# Design and Implementation of Online English Writing Review System in Artificial Intelligence System

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**Abstract.** This paper uses nodejs based service to establish an online English writing review system, which has good application significance for online English teaching and other applications. This paper improves the original English text classification model through deep learning method, and gets better accuracy than the original classification results, which has certain reference significance for text classification based on deep learning.

**Keywords:** English text classification · Word correction · English online review · Artificial intelligence

## 1 Introduction

English writing ability is an important factor to measure students' English language development. The research background of this paper is based on the increasing demand of existing English learners for English communication and English learning review system. The existing English sharing and review system needs to be improved in content richness, user stickiness, article classification accuracy and so on. At present, there are few good English writing sharing and review systems in China. The existing writing review systems do not have a good user interaction experience [1]. Most of the articles are classified manually and labeled by users, which affects the accurate search of articles and the interaction between users to a great extent. Therefore, it is of great significance to improve user interaction, provide rich and detailed content, and enhance the accuracy of article classification.

## 2 System Requirement Analysis and Architecture Design

### 2.1 Requirement Analysis

The system layer needs to adapt to the changing needs, the software needs analysis and architecture design needs to meet the hierarchical structure, and the English online writing review system layer needs to provide continuous, stable and accurate data processing services for the application layer. There is no guarantee for the smooth operation of the


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system layer, the system layer needs to meet, the security and stability of the physical layer; the network layer needs to meet. The writing review system transmits data through the network in the form of HTTP request. In the process of transmission, there will be a large number of text data and image data; data consistency. Coordination among multiple systems and data unification among different processes of a single system are issues to be considered; timeliness of response; scalability. A good system needs to ensure the scalability of the system. In the process of iterative development of the system, new functions and new modules are often added. Application layer control and access security. The access control process and business functions of the English online writing review system include the permission audit of registration, login, writing, order placing, online payment, online review, blog publishing, etc.

### 2.2 Architecture Design

The overall architecture of the system is divided into front-end UI layer, display layer, user operation layer, nodejs service layer, database layer and neural network layer. Use these technologies to interact with the presentation layer, and display the data processed by the server on the interface. The neural network layer classifies the front-end access composition data and feeds it back to the nodejs server, so as to provide better content services for the front-end i layer and user operation layer. The functions of the neural network layer include model training, word error correction, text processing, etc. convolutional neural network is used to process and classify English text. The storage layer design is shown in Fig. 1. System storage structure the system adopts the form of separate storage to store the system data [2]. The system storage is divided into five parts, namely, Front end cache storage, system file storage, system database and other data information storage, word and text error correction results data storage and text classification model data storage, convolution neural network model of text classification is used to save the system for English Concerto text training results model, The system data saving module loads the new training result model into the running system after the model training.

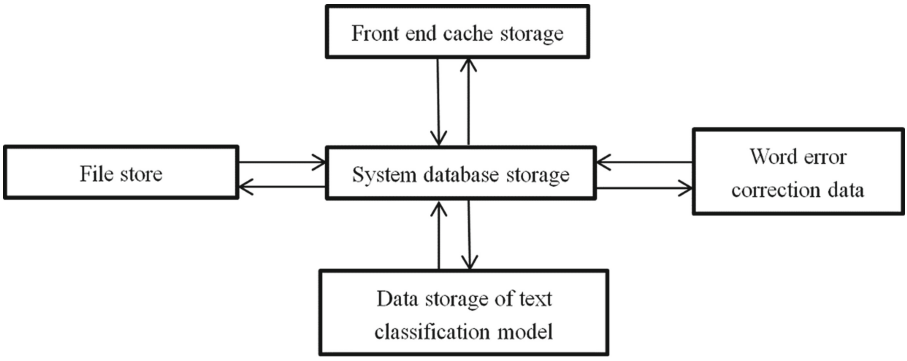


**Fig. 1.** System storage layer structure design

## 3 Design and Implementation of Text Classification Module

The English text classification process of the online writing review system can be divided into text preprocessing, neural network model training and training template updating, English text classification and other processes. The neural network training mode of the system adopts convolution neural network model of deep learning to train text classifier.

### 3.1 Text Preprocessing

Word vector is the symbol representation of words, which is convenient for machine language processing. Currently, the most commonly used word representation method is one hot representation method. The dimension of this representation method is the length of all words. Each word has its unique position marked as 1, and the rest positions are marked as 0. Every English word can be expressed as one of many data. The advantage of this way of English text representation is that it adopts sparse data storage, the way of data expression is also very simple, and the programming is also simple and convenient [3]. It only needs to assign a 10 to each word. However, this representation method has inherent defects for text classification, and cannot express the relationship between words and words, which cannot be fully expressed for English text with high text relevance. The co-occurrence matrix can be expressed as follows:

$$M_{to,human} += 1 \tag{1}$$

$$M_{to,\text{instinct}} += 1 \tag{2}$$

The co-occurrence matrix M of the text can be obtained by training the window with length of 5.

$$J = \sum_{i,j}^{N} (X_{i,j})(v_i^T v_j + b_i + b_j - \log(X_{i,j}))^2 \tag{3}$$

### 3.2 Convolutional Neural Network

Convolutional neural network, also known as convolutional neural network (CNN), is used to process data with similar network structure, such as two-dimensional image, one-dimensional time sequence.

The basic structure of convolutional neural network consists of feature extraction layer and feature network mapping layer. The feature extraction layer in the network layer is connected locally through the receiving domain between neurons. The local features determine the location relationship between the local region and other local domains or features. The mapping of each feature is composed of the mapping of many layers of features in the network layer. The mapping layer of each feature in the network layer is a plane represented by neurons with equal weights. In order to ensure the unique invariance of the feature mapping layer, the network layer will adopt the activation functions such as sigmoid activation function. In the network layer, the number of free parameters in the neural network can be reduced by sharing weights, so as to reduce the complexity of neurons. The frame of convolutional neural network is shown in Fig. 2.

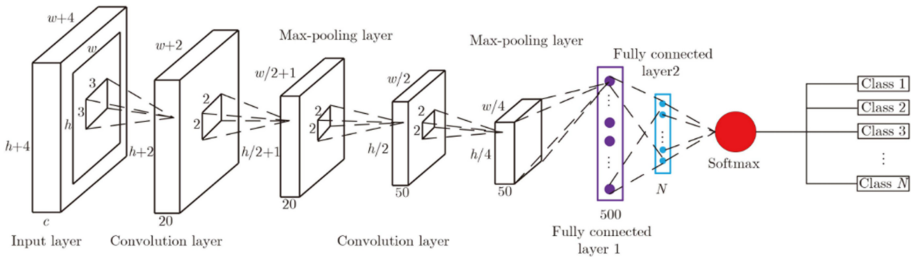


**Fig. 2.** Frame of convolutional neural network

## 4 System Implementation

This part introduces the specific implementation of the writing review system and the implementation of the word error correction module, introduces the implementation of the system from the perspective of front-end construction, and expounds the software flow of the word error correction module.

### 4.1 Implementation of Word Error Correction Module

The word error correction process of the system is mainly divided into word preprocessing, which is to de label and segment words; query the word dictionary to determine whether the words to be corrected are in the local word dictionary; word error correction; update the word error dictionary; query the word error dictionary.

The word text passed from the front end to the back end may contain HTML tags. The first step to deal with the word text is word segmentation. The word segmentation method adopted in this paper is regular expression processing method. The regular expression method uses JAV as (RPT) regular expression engine to generate specific string processing logic formula and replace HTML tags and their attributes with null. What is left is pure English text, and then according to the space between the words, the English text is divided into a single word and saved in the array, waiting for the subsequent error correction processing. After the word segmentation, the system will number each segmented word, so that the error result can be bound to the error correction word and returned to the client for processing.

### 4.2 The View Layer Implements the View Layer

Layer template parsing: template engine parsing is mainly divided into the following two aspects of data parsing. The data provided by the server, such as user's nickname, user's Avatar and article content, are loaded into the HTML tag. There are two ways to load the data into the HTML tag of the page in this English online writing review system. One way is to parse the data to be loaded into the data tag and coexist the data, another way is to parse all the data to be loaded into a string. The purpose of data processing is to process some data that cannot be processed by label parsing, such as buttons that can be parsed into different background colors according to the change of type [4]. The realization of view layer style is through the loading and rendering of CSS3 style file

and the control of page by JavaScript. The view layer of the writing review system is to deal with the overall display style and page of the front-end page of the browser (Fig. 3).

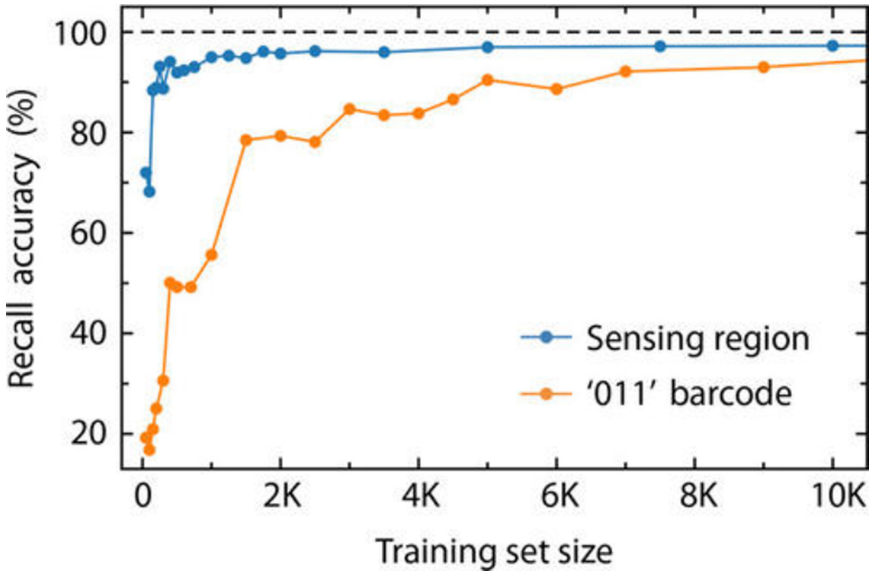


**Fig. 3.** Simulation for system implementation

## 5 Realization of System Front End Function

The front-end technology of the English writing and reading system adopts MVC and MVVM model driven, MVC is the model layer, control layer and visual layer. With the development of technology, the front-end technology is not only limited to page structure, page style, but also involves the development of background database, background control layer development, demand docking, product testing, product experience Optimization and other series of system development nodes [5].

### 5.1 Introduction of System Front End Technology

The front-end technology of the system mainly includes HTML (Hyper Text Markup Language), CSS (cascading style sheets), JavaScript, flash, XML and so on. Nodejs technology is a kind of server technology based on Google's Chrome browser engine. The language technology is built based on the V8 engine of Chrome browser. With the help of nodejs, we can quickly build our own server platform. The difficulties of the front-end technology of the system are as follows: 1. The page must be modular design to facilitate subsequent updates and system maintenance. 2. In order to ensure that the system can run smoothly in different versions and different types of browsers, special

compatibility processing is needed. 3. The realization of the page effect, such as the realization of the article review function, the system in order to provide a comfortable operating experience [6].

### 5.2 View Layer Implementation

View layer template parsing: template engine parsing is mainly divided into the following two aspects: data parsing [7]. The data provided by the server, such as user's nickname, user's Avatar and article content, are loaded into the HTML tag. There are two ways to load the data into the HTML tag of the page in this English online writing review system. One way is to parse the data to be loaded into the data tag and coexist the data, another way is to parse all the data to be loaded into a string. Data processing. The purpose of data processing is to process some data that cannot be processed by label parsing, such as buttons that can be parsed into different background colors according to the change of type. The realization of view layer style is through the loading and rendering of CSS3 style file and the control of page by JavaScript. The view layer of the writing review system is to deal with the overall display style of the front-end page of the browser and the display effect after partial operation of the page [8].

### 5.3 Implementation of Control Layer

The control layer is the bridge between the view layer and the model layer. The information is saved to the database through the model layer through the control layer's data processing, detection and other operations. Session saving is the saving of user login information. The user only needs to log in once within the specified time to reduce the number of user login and increase the system user experience [9].

The security filtering of control layer includes XSS filtering, keyword filtering, MySQL database anti attack filtering, and anti web tag attack to ensure the security of database and the cleanness of system content.

2. Payment security, English composition marking needs to use the payment system, for payment security, the research adopts the following forms. The result of the payment will be consistent with the Alipay IP, and the result of Alipay's return will be encrypted to determine whether the encrypted data is the same as the encryption result of the Alipay public key after encrypting. The payment information is confirmed for the payment result, preventing the amount of error, the order error and so on [10].

## 6 The Construction and Functions of the Computer-Based Writing System

### 6.1 Technological Tools: JSP Technology and SQL Server 2000

After the consultation service of computer program from the computer majors, the JSP technology and SQL server 2000 are finally selected as the primary tools for developing the on-line writing learning system. Moreover, because of the limited knowledge of computer, the technical problems like the computer programs applied in the CALL

software design are not studied in detail in this thesis. Only some of the key concepts will be introduced briefly in the following paragraphs one by one. For creating the database of the system, the computer program named SQL server 2000 is adopted. For creating the web pages of the system, the computer program named Myeclipse (belonging to the JSP technology) is adopted [11].

### 6.2 JSP Technology

JSP or Java Server Pages, was developed by Sun Micro-systems. JSP technology is object-oriented programming language and is based on Java language JSP is widely used for developing dynamic web sites and for creating database driven web applications because it provides superior server side scripting support. Here are some of the reasons for the popularity of JSP. Firstly, simplifies the process of development. It allows programmers to insert the Java code directly into the JSP file, making the development process easier. Although JSP files are HTML files, they use special tags containing the Java source code which provides a dynamic ability. Secondly, portability. The Java feature of "write once, run anywhere" is applicable to JSP. JSP is platform independent, making it portable across any platform and therefore multi-platform. It is possible for the programmer to take a JSP file and move it to another platform, JSP Servlet engine or web server [12].

### 6.3 SQL Server 2000

SQL server 2000 is taken as the main computer program for creating the database SQL server 2000 is a kind of database platform developed by Microsoft, which uses the SQL language to create all the relational tables and the view structures. Its main functions to deal with the B/S model where the design manager can maintain the web pages through the Internet and have the ability to directly access and manipulate configuration database files [13].

This module is to make students have a systematic and comprehensive study of one writing item. This module is basically constituted of two aspects: the brief introduction of one writing item and the general writing skills instructions of one writing item. The former part mainly includes these aspects: the definition (s) of this writing item, the general and specific classification of this writing item, the demands for writing this kind of writing item, a brief introduction of the situational use of this kind of writing item, the basic contents of this writing item and etc. The later part mainly includes the following aspects the general and specific conditions for applying this kind of writing item to the daily life the general statements and the specific introduction of the writing skill instructions.

## 7 Construction of Three Interfaces

Which will give you acomprehensive and better understanding of the general structure and ruming mechanism of the system. These three interfaces include the user Interface, here the user mainly referring to the students, the teacher Interface and the manager interface, which primarily refers to the computer professionals who designed the system and will be in charge of the background management [14].

### 7.1 User Interface

The user interface, as its literal meaning saying, means there is an interface in the system for students to work on. There are totally four modules provided by the system for students to study. They are the on-line learning module, the on-line testing module, the on-line evaluating module and the on-lime interacting module. There will not devote a lot of space to repeatedly introducing each module in detail, which has already been elaborated in the previous sections. To summarize into one sentence, students can have acomprehensive and systematic study of college practical English writing through this interface [15].

### 7.2 Teacher Interface

Just as the name showing, teachers launch the teaching activity mainly through this interface. Although to reach students' autonomous learning is one of the objectives for developing this on-line writing learning system, the important role of teachers cannot be totally neglected. In the traditional classroom-based teaching activity, teachers, classrooms and textbooks are regarded as the center of teaching where students cannot have an overall development because they cannot full play their initiative and creativeness. This will be definitely improved by developing this on-line writing learning system where students can full play their initiative and creativeness. However, teachers are still the organizer and administrator in guiding students' study. They have just experienced a succession of changes from authoritative to neutral and finally to converting [16].

There are totally four modules provided by the system for teachers to launch their teaching activities of supplementary property as publishing the newly updating messages, on-line teaching of what students cannot understand by themselves, on-line evaluating and on-line answering FAQ. Publishing message means that if there appear new learning materials about the practical writing, teachers can update them in the system for students further study and teachers have to renew the testing questions for students to practice from time to time in order to guarantee that students can have a comparatively complete testing of what they have learned. On-line teaching relating to the on-line interacting means that during the process of on-line writing leaning, students may meet various difficulties, and then they can ask help for their teachers, so teachers must response to them immediately and give them proper answers or explanations through this module. On-line evaluating means that teachers are required to give them feedbacks after students hand in their literary compositions. As introduced in the previous sections, students' literary compositions of one writing item cannot be evaluated by the system itself, which need still revising by teachers. On-line answering FAQ is similar to the second module on-line teaching where teachers should give answers to any questions about the study raised by students.

### 7.3 Manager Interface

There will not take a lot of sentences to explain this interface any more. This interface belongs to the backstage management of this on-line writing leaning system. Teachers also play a significant role as a backstage supporter. However, they are different from

each other: the former mainly focuses on the computer technology support and technical management of the system, whereas the latter is mainly responsible for dealing with the knowledge or the contents changing, updating and etc. of the system. It is always the computer majors who work on this interface. They provide the services such as technical support in managing people, managing curriculum, managing FAQ answering and managing the exam, system maintenance and operation support etc.

## 8 Conclusions

Through the process of requirement analysis, architecture design, function realization and iterative development, the system realizes the online English writing review system based on nodejs. The system can solve the problem that students can't practice after class and interact with teachers and students. On the other hand, it provides convenience for teachers to correct students' English homework after class. In addition, English text classification based on convolutional neural network achieves good text classification effect, and word error correction also achieves good error correction effect. For the system itself, it can provide users with more appropriate article service. However, there is still room for optimization in the stability of the system, and the design of the text classification system also needs to be optimized. Due to the limitation of code writing time, we will continue to optimize the simplicity of system code in the future.

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