

# Preliminary Design of E-learning Learning Resource Interaction Based on Web Data Mining

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**Abstract:** According to the problems of low resource utilization efficiency, single learning content and lack of personalization in e-learning system, a personalized e-learning system based on Web data mining is designed by applying web mining and ontology technology. The system can provide more satisfying teaching methods and learning resources according to the characteristic information of learners' knowledge structure and learning preference, and create a relatively personalized e-learning environment. Experiments show that ontology technology can fully improve the mining effect, improve the management efficiency of learning resource database, effectively promote students' network learning, meet students' personalized learning needs, and provide intelligent auxiliary means for system decision analysis.

**Keywords:** Web data mining; E-learning learning resources; Interaction design

E-learning teaching is a new teaching mode that takes computer network as the supporting environment and learners conduct online learning through virtual classroom. By analyzing the current situation of e-learning system, it is found that it has some obvious shortcomings. Web mining. It refers to extracting interesting and useful patterns and implicit information from WWW related resources and behaviors. [TL apply Web Mining to e-learning system. We can find students' access habits, learning interests, tendencies, etc. in a large amount of web access data, recommend courses and learning materials to students, point out the knowledge key points that students don't master and recommend learning resources according to the test results, get feedback of students' situation, and provide teaching suggestions to teachers, so that teachers can adjust in time Teaching points, teaching contents and teaching methods. Provide personalized services to make it possible for students to study efficiently and personalized according to their own characteristics.

## 1. E-learning's problems in resource management

E-learning is a new learning method formed with the emergence of web. However, there are still problems in the resource management of e-learning<sup>[1]</sup>.

Firstly, the limitation of resource association leads to the lack of personalization and self-adaptive ability of learning. Secondly, the description standards of learning resource database are inconsistent, including a large number of heterogeneous resources. Finally, there are many and miscellaneous teaching resources, and the traditional keyword-based retrieval is inefficient, especially for multimedia resources. To solve the above problems, some researchers also put forward corresponding solutions, such as component-based business logic encapsulation for web applications; Automatic e-commerce based on XML and web services and so on. However, these existing web technologies can not really realize the long-awaited personalized and intelligent applications. These are the problems that semantic web can solve.

## 2. Web service oriented e-learning system architecture

### 2.1 Web Services

Web service is actually an independent component with a unique URI, which enables users to easily reuse various applications through the Internet. Web services can be assembled to form a new service with more complex functions. Obviously, this requires the interoperability of Web services. Web services are independent of the operating system. They can work on all web service engines without considering the proportion of programming language. The development and use of Web services involve many specifications, such as soap, UDDI and so on. It is transmitted like an envelope with an information message; WSDL clarifies the functional characteristics of the logical units that make up a specific w-out service. These specifications

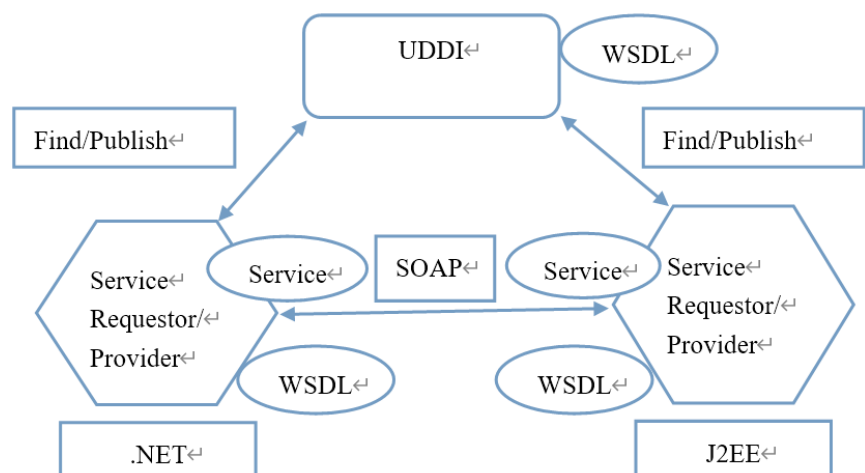


Figure 1 Web Services

form the basis of the web service model, in which services, like ten components, turn the Internet into a huge distributed system<sup>[2-3]</sup>.

## 2.2 System architecture design

The architecture of e-learning system designed using web services is usually divided into two parts: client software and web services provided by several providers. This is consistent with the organizational structure of ordinary web services. The system client is the port of users using learning services. It can be a web portal or an independent application: while learning services are deployed on distributed servers, including content writing, content provision, practice, tracking, discovery services, and communication services such as email and short message. The use of learning services is not limited to learners. The whole learning system can be regarded as web services, so as to directly integrate the distance learning function into business applications (such as ERP system) to realize and other applications technological process “And interactive interaction. As long as there is terminal support, the learning service can also be integrated I on the mobile device. In this architecture, the service of the part on the distributed server mainly includes the following centralized form, content service, discovery service and configuration service. Among them, the content service provides learning materials in the form of learning objects and courses, while the discovery service is mainly used for search Learning content and various additional functions that can be integrated into the system. The third is to configure services and process user oriented data, such as system data and tracking data, which provide data needed for other services. Finally, there are other web services, including the typical E-learning behavior to be used by learners and teachers, as well as third-party services. Such as payment services, certificate services, etc.

## 3. Defects and Solutions

Combining several web services to create a decentralized system can obtain the same functions as the traditional e-learning system, but there are still some defects in managing content and search services for learners. In most cases, the system will use UDDI registration to search web services. However, UDDI is not appropriate for content services because the storage of additional metadata for content is not supported. In this structure, the learning object cannot be imported into the specific learning management system, so the content is stored in the distributed server and accessed when needed, but there will also be the problem of display. Because the web service is data-oriented, users can obtain the XML form of the data object from the service provider, which is not conducive to the understanding of the learning content.

When solving this problem, it is necessary to make it clear that the UDDI architecture commonly used by ordinary e-commerce web services needs to be modified to adapt to the e-learning environment. The learning resource registration system provides registration and query services for learning objects that comply with SCORM specification. In order to further realize the integration and real-time application of dynamic e-learning content, representation oriented web services must be realized. By providing a set of representation oriented services, the collection of applications and services can be completed dynamically, and there is no need to develop representation logic in order to realize integration. Learners can use the system platform to call the learning object of the content provider server and return it to learners after the processing of the presentation service. In this case, the message contains the display information and has a general interface, which can change the displayed information content according to the needs of learners.

## Conclusion

Web-based data mining service can effectively solve the related problems in the interactive design of e-learning learning resources, realize the distributed storage, sharing and dynamic exchange of content of e-learning learning resources and system functions, and promote the system to be more flexible and personalized.

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