Application and Optimization Analysis of Cloud Computing System in Education Information

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Abstract
Cloud computing is a new business computing model, which enables a variety of application systems to obtain computing power, storage space and various software services according to requirements. In this paper, the author analyzes the application and optimization analysis of cloud computing system in education information. The teaching management system designed in this paper has many modules, such as financial management, teaching management, student management and so on. The system has good interactivity and can meet the needs of digital management in most schools. The development of comprehensive education cloud platform will put forward a revolutionary innovative thinking for the construction of education information.

Keywords: Cloud computing, Web system, Computer assisted instruction, Education platform

1. INTRODUCTION

The 21st century is the information age, the information is imminent, especially the education information. Education management information system as an important part of education information, deserve a very good development, but in fact slow development, education management information system software both from the aspects of general quantity, and quality are far cannot satisfy the requirement of many schools(Chung, 2013; Aguilar, 2014). But the education management information system development and the application not only technical personnel, because it is a social technical system, the success of the development and application of it is related to many factors, these factors often play a decisive role (Gopinathan, 2012; Gikas, 2013). Therefore, building a new and effective graduate education management information system to ensure the normal and orderly conduct of the daily management, strengthen the cultivation process monitoring, and management standardization, scientific and other very important practical significance (Mahony, 2012; Kozhevnikov, 2014). Based on the literature review, traditional forms of setting the framework of the technique for system can be separated into listed aspects.

1) Using B/S mode. In the B/S structure, the user interface completely through the WWW browser for access, without additional client software development. B/S structure has been proven that it has better security and better cross-platform, but because the general architecture is an emerging technology, currently the technology is not yet mature part.
2) Using C/S mode. C/S is built on the basis of the LAN as is collaboration between the client and server two layers of system platform model. Using the system C/S model has the advantages of the strong interactivity, high efficiency, high speed and good security.
3) C/S mode combined with B/S mode. If in high security requirement, interactive, flexible processing of large amount of data, data query and the place fixed small scale using C/S mode, and in the security and interactivity is not high, flexible site wide area within the scope of using B/S mode can make full use of the two modes respectively.

Besides the selection of the technique for developing the software, storage media is also essential for a successful system. The prototype of the cloud computing in the IT market is gradually formed, which provides new opportunities for the IT service provider and has given rise to the transition of the traditional IT products. IT embodies the thought of "the network is the computer", will be a large amount of computing resources, storage resources, software resources link together to form a huge size of the shared virtual IT resource pool (Mora, 2014; Porter, 2014). Under this perspective, we will use this technique for the systematic implementation. Cloud computing is in the rapid growth of the size of the market at the same time, also faced with unprecedented challenges (Taras,2013). Due to the lack of scientific compensation mechanism, which leads to the cloud service provider for the punishment of service opportunity cost reduction, cloud service risk probability increases, and the serious influence the customer confidence in the application of the cloud services. SLA as a service provider and customer signed a formal contract, its fundamental purpose is to let the two sides in front of the service to reach a clear shared vision, establish the formal contract mechanism at the same time limit the default behavior to encourage the parties to reach or exceed the predetermined goals (Veletsianos, 2013; Vexler, 2014). Customers rely on SLA to require service providers to provide security for its service, and put forward compensation in the event of a service failure. In the later sections, to deal with the mentioned
challenge and propose our new methodology, we conduct research on education management system optimization model based on wavelet neural network and adaptive weight analysis. To begin with, we show the sample demonstration of the traditional education management system in the figure one.

2. THE SAAS AND CLOUD COMPUTING

Software as a service as a new mode of software delivery been recognized more and more widely, and will become the next important operations of software services. As a kind of distributed system architecture, SOA can be heterogeneous platform application integration of the different services, through the well-defined interfaces between these services and standardize together in loose coupling way, the multiple existing services integrating it into a new system through the network. The SaaS has the following features and characteristics.

- Service features. SaaS allows the software to the Internet as a carrier in the form of services used by enterprises as enterprises do not need to spend a lot of money to buy the ownership of the software.
- Provide software through the Internet. SaaS provider will be unified plan of the software on the server that can according to the actual needs of their customers, order the products via the Internet providers. According to the analysis of the SaaS system, the use of hierarchical control of the SaaS system to manage the implementation of multi-level access control, to ensure the security of the system and the flexibility of the data access with delamination and extension. SaaS "one-to-many" service model made it possible to mass service, help to realize the service provider's economies of scale, and generate the long tail market. SaaS vendors use "one to many" service mode, develop an application can supply thousands of customers to use, can maximize the scale effect of the software, at the same time reduce the operating costs of software, including the production infrastructure, operating cost, upgrade costs, and many support costs (Wang, 2012). In addition, the SaaS provider can also be centralized control these costs that making use of the characteristic, the influence of SaaS long tail have a massive economic effect. In the table one, we define the primary components of the SaaS.

<table>
<thead>
<tr>
<th>Component Name</th>
<th>Definition and Feature</th>
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<tbody>
<tr>
<td>Assign role authorization</td>
<td>Permission configuration said authority and the distribution of the many-to-many relationship between role that is, a role can be granted more authority.</td>
</tr>
<tr>
<td>Distribution organization permit</td>
<td>Implement a many-to-many relationship between organization and license. An organization can have multiple licenses as a license can be assigned to general multiple organizations.</td>
</tr>
<tr>
<td>Limits of authority</td>
<td>Permissions are for one or more data objects in a computer system access permissions in some way is the operation task data access interface of data resources.</td>
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The session
A session is a mapping of a user to a number of roles, and when that the user activates a part or all of the characters he is granted, he builds a session.

Assign user roles
Assigned user said the distribution of the many-to-many relationship between users and roles, that is, a user can be granted multiple roles, a role can be assigned to multiple users.

For SaaS providers, use the intersection of design methods SaaS software must be able to meet the overwrite software costs, including the cost of software design and service operating costs, that is, as this method must be profitable. Therefore, the method needs to carry out the necessary conditions for economic analysis. It is worth noting that the non-fully trusted service operators to quickly and accurately reconstruct the data object. Based on the logical view of data objects in the physical storage block, non-trusted service operators can solve all the possible attacks, but still unable to determine what data block combination is true and what data block combination does not exist, so as to effectively prevent the combination of data privacy. Therefore, the safety concern is also the essential component.

3. THE PROPOSED CORE METHODOLOGY AND ALGORITHM

3.1. The wavelet neural network model
Artificial neural network prediction method to predict nonlinear effect is very good, from the perspective of the characteristics of network traffic, also is nonlinear, in theory, neural network can approximate arbitrary precision any form of nonlinear sequence. Compactly supported wavelets makes wavelet neural network is superior in rapid change and learning containing discontinuous functions aspect would wavelet function as a function of the basic hidden layer neural network structure constituting the neural network wavelet neural network, wavelet neural network identification the parameters of the self-regulating, self-learning ability, that has the scale and translation parameters adjustable parameters large-scale smoothing function capable of learning, and small-scale able to function with partial singular learning. Theoretically, there are two forms of integrating wavelet. (1) Wavelet decomposition of network traffic time series, wavelet transform scale coefficients and wavelet coefficients of the sequence, and then input to a neural network to be trained to predict. (2) Neural network hidden layer of the transfer function instead of using wavelet function, this combination of essentially change the structure of the forecasting model, in does not affect the premise of that prediction accuracy, shorten the training time of the model to improve the speed of the training, to overcome the neural network easy to fall into local advantages disadvantages.

Wavelet neural network forecasting model is made of three layers structure of wavelet neural network that chose a three layer structure, because most of the actual sequence of time series is a nonlinear, less than three layer structures is unable to approximate the nonlinear curve. When the layer number is more than three layers, of course that can also close to the curve, but increased the complexity of the calculation. In the following formulas, we define the architectures.

\[ a_n^e = \sum_i w_{ij}^e b_{m-1}^i \]  \hfill (1)

\[ b_n^e = \varphi_n(a_n^e) \]  \hfill (2)

Minister-designate N network has the four layers: input layer, pretreatment layer, hidden layer and output layer. The transmission function can be then shown as the following formula.

\[ y'(t) = \sum_{j=1}^W w_{j} \Phi \left( \sum_{i=1}^n w_{ji} x_i(t) - \theta_j \right) \]  \hfill (3)

Wavelet neural network weights by means of the criterion of minimizing evaluation function to obtain which can be obtained from the formula 4.

\[ J_{opt}(W,W',\theta) = \frac{1}{N} \sum_{k=1}^N \left[ y(k) - y'(k) \right]^2 \]  \hfill (4)

The optimization procedure is shown in the figure 2.
Before the network training to a number of levels of the wavelet decomposition and wavelet packet decomposition, and the wavelet decomposition algorithm adopts the cascade filter group to realize fast wavelet transform, the wavelet function and scaling function using the Malat pyramid method to construct compactly supported binary wavelet. The principles for the training can be organized as follows:

1) Modifications including network node split and delete. When the network node split, add a node and its connected to the power, divides the value assigned to the original node when delete network nodes, delete nodes and its connected to the right.

2) Wavelet packet decomposition is different from the wavelet decomposition of decomposition requires basis functions must be orthogonal compactly supported, but not that orthogonal dyadic wavelet, does not satisfy this requirement.

3) Once the network is trained using tree traversal algorithm, the leaf node of the search tree, the wavelet decomposition, so that each has a parent node, with wavelet decomposition or wavelet packet decomposition of general signal data, as a result of the output network preprocessing the input to the hidden layer, operation network, classification can be obtained results.
To finalize the WNN training procedure, we list the forms of the wavelet signals in the figure three. This method of combining wavelet transform and neural network, although a good prediction effect, but the essence is the neural network prediction, and not fundamentally improve the training speed of the neural network is slow, easy to fall into local advantages, it is difficult to find the global minima. Therefore, the optimization in the later section will be essential.

3.2. Neural network weights adjustment paradigm

We are adopted by the neural network with a hidden layer of three layer forward network, hidden layer and output layer nodes with a standard of Sigmoid function. General approximation theorem shows that the feedforward neural network has a hidden layer to achieve any approximation. To facilitate the discussion, the output neuron layer shown in simplified to contain only a linear neurons, hidden layer neuron activation function is sigmoid function. Without loss of the generality, this model can be extended to multi-output nonlinear monotonic output that neuron excitation former single hidden layer of the neural network.

In the reverse phase, using the error gradient descent the right to modify the value of the input layer to the hidden layer and the hidden layer cell threshold principle as BP is different from the traditional hidden layer to the output layer weights in the back propagation stage not to amend, reverse phase adjust only the connection weights between the input layer and the hidden layer and the hidden cell threshold. That error back through the output layer to the hidden layer is connected between the output layers is transmitted to the hidden layer, hidden layer as a unit assigned to modify the input layer to the hidden layer connection weights and hidden layer cell threshold based on gradient descent principle. The updated parameters are the listed formulas with the general integration and combination.

$$ Net_{general} = \sum_{i=1}^{n} x_i w_{ij} \quad (5)$$

$$ f(x)_{revised} = \frac{1}{1 + \exp(-x)} \quad (6)$$

Algorithm is different is that by the algorithm is to determine the optimal output power vector and that the reverse adjustment of input power vector, can make the adjustment of training the weights of neural network in the positive and negative two phases are implemented. Adjust the input vector of the above ideas are similar to normal BP algorithm, but BP back propagation is the error signal in order to inform weight changes, to reduce the error of the output. Our algorithm is based on the weight update, update as input and two learning methods. Weight adjusting nested in that the input control inside. Several times after a weight adjusting input adjustment. Thus, increase the amount of computation is very few, but can bring the learning performance is greatly improved which is shown as follows.

4. THE IMPLEMENTATION OF THE FRAMEWORK

For our system, we primary use the Ajax. The core of Ajax is the XmlHttpRequest JavaScript object and supports asynchronous request, you can use the JavaScript to request and process the response to the server, without blocking the user. This updates the data, no need to refresh the entire page, just need to update the specific parts of the page can be referred. User or a basic user program using distributed database as centralized database, don't need to care about the distribution of global data in the distributed database distribution transparency also called distribution independence from the following aspects.

1) Location transparency: it is the middle layer distribution transparency, data on the user's program to understand global data fragmentation, but don't know the duplicate copy of each logical clip, also do not have to care about each fragment and the copy of the site location distribution.
2) No distribution transparency: the user to understand the global data fragmentation, replication of each logical fragment, while the site location distribution and the fragments and their copy of the heterogeneous data conversion model to users and their treatment program.
3) Shard transparency: is distributed at the highest level of transparency, at this point, the user to write programs for global relations only operate without considering the logic of data fragmentation.

The database management system is a management information system is an important support technology is the key of the network system. The database system selection system should be consistent with the basic mainstream relational standard, client/server architecture and the system should have good adaptability and extensibility based on. The figure 4 shows the systematic architecture.
The database system of this system adopts the distributed system design method. The Department as the center of teaching database that is responsible for the management of all student information. Each sub teaching point is also built with its own database of local students teaching management. The whole database system uses some rules for the data synchronization and application. The logical structure of the distributed database system is at the beginning of the system design as we consider the distributed management function which is directly used by the database software to meet the requirements of the distributed management system. But in the later design and testing, it is found that there are problems, which limit the application of the database software. For the further consideration, we list the primary components as the follows.

1) Cultivate management module. The module including the training plan formulation and the queries, training plan and query, curriculum planning statistics, cultivation plan submitted status query and funds management.

2) System management module. This module includes user management, system global parameter settings, system tools and the basic public code maintenance, etc. Used to definition, using the system user divides user permissions and maintains the user password.

3) Related to basic module. The teacher management, student management and the teacher module includes course management. Course management mainly include course maintenance, query and maintenance schedule.
5. CONCLUSIONS

In this paper, we conduct research on the novel education management system optimization model based on wavelet neural network and adaptive weight analysis. In information age, the frontier in the scientific research in colleges and universities, establish efficient management information system as an important part of promoting the management level of the education. The development of higher correspondence education management system and application has realized the correspondence station unified online teaching management, using advanced management technology, the construction of the management information system based on Internet platform, transfer data, release information, data and resources sharing, improve the timeliness of the information. How to effectively deal with scattered data and can implement centralized management? Therefore we designed in distributed database platform to build the remote teaching management system, so as to better achieve the teaching management information exchange and basic management. The proposed methodology is implemented with the Ajax, the user interface is well designed. In the future, more modifications will be down.

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