College English Assisted Teaching Based on Artificial Intelligence

Zhu Xiaowei
（Wuhan Polytechnic, Wuhan Hubei, 430074，China）
q4cb07@ygoll.cn

***Abstract*—The problem to be solved in artificial intelligence (AI) is considered to discuss the application of AI technology in English teaching, and a college English assisted instruction system based on expert system is designed in this paper. The expert system module for teacher assisted English teaching is based on expert system theory, and the knowledge representation of domain knowledge is made by integrating production and framework. According to uncertain fuzzy inference analysis, teachers can understand the mastery of students' knowledge points. Instruction teaching adopts neural network to establish student autonomous learning system module, which is used to analyze the student test situation and perform self diagnosis. The experimental results show that the system can help teachers grasp the learning situation of students through reasoning analysis, and enable students to learn autonomously with good application value.**

Keywords-English teaching; AI; expert system; distribution; B/S

I. INTRODUCTION

Artificial intelligence(AI) is a challenging and creative field in English teaching while its birth and development improves people's focus in information technology and curriculum integration. Since 1970s, expert system with teaching ability has been developed and people constantly introduce problems-solution and knowledge representation into assisted instruction. In recent years, increasing maturity of ai technology enhances application of English teaching in its research achievements. English teaching development innovation and its teaching modernization have been promoted to a large extent. At present, the importance of ai technology to be applied in teaching system has been accepted. It is significant to study application of ai technology in English teaching with information technology and curriculum integration as direction.

Rule-based expert system is an AI branch with the perfect application prospect. It is effective, feasible and innovative to combine between expert system theory with data mining technology as well as internet platform to be applied in research and study of college English teaching. First, this paper introduces principle, development and application in expert system and then puts forward the solution scheme in terms of difficulties in college English teaching. That is, data mining technology and AI in expert system theory are used to realize a set of English assisted teaching system. Towards users' difference, the system mainly includes two parts: one of them is experts' system theory-based English assisted teaching module. This module aims at teacher users and module, applies framework-styled and generation-styled knowledge representation to classify and summarizes English knowledge points. The optimized algorithm will be applied to analyze knowledge point association of test. The second one is to apply data in system to set up students' autonomous learning module and realize self-diagnosis with individual as a unit. Suggestion titles of autonomous learning will be proposed through repeated exercises so that students can practice with a specific purpose. Finally, the whole system will be designed and realized according to development process in software system

II. RELATED WORK

A. Mutual Relationship Between AI Technology and English Teaching

First, English teaching activity is very complex with many undetermined factors. The most prominent characteristic of ai is appearance of simulation in human thought mode and thinking-solution deduction. Complexity in English teaching needs to depend on unique solution of ai in play so as to offer each students assistance and formulate their dynamic teaching strategy.

Second, some schools face difficulties of poor quality and effect in English teaching so they need innovation of scientific technology. AI can play its role in language learning and this makes up many defects in English teaching. So it cannot only be helpful to adapt to English curriculum standard but can also innovate English curriculum teaching mode and students' learning style improvement.

Third, construction of AI English teaching system can be taken as a breakthrough to promote innovation of modern intelligence technology in English teaching, improve teachers' English teaching quality and students' initiative to learn English. Intelligent method is the commanding point of improvement for assisted teaching of computer language.

Fourth, teaching plays a foundation role in social development so application field of AI should necessarily be applied and explored in education and teaching.

B. Expert System

Expert system is one of the most active fields in AI application research and it has been widely applied. The expert system is put forward when the research of AI is in low tide. Its successful application makes AI get rid of the predicament. From this, people begin to turn from the law of thinking to intelligent behavior, and realize the application of AI from the theoretical research to the practical application, from the discussion of a kind of thinking

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method to the application of special knowledge. A major breakthrough in solving special problems.

The structure of expert system refers to the construction method and organization form of each part of the expert system. Different expert systems, application fields and application goals are different, their functions and structures are different, but in the abstract, the expert system consists of six basic components: human-computer interaction interface, knowledge acquisition mechanism, reasoning machine, interpretable organization, knowledge base and database, and the expert system structure is shown in figure 1.

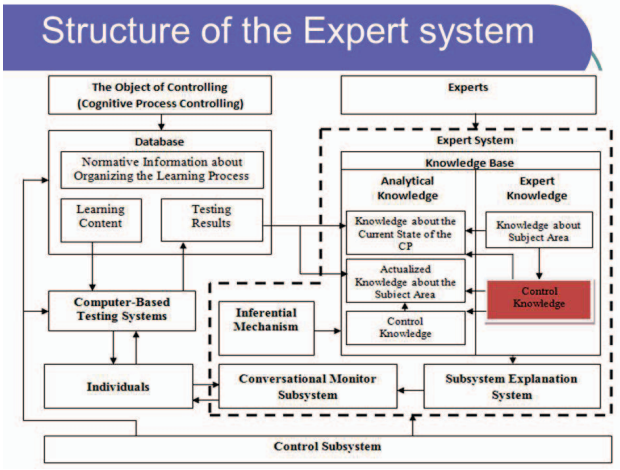

Figure 1. Structure of expert system

III. AI-BASED SYSTEM DESIGN OF COLLEGE ENGLISH ASSISTED TEACHING

A. Overall Architecture

The system adopts B/S mode system structure and constructs Internet-based networked teaching assisted system. There are two modules in system: assisted expert system of college English teaching and students' self-learning system. The whole system contains four users: domain expert, English teacher, students and system managers. When users log in, they will have different module operation authorities according to different identities. Users' operating authorities are shown as figure 2.

System managers refers to daily maintenance staff which are appointed by system owners such as user management, item bank management, passwords modification.

Domain expert refers to senior English teachers with many years' teaching experience. They can thoroughly analyze knowledge point, degree and certainty degree which involve in English test and offer samples with the given format, which mainly includes knowledge base maintenance, sample maintenance in neural network and passwords correction.

Teacher refers to general English teachers. Each teacher has the appointed classes and students. Their main authorities are test organization, uploading test results, analyzing knowledge point of the appointed students' group, etc.

Student refers to common students who can log in system with the given username and passwords by system managers. Their main authorities are exercise involvement, self-diagnosis, historical exercise diagnosis, strengthened practice of knowledge point and passwords modification, etc

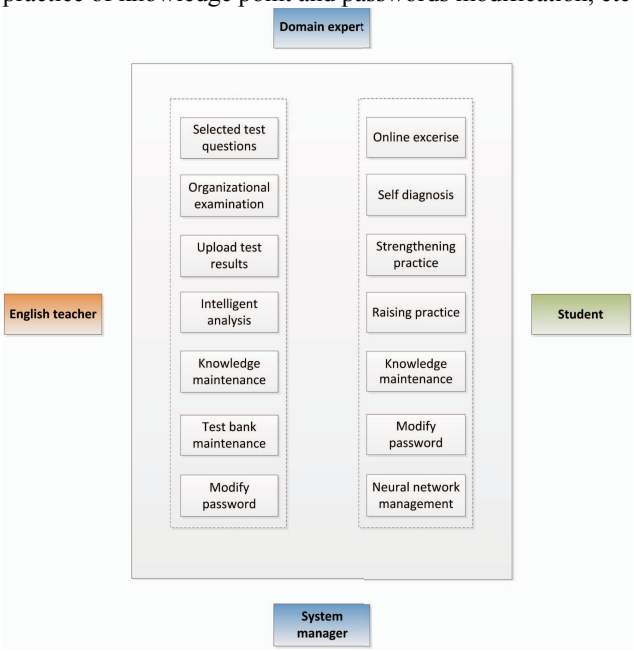

Figure 2. Expert system of college foreign language teaching based on AI

B. System Module Division

1) Student model

Student model is the core in implementing intelligence teaching. This is system characterization in students' knowledge, cognition, learning motives, learning style and learning historical changes after students pass learning and test during system teaching. Its main effect is to provide judgement basis for realization of teaching target, teaching content and teaching strategy so that system can set up appropriate individual teaching according to students' characteristics.

2) Teacher model

Teacher model is intelligence teaching system for organizing, managing and implementing the whole teaching activity center. Its effect is to combine with students' target and practical ability, integrate learning results which are offered by students' module, analyze students' current status and make teaching strategy. Teacher model chooses the most effective teaching method for students to perform teaching activity, monitor, evaluate students' learning effect and realize individualized direction.

3) Domain model

Domain model contains students' knowledge base and teacher knowledge base. Students knowledge base records students individual information such as learning history, knowledge level, problem solution, learning situation,

learning ability, comprehensive ability, etc. These information offer system information reference in terms of students' judgement, selecting learning content, content organization and difficulty arrangement in system.

4) Diagnosis model

Diagnosis model is made up of diagnosis and evaluation. Diagnosis function is to diagnose students' errors and defects during learning and operate error-correction remediation instruction according to personal characteristics.

C. English Expert System Design

1) Data Layer realization

Data layer is divided into three modules and they are knowledge base, basic database and mining database. Basic database is mainly that users define and upload data such as manager list, domain expert list, teacher list, students list, students' answering data, etc. Students' list and students' answer data are the most important part. Knowledge base is the foundation to realize expert system and it contains domain-specific knowledge for domain experts. Towards English teaching, knowledge base mainly stores grammar and vocabulary analysis, item bank, item analysis data, etc. Mining database stores those data which are generated when system operates data mining modules including intermediate step data during system operation.

In terms of expert system, the most important part is expression and design of knowledge base. There are two aspects of knowledge base. The first step is to submit system knowledge and classify it. Then, according to the defined model rule, knowledge base stores knowledge so that knowledge base can be conveniently corrected and supplemented. In English expert system, knowledge base is divided into two parts. One of them is static knowledge base including fixed vocabulary and grammar. For instance, vocabulary is divided into verb, noun, etc; grammar is divided into tense, sentence pattern, subjunctive mood, etc. The other part is dynamic knowledge base and this is the added knowledge with test questions and teaching requirement, including detailed analysis of test questions, correct and error of options, etc. It is gradually added by domain experts after system starts to operate.

2) Inference engine

Inference engine is the main enginary part in expert system operation. This system firstly adopts forward inference and titles infer all the involved and checked knowledge points. Then, it adopts backward inference and infers grasping knowledge points through students' answers. Forward inference and backward inference complete inference process in expert system. The system operation is based on students' answer data which are uploaded by teacher users and knowledge base rule which is made by experts to calculate corresponding fuzzy output variables. Then, according to output variables, conclusions with reliability can be inferred to achieve. Knowledge base rule is uncertain while intermediate result, that is, fuzzy output variable, is also uncertain. This is determined by expert system rules. Its latter final result also has certain reliability and these uncertain factors gradually transfer during system data operation.

3) Interpreter

In the system, through local uploading students' answer file, English teachers display inference results in table form. There are two parts of interpreter. One of them is system offers knowledge point in knowledge point expression form according to diagnosis conclusions from users' uploading test results. The other one is to offer hint information on the basis of diagnosis fault knowledge point and notify conclusion reliability.

D. Weighted Inference Model

In the process of uncertain inference, if there are multi-preconditions in knowledge condition, weighted factors can be introduced to express importance degree of sub-condition. Through endowing different weights to different sub-conditions, influence degree of each sub-condition on conclusion in multi-condition can be reflected. Generally, if independence of one sub-condition is stronger, or its importance in conclusion is higher, the weight value of weighted factors in this sub-condition should be larger. Knowledge representation form of weight is depicted as follows:

If $A_1(w_1) \wedge A_2(w_2) \wedge ... \wedge A_n(w_n)$ Then B = $CF(B, A)$, A= $A_1(w_1) \wedge A_2(w_2) \wedge ... \wedge A_n(w_n)$

where $A_i(i = 1, 2, ..., n)$ is sub premise and B is conclusion. Their true value is between 0 and 1. Weight factor $w_i(1, 2, ...n)$ is weight coefficient of condition A_i and its value must be given by domain expert. It satisfies the normalization $\sum_{i=1}^{n} w_i = 1$.

Set the reliability of each A_i as $CF(A_i)$, the reliability of combinatorial evidence is calculated as

$$CF(A) = \sum_{i=1}^{n} w_i \times CF(A_i) / \sum_{i=1}^{n} w_i \quad (1)$$

$CF(B, A)$ is the reliability of rules and it satisfies $0 \le CF(B, A) \le 1$. Then the reliability of B can be calculated as

$$CF(B) = CF(B, A) \otimes CF(A) \quad (2)$$

where $\otimes$ denotes an operator character.

If weighted factors of sub-condition are introduced in rules, they can express different support degree of multi-condition on conclusion, independence and dependence of each condition in English expert system. This enhances accuracy of knowledge representation and uncertain inference, and also solves uncertain inference during incomplete conditions.

IV. System Realization and Empirical Analysis

When students log-in system, they can enter self-diagnosis module for self-diagnosis. Its main page is shown as figure 3. Students can choose corresponding knowledge point module to practice according to their abilities. After

exercise, the system stores exercise results into database and returns exercise results to students. Meanwhile, exercise data will be offered to system for analysis of improving exercise. The system will automatically store answering condition into database and feedback students' grasping ability through database inference function such as answer correctness, question interpretation, etc. Meanwhile, these data will also be recorded to students' individual account number for query and suggestions.

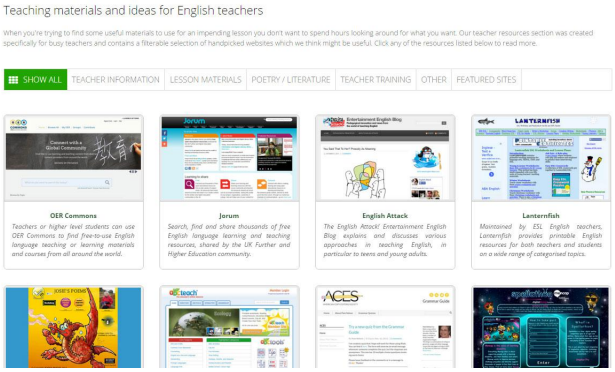

Figure 3. Online practice interface

We invite 30 students and 25 teachers to take part in field test and choose computer lab in our school. They will be divided into teachers, students and managers. Manager characters firstly authorize identities of teachers and students to enter platform. These staff use and check module function smoothness in software system, task completeness in operation, normal verifying functions, etc. After the tests, each character will also evaluate system usage and they generally consider system is comprehensive in function, convenient in usage and humanity in interface

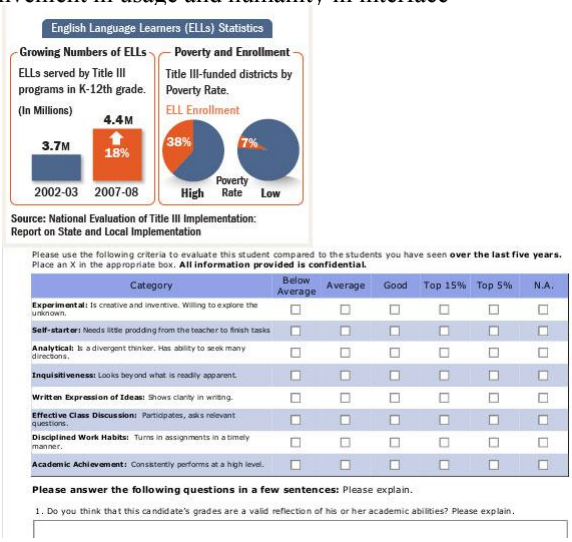

Figure 4. Graphical interface for role statistics

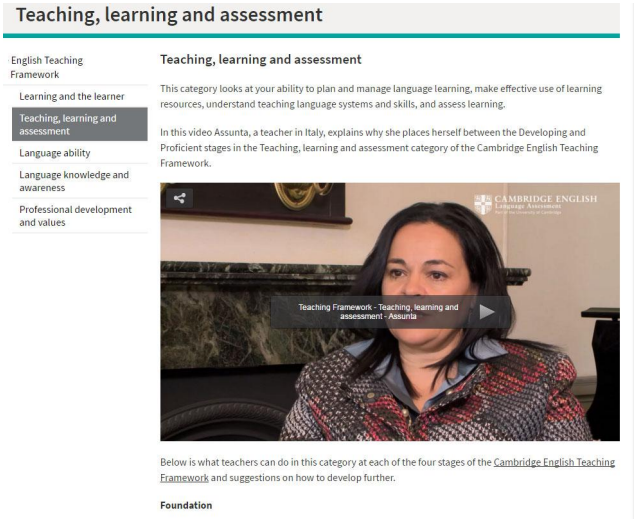

Figure 5. Evaluation Interface of teachers' online course

V. CONCLUSIONS

This paper analyzes related contents of ai, analyzes rule-based uncertain expert system realization and puts forward overall realization scheme of AI-based college English assisted teaching system. The empirical analysis shows English teaching assisted expert system in this paper applies generation-styled and framework-styled knowledge representation and adopts uncertain inference technology. It can complete college English teachers' basic evaluation in student groups' grasping knowledge points so system has practical value

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