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Voice Learning System

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Design of a Spoken Language Dialogue Learning Platform - Voice Learning System

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Abstract

The Internet becomes more and more important because of providing conveniently online learning, usually called E-learning.

Due to rapid growth of network technology, learning on the Internet is more and more easy. But learning on the Internet still has a limitation if there is no wired-connection PC or wireless-connection laptop. With the requirement of learning anytime and anywhere, we combined data communication network and telecommunication network to develop wide area learning environment, which is called mobile-learning. In this paper, we will introduce a new idea called Voice Learning. And we will introduce our voice learning system (VLS). VLS can supply specified or personalized courses for blinds and enhance efficiency of linguistics education. With VLS, people can learn online by voice learning technology with cell phone or traditional phone anytime and anywhere.

Keywords : Mobile-learning, Voice Learning

1. Introduction

General Learning Management Systems (LMSs) work on network. They are limited by place. If the place has no network, learners can't enter these systems. If the LMS could work on a cell phone, this question would be solved. But the problem about the

small screen of a cell phone is arisen. If a LMS shows teaching materials by graphic user interface (GUI) on a cell phone. It is too hard for learners to read, and blinds can't use this system. And for popularization, phone is greater than network. The quantity of users of a LMS works on a phone will be greater than that works on network. Voice Learning System is designed to solve these problems. This article will introduce it later.

Chapter 1 is an introduction for VLS and VoiceXML. VLS is a system this article wants to present. VoiceXML is key tool for VLS. Chapter 2 points out what VLS needs and why VLS needs them. Chapter 3 is an analysis for users. It is prepared for system analysis. Chapter 4 will show the architecture of VLS and explain the functionalities of six modules of VLS.

1.1 Introduction of VLS

The major goal of Voice Learning System (VLS) is to supply a platform to show the teaching materials by voice user interface (VUI). For learners, the method of presentation is a lot of dialogs. Learners can talk to VLS. Learners can learn anywhere and anytime by cell phone. Blinds can also learn online by VUI on VLS. This is for learners. For the other users, VLS supplies a GUI to them as general systems. Figure 1 shows the major goal and the other goals.

(SERVER-CLIENT infrastructure), so VLS has a WWW server which is responsible to supply a web interface to clients. This WWW server is also a VoiceXML document server and VXML interpreter can get VoiceXML files from this server. Figure 3 shows the environment :

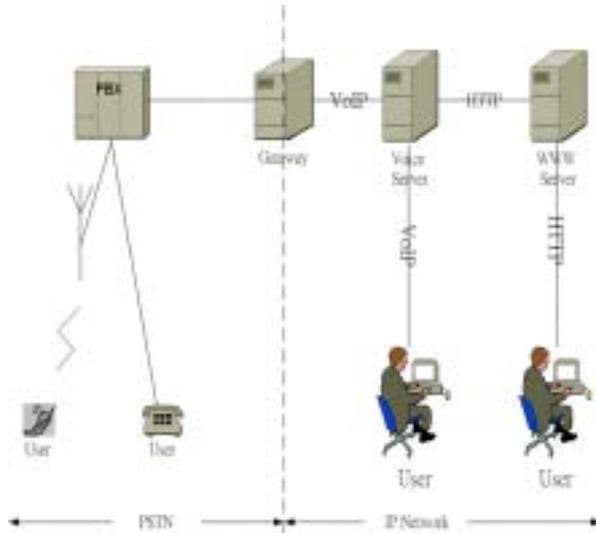


Figure 3 Environment

3. User's needs

In order to know what functions VLS has to supply. First step is to analysis what users' needs and second step is to get use case model of this system.

VLS serves for four kinds of users, i.e. author, administrator, LMS and learner.

Author on this system likes a teacher on traditional school education. An author can create a class and register the learners he likes to his class. After creating a class, author has to edit a course(s) to that class and edit teaching materials for that course(s). So author's main needs are the creations of teaching materials, test papers and management of classes.

Administrator on this system likes a school director on traditional school education. Administrator can manage the functions of VLS system and teachers, but administrator can't manage learners and teaching contents. Learners and teaching contents are managed

only by authors.

VLS is a LMS and the other LMSs can get teaching materials from VLS or send teaching materials to VLS. VLS has to supply a platform to LMSs to download or upload teaching materials. How do LMSs get teaching materials from or send teaching materials to VLS? SCORM [6] is the best answer presently.

Learner is the major user for this system. Learners can browse the teaching materials which are made up by VoiceXML files by VUI of this system. General LMSs are constructed on network with Server-Client infrastructure, but this structure has a limitation of place. It can only work at the place has network. If teaching materials can be presented by voice, the purpose of learning anywhere and anytime will be achieved.

4. System design

According to the users' needs, the use case diagram can be got. Figure 4 shows the Use Case Model.

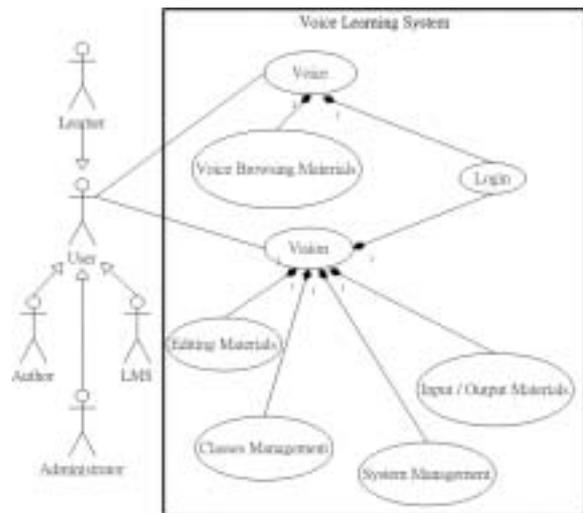


Figure 4 Use Case of VLS

There are four kinds of users. They inherit user's functionalities. VLS supplies mainly two functionalities, voice and vision. The functionalities of

voice include the functionalities of voice browsing materials and login. The functionalities of vision include editing teaching materials, classes management, system management, login and input/output teaching materials. The functionality of login is responsible to watch the system to check users' IDs and what they can do at this system.

From the use case, user has two interfaces, GUI and VUI. The users have different IDs works on different functionalities of VLS.

According to these functionalities, we subdivide VLS into six modules. Figure 5 shows the structure of VLS.

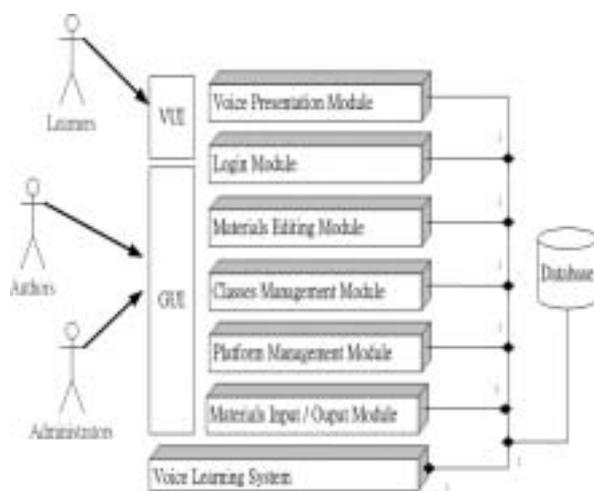


Figure 5 System Structure

4.1 Voice Presentation Module

Voice Presentation Module is responsible to translate VoiceXML files into voice to learners and learners can input data from VUI by phone or audio devices. Here Learners can speak directly the data they want to input or press DTMF keys to input. The method of presentation is a dialog between learners and Audio Presentation System.

4.2 Login Module

Login Module watches the whole system. It is

responsible to manage the security of VLS. A user must have his own account name and password and then he can enter this system. Users who want to enter VLS interact with Login Module first. If users pass the examination of Login Module, they can enter the other modules.

4.3 Teaching Materials Editing Module

Teaching Materials Editing Module is responsible to supply a GUI to authors to edit teaching materials. Authors can create their audio teaching materials, i.e. VoiceXML files, by this module. Here this module will create metadata first from authors' inputs. The metadata are to describe the information of a VoiceXML file. The metadata will be included in the field, Resources, in a content package (SCO) when VLS wants to export the content package. This module has another functionality, i.e. editing test papers. Authors can create three kinds of questions to learners, i.e. true-or-false question, choice question and question-and-answer question. Because test paper presents dialogs to learners, system has to add additional events, help, no response and again, on VUI. There are no these events on GUI. We show the sequence of dialogs of a choice question on a test paper below.

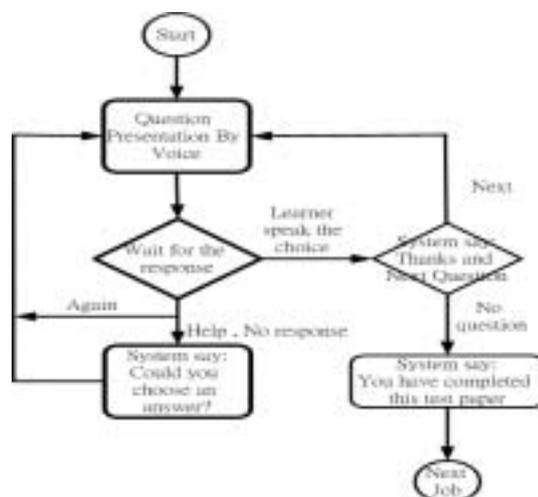


Figure 6 Dialog Flow Chart

This dialog sequence can also be the sequence of teaching materials, if we change the contents of the dialogs. The event dialogs, Again, Help and No response, are very important on VUI. Sometime learners may not understand what system said. Learners can speak help to Help dialog or again to listen to question again. Learners can also make no response to enter Help dialog.

4.4 Classes Management Module

Classes Management Module takes charge of most things. An Author creates a class here and assigns courses to that class. The learners are assigned to a class by authors. Learners can't register themselves to a class. An Author controls his own classes, teaching materials and students. Authors can leave a message to a learner. The message is also a VoiceXML file and the learner can get it by VUI. Authors can grade test papers here. This module will arrange automatically the learners' grade to show to authors. There is a most import job here. Authors have to create the metadata of a course. The metadata is different from the metadata created by materials editing module. The metadata created here has to describe the sequence of subjects in a course and the information about the course. The metadata about sequence will be included in the field, Organization, in a content package (SCO [6]) and information about the course will be included in the field, Meta-data. When a system gets these metadata, it will know how to direct a learner to complete a course. These metadata will be used when VLS wants to export the content package.

4.5 Platform Management System

The users of the platform management system are administrators. Administrators can't manage learners,

classes, teaching materials. They manage authors and functionalities of VLS. If an author creates an illegal teaching material, an administrator could stop the author's rights.

4.6 Materials Input/Output Module

Materials Input/Output Module is a gateway of VLS. The information (i.e. SCOs [6]) which are imported or exported will be over this module. In order to exchange teaching materials with the other LMSs, a course will be packaged into a sharable content object (SCO [6]). The major job of this module is the content package. This module will gather the information from classes management module and assets from Asset Depository. When a LMS chooses a teaching material, i.e. a course, this module will compress the relational files and meta-data into a ZIP file. This ZIP file is a SCO. After a LMS downloads the SCO, it can decompress it and handle it according to the manifest in a package (SCO), if the LMS is SCORM-compliant. VLS can also get the SCOs from the others LMSs. This module will also decompress the SCOs and handle the physical files on the SCOs from the other LMSs. The picture shows the structure of the package (SCO).

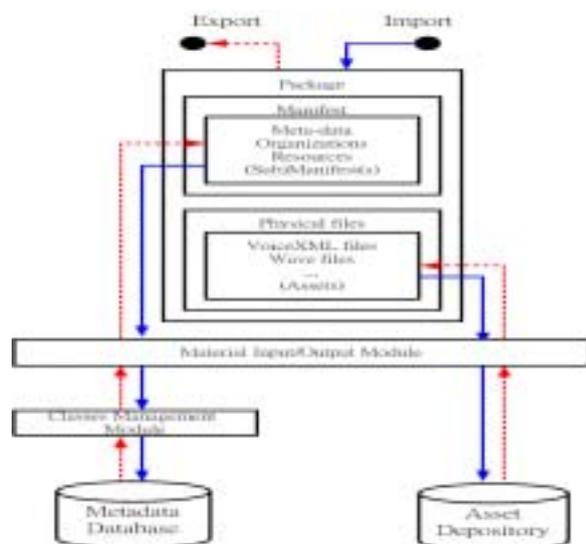


Figure 7 SCO

4.7 Data flow

Finally, according to the functionalities of these modules, we can get the data flow between modules.

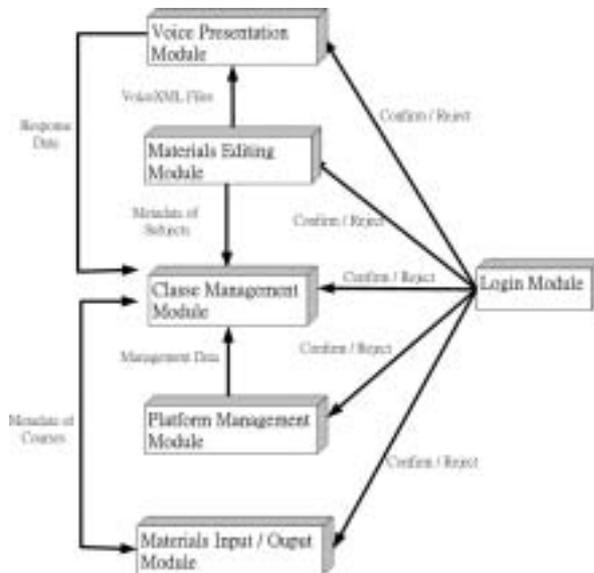


Figure 8 Data Flow Chart

5. Conclusion

Due to the rapid growth of the technology, learning by computer or PDA is not enough. Because it is limited by the place. Learning by cell phone can solve that problem. But the screen of a cell phone is too small. It is not convenient to read and blinds can't read it. If a system can show its teaching materials by voice, there is no obstacle and people can learn anywhere and anytime by cell phone. Learning by cell phone can also reach the goal of mobile-learning. Due to the technologies of text to speech (TTS) and automatic speaker recognition (ASR) grow rapidly; learning by VUI will be come true.

6. Reference

[1] 祥泉, 2002, VoiceXML 原理與語法, 泉老師工作室網路應用技術文件。

[2] 廖文宏、賴建安、周軒逸, 2003, 語音介面設計之初探：以虛擬 DJ 為例, 國立政治大學資訊科學系。

[3] 孫惠民, 2002, UML 設計實作寶典, 台北：學費行銷股份有限公司。

[4] VoiceXML forum, <http://www.voicexml.org>。

[5] ADL SCORM™, <http://www.adlnet.org>。

[6] Advanced Distributed Learning initiative , Sharable Content Object Reference Model Version 1.2, 2001。

[7] World Wide Web Consortium, Voice Extensible Markup Language (VoiceXML) Version 2.0, <http://www.voicexml.org/spec.html> , 2001。

[8] Franz Lehner, Holger Nosekabel, The Role Of Mobile Devices In E-learning-First Experiences With A Wireless E-learning Environment, Chair of Business Informatics III, University of Regensburg, 2002。