record the number of each item or attribute, that is to calculate the degree of support for each

project, collect all support is not less than the minimum support of the project of user frequent itemset L1 1, then all the elements in the formation of the 2 link L1 candidate set C2 again ergodic transaction database support 2 - item sets is calculated for each candidate C2, collect all support is not less than the minimum support of the project of user frequent itemset L2 2, and then link the L2 into C3, traverse the database L3, repeat the above process until no candidate set so far. Throughout the process, multiple cycles, resulting in a large number of candidate sets, verification procedures need to repeatedly scan the database may be a lot of transactions. From the above analysis we can know that the Apriori algorithm requires multiple scans may be a large database, if the frequency set contains a maximum of 20 items, then need to scan the database 20 times, which requires a lot of I/O load.

2.2. Neural Network and Data Mining

The problem of database technology research is how to organize, store and efficiently obtain and process data efficiently. Modern database technology has made brilliant achievements, it in data sharing, and application independence, maintain the consistency and integrity of data and in the aspect of data security and provides an effective tool to achieve efficient data entry, query, statistics and other affairs function, but cannot be found in the data the potential relations and rules, cannot predict the future development trend according to the existing data, the lack of knowledge discovery means behind the data. Data and information gap between the requirements of a more powerful data analysis tools, the data into the ocean of knowledge of the source of the ocean. Data mining is the result of the evolution of information technology.

The development of information technology can be roughly described as follows: at the beginning of the construction process of simple data collection and database; the later development of data management, including data storage, retrieval and database transaction processing; and then later to analyze and understand the data, this time the OLAP, data warehouse and data mining technology. The construction for the development of data storage, retrieval and transaction processing technology to create the necessary conditions for data collection and database, with the application of mature technologies of query and transaction processing are frequently to a large number of data systems, understanding and analysis of the data also behoove the development of information technology has become the next target. Data mining is a multi-step iterative process, according to the user's satisfaction with the process status or the results of the model, may need to return to a previous step to re operation. The data mining process can be roughly divided into four main stages: problem definition, data preparation, data mining algorithm execution (pattern extraction), results interpretation and evaluation, and the basic work flow chart:

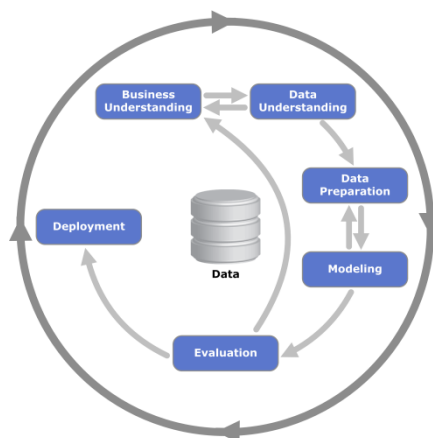


Figure 1. Work Flow of Data Mining

The task of data mining is simply to discover the potential and useful patterns from the data set. Broadly speaking, there are two types of patterns found in general: descriptive (descriptive) model and predictive model (predictive) model. Descriptive pattern is a normative description of the facts in the data set and the general characteristics of the data. The predictive model is based on the values of the data items of the model to determine or predict some unknown outcome. In practical applications, it is often divided into the following categories: classification, clustering, correlation, sequence.

- **Classification analysis:** mainly through the structural classification model, the data items with certain features are mapped to a given category. Constructing classification model consists of two stages: training data samples with a given category labels, to establish the classification model by learning, and the accuracy evaluation of the model using the test data and the training data with a class label. That is to say before classification, divides the categories is established.
- **Cluster analysis:** according to the data characteristics will be divided into many different types of data or cluster, the difference between the requirements of the class should be as large as possible, the difference in the data within the class should be as small as possible. And classification analysis, clustering analysis of the input set is a set of non calibration records, that is, the input record does not have a category label, the clustering process is an unsupervised learning process. The purpose is to divide the record set reasonably according to some rules, and to describe the different types of the records in an explicit or implicit way.
- **Forecast analysis:** it is to find the regularity from the existing data, establish the model, and use this model to predict the type of unknown cases, characteristics and so on. Can also be said to be based on the t_0 to the T_N event of the establishment of the model, and use this model to predict the t_{n+1} time to answer. In essence, it is in the process of learning the training set which is known to be known, to classify the input information, and to establish the corresponding relationship between input and output.
- **Correlation analysis:** Mining Association Rules in the transaction database is a very important research topic in the field of data mining, can be defined as: if the correlation value between two or more variables have some regularity, called the regularity. Relevance. The relationship can be divided into simple correlation, time series correlation and causality. Simple association has no time concept, only to emphasize a correlation between. Mining association rules generally requires both reliability and support.

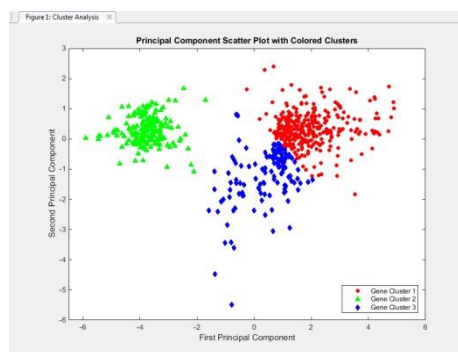


Figure 2. Cluster Analysis

With the continuous development of the artificial neural network technology and mature, intelligent computing ability of neural network and the characteristics of the special application field is expanding, many of which cannot be resolved by traditional information processing method using neural network has achieved good results. The

neural network can automatically acquire knowledge from data, and gradually to the new the combination of knowledge to its mapping function, and the implementation of hypothesis test logic. This ability makes the neural network is very suitable for dealing with a certain kind of knowledge, especially the inaccurate knowledge. A neural network is an information processing system consisting of one or more neurons. For the M neural network with input nodes and output nodes of the N , the relationship between input and output can be regarded as a mapping model of m dimensional Euclidean space to a Euclidean space, the error between the actual output and the expected output of the network is the network model to measure the performance of the index. Neuron is the basic processing unit of the neural network, which is generally expressed as a multi input and single output nonlinear computing device. The network structure can be displayed from the basic structure of a single neuron.

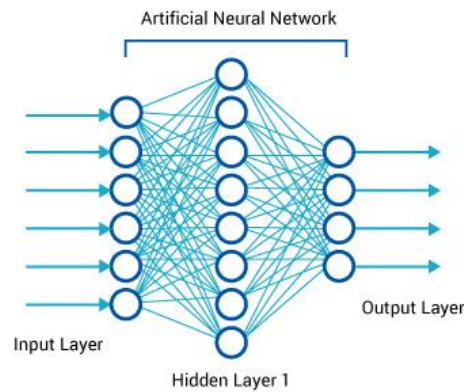


Figure 3. Neural Network

The process of data mining based on artificial neural network method mainly includes three main stages, as shown in Figure 4:

1. Selection and pretreatment data: for the construction of network ready data, including training data and test data. Select the data before the first to observe and understand the data, select one or a few suitable sample data sets. Combined with the mining task, the characteristics of the data and the mining method used to select the appropriate data coding (conversion) method.

2. Network training and pruning: this stage need to choose to network model, the selection or design of a network training algorithm. After training the network may be bloated, pruning is in the premise of not affecting the accuracy of the network, the network connection and removes the redundant nodes. There are no redundant nodes and the network generated by the connection of the model is more concise and easy to understand.

3. Rule extraction and evaluation: after learning and pruning, the network contains learned rules (knowledge), but in this form of rules is not easy to understand. The purpose of rule extraction is to extract rules from the network, and to transform it into a kind of easy to understand form, such as decision tree, fuzzy logic and so on. Test and evaluation of the reliability of the rules are by using the test samples.

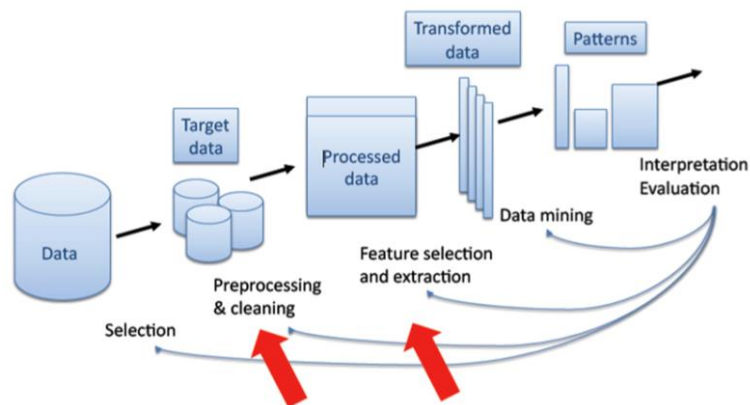


Figure 4. The Process of Data Mining

3. The Application of Multimedia Technology in the Teaching of Wushu

3.1. Multimedia Teaching Situation

This study defines the concept of Wushu teaching as follows: refers to the teaching in Wushu class in the use of multimedia technology assisted teaching methods for short. Is actually an integration of multimedia technology and the teaching of martial arts. It is said that the implementation of martial arts teaching activities as a platform for modern environment in order to realize multimedia, multimedia technology, resources, function with the martial arts curriculum structure, content, combination of resources, so as to change the traditional teaching mode of Wushu teaching, optimize the teaching process, improve the enthusiasm of the students, a modern teaching mode of multimedia teaching martial arts initiative. Specifically in this study is in the special course in martial arts by means of multimedia teaching. We analyzed through the network big data, the Jinan city sports specialized university student and the teacher carries on the investigation and analysis, the questionnaire altogether extends 442, the recycling 430, the effective questionnaire 372, has the efficiency 93%. The information quality is defined as: access to information, processing ability of the computer. Here referred to as quality and quality. Quality refers to the computer network operating system, file processing, installation and use of software skills and the application in the work ability. The network quality refers to the email, web browsing, web search, download the software. The skills and the application in the work ability. Through the analysis of the data, we can obtain the ability of college physical education teachers to use computer.

Table 1. Wushu Teachers Use Computer Ability

Index	Content	Often use		Occasionally		Rarely used		Not use	
		No.	%	No.	%	No.	%	No.	%
Gender	Male	280	69%	89	21%	22	5%	9	2%
	Female	200	74%	60	20%	15	4%	10	3%
Age	20-30	156	38%	78	15%	34	7%	0	0%
	30-40	234	76%	32	7%	12	2%	0	0%
	>40	65	16%	21	5%	18	4%	0	0%
Education	Undergraduate	185	43%	78	21%	31	9%	0	0%
	Master	293	82%	56	14%	22	7%	0	0%
	Doctor	12	2%	2	0.3%	0	0%	0	0%

We can see that the computer has entered into our life, most (95%) martial arts teachers will often use the computer only a few in life also (5%) older teachers will occasionally use a computer in daily life. Computer operating level is the key, a good teacher on the multimedia class survey showed that 15% of the martial arts teacher said he was very skilled in computer operation, 70% of the teachers said the skilled operation, and have 15% of teachers said unskilled operation. (see Figure 1) in general most of the teachers are able to operate the computer skilled in interviews. To know the teacher called computer operation only on computer based applications such as: proficient in office software, network query, network download and other basic operations. They tend to use PPT software to design a simple class. More complex software such as: flash, Authorware courseware making software technology they have no master, very few teachers will use them to design courseware. Therefore, the current level of computer operation of martial arts teachers is limited, which is rarely used in computer technology training and learning.

Wushu class teacher computer operation level is not high, but during the work in computer application training of teachers is not much investigation shows that teachers of Wushu during the work in computer application training accounted for 37.5%, did not participate in training for 62.5%. first, because the computer application ability of professional teachers of martial arts school is not enough give attention. During the work in Wushu class teachers to participate in training of computer application technology, the opportunity to learn less. Secondly, because the teacher class is busy enough computer operation and simple can meet the needs of teaching, so they rarely at their own expense to participate in training. At present, many schools are popular computer multimedia devices, but it ignores the teacher computer based training, so as to grasp the essence of the lack of courseware in theory. In the ideological concept, the machine used to make With, and do not pay attention to the design of tool use; in practice, often can not consciously reflect the two major advantages of human-computer interaction and intelligence, the computer only as a kind of traditional teaching methods. Therefore, the courseware of theoretical knowledge of teachers, the application of computer aided technology development and promotion of martial Arts teaching in the new curriculum standard the next is extremely important.

Table 2. Wushu Teachers Computer Grade Examination

Content	Attended	Have not participated in
Frequency	134	286
Percentage	31.5%	68.5%

Computer grade is a standard, testing the level of computer investigation shows: during the work of Wushu teachers participated in computer grade examination accounted for 31.5% of investigation number, did not participate in the computer grade examination accounted for 68.5%. (see Table 2) the above survey data shows that only a small part of the martial arts teachers in computer grade examination. Two reasons, the first is the computer grade certificate use at work not. Second is because teachers usually is more busy, no time to review the exam.

3.2. Multimedia Teaching Mode

Learned in the investigation, in the martial arts special theory class teachers may have classes in the multimedia classroom, special technology class martial arts will sometimes come to watch the video on TV in martial arts. But some schools of martial arts training venues is not set to the needs of multimedia, teaching martial arts teachers will hold their own laptop computer class and let the students watch the martial arts teaching video from the notebook computer. There is a multimedia classroom and martial arts training venues

run multimedia teaching. This is bound to affect the efficiency and quality of Wushu teaching. The survey showed that 77.5% of the students said they will use computer multimedia projector to class. 54% students expressed by a DVD TV multimedia class, 6% of the students expressed by other forms of multimedia class. This shows that the use of multimedia to teach computer projector school. In the room, the majority of the multimedia lessons of martial arts, TV DVD in the multimedia teaching of martial arts is more widely used.

Table 3. The Form of Multimedia Used in the Special Course of Wushu

Content	Multimedia projector	Television	Other
Frequency	289	204	32
Percentage	77%	54%	6%

For multimedia facilities to meet the needs of martial arts teaching, the teacher said 70% cannot meet the needs of Wushu teaching. Only 30% of the teachers said to meet the teaching needs. (Table 4) shows that most martial arts school multimedia facilities cannot meet the needs of martial arts teaching. Thus most of Wushu class teachers and national traditional sports professional students agree to set up a multimedia hardware facilities in the martial arts training venues attitude. So we can see that are recognized by people in martial arts multimedia auxiliary teaching.

Table 4. The Attitude of Martial Arts Teachers to Multimedia Teaching

Content	Very support	Support	Indifferent	I won't support it
Frequency	27	14	0	0
Percentage	61%	39%	0%	0%

The martial arts multimedia class development must first solve the problem of multimedia courseware, multimedia courseware source used in Wushu class teacher is not a table, 5 survey data show: the most of their own design accounted for 65%, accounting for 57% of the network to download, buy CDs accounted for 38%, accounting for 5% of the other. In today's information age, computer technology has penetrated into all areas of society, the computer has become a tool of our daily life and work, martial arts teachers also come into contact with the computer and use it. Most of Wushu class teachers will design their own multimedia courseware to the martial arts multimedia course, because teachers have different teaching methods and the style of their own, completely copy ready-made courseware will limit their teaching ideas, just like people can't easily lecture teaching plan is one reason. But some materials for the courseware design our own teachers, some are downloaded from the Internet, some buy directly from the market, data sources, the lack of unified and system, affect the quality of teaching.

Table 5. Sources of Multimedia Courseware

Content	Their own design	Network download	Purchase CD	Other
Frequency	26	23	15	2
Percentage	65%	57%	38%	5%

In today's information age, computer technology has penetrated into all areas of society, the computer has become a tool of our daily life and work, martial arts teachers also come into contact with the computer and use it. Most of Wushu class teachers will design their own multimedia courseware to the martial arts multimedia course, because teachers have different teaching methods and the style of their own, completely copy ready-made courseware will limit their teaching ideas, just like people can't easily lecture teaching

plan is one reason. But some materials for the courseware design our own teachers, some are downloaded from the Internet, some buy directly from the market, data sources, the lack of unified and system, affect the quality of teaching. Table 6 survey shows that 65% martial arts teachers rarely design of multimedia courseware in peacetime in martial arts teaching; multimedia courseware design often 27.5% Wushu class teachers; only a few teachers said never designed courseware. Because the multimedia hardware facilities of the school is not complete, the school leaders do not attach importance to martial arts, multimedia class no class a clear plan, therefore, offer of martial arts multi-media course shows great randomness.

Table 6. Multimedia Courseware of Martial Arts

Content	Designed	No
Frequency	121	253
Percentage	32%	68%

4. Conclusions

The status quo of martial arts multimedia teaching of the investigation, to understand the status quo of Wushu teaching development, analysis of the main factors influence the development of college physical education professional multimedia teaching and problems in Wushu in multimedia teaching, for the better development of martial arts multi-media teaching put forward corresponding suggestions and countermeasures. In order to promote the application and popularization of multimedia in the teaching of in the martial arts teaching. But also to further promote the modernization of Wushu teaching reform, optimize the martial arts classroom, improve the teaching quality of Wushu to make suggestions. At the same time the application and popularization of multimedia teaching martial arts will also be for the martial arts culture propaganda, people form lifelong sports consciousness play a positive role in promoting the integration of multimedia technology. Multimedia teaching and modern educational theory and combine communication theory. The aim of teaching is to better carry out teaching intention, implement teaching plan, and promote the teaching effect. Fruit optimization, improve learning efficiency.

Therefore, the application of multimedia technology is not only the reform of teaching methods, but also in teaching, change the teaching idea, teaching content selection, teaching design. For the better development of Wushu teaching, we must improve the multimedia teaching evaluation system. To solve the contradiction in teaching is through the evaluation. To make a correct judgment of teaching content, feedback teaching effect and the teaching goal, process, methods of adjusting, summarizing, strengthening macroeconomic regulation and control of the work of teaching and guidance, promote the teaching of high quality, high level of development. To fully mobilize the enthusiasm and initiative of teachers, to enable them to participate in the practice of curriculum reform and teaching reform in design to reflect the superiority of multimedia teaching, and guide the healthy development of modern teaching.

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