Research Article
A B/S-Based Computer-Aided Translation Teaching Method

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English and Chinese are fundamentally different in many ways, due to which miscommunications are common in both languages. For this purpose, there are several English-Chinese translation systems available these days, but most of them provide a sluggish interactive experience, primarily due to erroneous language, grammatical problems, imprecise pronunciation of the system, and slow translation feedback speed. Therefore, there is a need to develop an efficient and collaborative system. Due to these factors, this paper proposes an interactive machine translation system for English-Chinese based on the B/S architecture to aid communication between English and Chinese speakers in both directions. This system is designed based on the B/S three-layer architecture. To achieve the desired results, this paper explains the machine translation mode and then implements the overall system design based on the process of system operation, algorithm for translation enhancement, network structure, and application, respectively. Lastly, an investigational platform is created using the WINCC6.0 operating system to evaluate the overall system performance. Results of the system testing demonstrate that the comprehensive score of manual evaluation is 3.769 points, which is higher than the limit value of 3.5, which shows that the system’s translation quality is high and that it can fulfill the expectations of users.

1. Introduction

People’s lifestyles have recently transformed as a result of the advancement of Internet technology and the globalization of the international economy. As a result, connections among individuals speaking various languages in each country have become stronger, international communication has become more active, and the demand for multilingual communication in social work and everyday life is growing. As a result, translation has grown critical in this process, as achieving equal communication among various languages has become highly significant. Conventional manual translation requires a large amount of manpower and economic support. It is essential to produce quick and accurate computer translation results, and it is extremely crucial to replace human translation in the areas of professional translation. At this point, the partial translation result also indicates that there is still much opportunity for study in this field. Machine translation is becoming increasingly vital in current culture, and its scope is tremendous given the growing economic growth. Each day, individuals from all walks of life interact with a significant amount of publications, and persons speaking dissimilar languages interact with one another. As a result, automatic translation with the help of machines has high demand of market, and only a huge volume of information can satisfy translation demands. Currently, the most frequent approach is a mix of English and Chinese, translation of automatic machine, which has the advantage of considerably improving lives of people and also serves as a basic data warehouse.

In this regard, many researchers are working hard these days to create an efficient system, particularly for teaching translation systems. In this context, the authors of [1] presented a speech-2-speech system of translation that primarily emphasizes on English-2-Dravidian translation. The 3 key technologies involved in their proposed system are machine translation, automated constant voice identification, and text-2-speech production systems. Automated continuous voice recognition has been achieved using an automatic association neural network, VSM, and hidden Markov model. HMM outperforms AANN and SVM;
however, there is yet insufficient evidence to support this claim. The previous work of [2] argues that deaf-mute persons, who utilize sign language, are an integral element of the growing community. Conversation between hearing-impaired persons and normal people, on the other hand, becomes problematic since most normal people do not understand the meaning of gesture recognition motions. Deaf and dumb people, on the other hand, cannot understand the language spoken naturally. There are roughly 72 million deaf and hard-of-hearing persons in the globe, as well as sign language users [3]. An examination of the present system gives us the required knowledge about its functioning, rate of success, flaws, and limits, but its future development remains hazy. The author of [4] advises contextualizing the word inserting vector with a nonlinear word’s bag description of the original phrase. He proposed employing typed symbols to represent specific signals like proper nouns, numerals, and abbreviations to better translate phrases that are not suited for translation using continuous vectors. However, due to the unpredictability of the experimental method, there are still loopholes in the experimental data.

As we know, miscommunications are widespread in both English and Chinese since the two languages are fundamentally different in many respects. In some cases, the interactive experience is sluggish because of incorrect wording, grammatical errors, the system’s poor pronunciation, and the slow translation feedback speed [5]. As a result, the research of machine translation technologies for English literature plays a significant role in advancing English education and increasing foreign literature reading effectiveness. The unpredictability and randomness of the English literature’s environment lead to low reliability of machine translation of English literature [6]. Hence, it requires the optimized design of the teaching platform for English literature translation joint with the enhanced design of the algorithm of machine translation of English literature to enhance the correctness and competence of English literary translation. As a result, there has been a lot of interest in the study of the relevant teaching platform design technique [7, 8]. This paper proposes an interactive English-Chinese machine translation system based on the B/S architecture to allow communication between English and Chinese speakers in both directions. The system has been designed under the B/S three-layer architectural model. In addition, it corrects the difference in conversion in a detailed business framework and improves the correctness of the translation. The translation method is improved and perfected in this study by the invention of a memory-assisted long-character English. As a consequence of the testing, the system can conduct memory-assisted tasks quickly while retaining high accuracy and reliability, and its overall performance is excellent. The following are the main achievements of this research work:

(1) Firstly, this paper clearly explains the machine translation mode, and then it implements the overall system design, taking into consideration factors such as the system operation process and translation optimization algorithm as well as the network structure and the application, among others, in order to achieve the desired results.

(2) Secondly, it conducts a detailed examination of the key speech recognition hardware, the English-Chinese translation hardware, and the translation result output hardware.

(3) Thirdly, it develops three key programs in the system’s software section: the user login program, the speech recognition program, and the English-Chinese translation program, among other things.

(4) Lastly, it develops an experimental platform based on the WINCC6.0 operating system in order to evaluate the overall system performance.

The remaining sections of this study are divided as follows: Section 2 describes the developed interactive English-Chinese machine translation system based on B/S framework, Section 3 contains experimental test analysis, and Section 4 summarizes the paper.


A translation memory is a linguistic database that maintains both the original text and the translation and may be recycled to generate fresh source language translations. It selects different nodes of precise matching and fuzzy matching throughout the data search process. The main function of the fuzzy matching mode is to increase the translation memory, which is also present in many other data search modes. When it comes to automatic translation systems, translation memory is a critical feature and a critical component [9]. In general, the available translation memory data storage can be divided into two types, one reference and the other database storage, which is mutually exclusive. When it comes to practical applications, translation memory can be used in translation systems such as automatic translation systems, machine translation systems, electronic dictionaries, and so on. At the moment, automatic translation systems based on translation memory are compatible with a wide range of document formats and are capable of translating technical documents and writings with specialized terminology to a significant degree. It has the advantage of being able to ensure consistency and completeness in the text translation, as well as being compatible with a variety of formats. It may also be used to significantly enhance the efficiency and quality of translation while saving money and time. When it comes to communicating, language is the most direct method. Once you are unable to grasp each other’s language, you will be unable to comprehend what the other party is attempting to communicate, and you will be unable to communicate with each other at all. As a bridge of communication between two parties, an interpreter has historically been required on numerous diplomatic occasions. This strategy carries a high level of risk because it is directly influenced by the translator’s own business and
This is why machine translation systems have been developed and are now widely utilized throughout the world. It is proposed in this study that an interactive English-Chinese machine translation system based on the B/S architecture be developed to overcome the issues raised above by the previous machine translation system.

2.1. System Operation Flow. One of the most essential roles played by the specific system’s design action process is to assure the constancy and dependability of the system operation process. As a result, the system begins by launching the online translation device and specifying the amount of software runs that will be performed. The first of them is the initial run state, in which the word bank is loaded directly and saved in the previously constructed folder. If it is not in the first running state, it enters the key running interface, which displays the major tasks such as translation of word, word inquiry, and management of word, among other features. Following the determination of the detailed functions to be selected, it proceeds to the exactly related interface. Figure 1 depicts a detailed representation of the system’s operating flow. The operating flow of the system is made up of two main system screens. The proposed system begins by displaying the first main system screen, which includes vocabulary, vocabulary search, and thesaurus management of vocabulary translation. Following that, the second main screen appears which allows for the addition or deletion of raw words, offline search, the addition or deletion of a thesaurus, and the selection of translation language. The system eventually returns to the main screen.

2.2. Translation Algorithm Superiority. Machine translation is a crucial task that attempts to use computer systems to translate human language sentences [10]. The beginning approach to machine translation was highly dependent on handcrafted translation rules and grammatical structures. Due to the inherent complexity of natural languages, it is hard to cover all language abnormalities with mechanical translation rules. For this purpose, semantic feature investigation of English literary conversion, the logistics model is employed. The logistics model, like any other chaotic model, exhibits unpredictability and starting sensitivity of characteristic. It has the benefit of high environmental adaptability for analysis of the semantic feature in various English settings, and the one-dimensional projection is utilized to create the logistics chaotic model, which can be computed using the following equation:

\[ x_{n+1} = \lambda x_n (1 - x_n), \]

where \( x \in [0, 1] \), \( \lambda \in [0, 4] \).

Here, \( \lambda \) is the driving parameter and \( x_n \) is a value between zero and one representing the existing English speech to maximum achievable English speech. The
equation is applied in such a way that it initiates with a static value of the dynamic parameter, \( \lambda \), and a preliminary value of \( x_0 \). The equation can be run by gaining \( x_1, x_2, \ldots, x_n \). For low values of \( \lambda, x_n \) eventually converges to a single number. The above equation explains the Henon attractor subcluster of English literary translation. The dispersion model of text feature concept set of English conversion output for the adaptive context equation (2) by combining it with the knowledge set of English literary translation is generated as stated in equation. xT_he dispersion model of text feature concept set of English literary translation lexicon were gained using

\[
\begin{align*}
\dot{x} &= a + by = x^2, \\
\dot{y} &= x, \\
\dot{z} &= xy - bz, \\
\end{align*}
\]

The Lorenz system is a set of ordinary differential equations known for having chaotic solutions for specific parameter values and beginning circumstances. This work introduced the Lorenz attractor for semantic correction of commercial English literature translation, and the Lorenz function can be calculated utilizing the following equation:

\[
\begin{align*}
\dot{x} &= -\sigma x + \sigma y, \\
\dot{y} &= -xz + rx - y, \\
\dot{z} &= xy - bz, \\
\end{align*}
\]

\[
[\sigma, r, b] = \left[ 10, 18, \frac{3}{2} \right]
\]

or \([\sigma, r, b] = [16, 45, 92.4] ,\)

A mixture of features is used in the extraction of word cluster features for English literary translation. In logistics, the difference in semantic feature distribution between words and between words and phrases is merged. The process of semantic feature grouping is carried out under the influence of the chaotic attractor. The automated lexical characterization of English literary translation is accomplished through the use of contextual characteristic matching and variable of adaptive semantic searching approaches.

Let us suppose the semantic code order of the English speech which is to be converted is \( N \) characters long and \( x \) is the set of semantic distribution ideas, which may be denoted as an \( N \)-column characteristic vector with \( N \) number of columns such as \( x(n) \in \mathbb{R}^N \), utilizing the method of associative semantic grouping appearance; this paper gained the business literature conversion. Here, the clustering model of business English literature conversion is labeled in the following equation:

\[
x = \sum_{i=1}^{N} s_i \psi_i = \psi s.
\]

Here \( S_i\psi_i \) is the Euclidean distance between \( s_i \) and \( \psi_f \).

Our method of extracting the body text from the memory-assisted long-character English vocabulary is constructed on characteristic of the binary semantic relationship associativity method of withdrawal. This paper analyzes the memory-assisted long-character English vocabulary in detail, extracts the body text from it, and calculates the similarity of text among memory aided lengthy character \( A \) and the memory-assisted lengthy character \( B \) using method of binary semantic feature associativity extraction given in equation (5). This paper analyzes the memory-assisted long-character English vocabulary in detail, extracts the body text from it, and gains the similarity of text between memory aided lengthy characters \( A \) and \( B \).

\[
\sin AB = \cos AB = \frac{T(A)T(B)}{|T(A)T(B)|}
\]

Fuzzy idea sets can be obtained (as shown in equation (6)) by adapting to the context of the text utilizing the location of lengthy character English words. For the association between semantic word length and text lexical features to be obtained, the translation output vector idea set is properly updated as per the contextual thinking and attributes fields embedded in the lengthy character English vocabulary. Contextual self-service matching is used to determine the quantity of interword interaction information characteristics in a text depending on the placement of the text. In order to achieve automated translation and the computation of translation rules, use the feedback of interword interaction information aspects as well as translation adjustments.

\[
\cos AB = \frac{T(A)T(B)}{|T(A)T(B)|}
\]

The English literary translation machine algorithm is designed utilizing contextual characteristic matching along with outcomes of adaptive semantic variable based on the mentioned semantic characteristic examination of English literature translation utilizing the logistics model. Equation (7) is used to generate the best semantic feature matching result for the English translation.

\[
J(m) = \max \{ J(r) + D_m(r) + C \}, \quad J(0) = 0.
\]

Based on the original text information \( s(t) \) for semantic discretization, the quantity of semantic text characteristic \( B \) is estimated parametrically adaptively, and the feature matching degree of the output English translation output is obtained by the following equation:

\[
p(x_i|a) = \prod_{i=1}^{l} p(y_i|a, r_i, l).
\]

The breakdown findings of the linked relative data of the English literature conversion lexicon were gained using
equation (9) after performing an automated lexical feature selection method of English literary translation.

\[ E_j = \sum_{k=1}^{n} E_{jk}, \quad (9) \]

\[ P_{jk} = \frac{E_{jk}}{E_j}, \quad (10) \]

To extract the correlation feature quality among words and vocabulary, the method of cross integrated evaluation decision was utilized, and the output was obtained by the following equation:

\[ WE_k = -\sum_j P_{jk} \ln(P_{jk}). \quad (11) \]

The semantic ontological content of English literary translations is threshold, and the experimental design decomposition approach is employed to determine the resemblance and proximity of conversion outcomes. The similarity and closeness of translation results are represented by equations (12) and (13), respectively.

\[ S_x = E[x^3(t)] + \sqrt{3} s[t - r_{0}], \quad (12) \]

\[ K_x = E[x^4(t)] - 3E^2[x^2(t)]b. \quad (13) \]

The differential adjustment of translation is conducted in a given context based on the output similarity and proximity feature extraction findings, and the correct text set of English literary translation output is generated in the following equation:

\[
\text{Computation}(n_j) = (E_{\text{elec}} + E_{\text{DF}})\delta + E_{\text{T}}(1, d),
\]

\[
= (E_{\text{elec}} + E_{\text{DF}})\delta + E_{\text{T}}(1, d),
\]

\[
= ((E_{\text{elec}} + E_{\text{DF}})\delta + E_{\text{elec}} + \epsilon_{fs}d)^2).
\]

(14)

2.3. Network Topology. Network design, which is based on computers conveying access requests, connecting with databases, and giving quick translation results, plays a substantial and fundamental part in system operation [11]. Not only is the user an easy and pleasant experience, but they should also take into account the storage barriers of the computer terminals. Therefore, systems are designed to meet specific needs. With the advancement and popularization of computer systems and network technology, the B/S architecture is now being used to design software systems to address the resource recycling of information management approaches. This architecture is based on three layers, i.e., application, server, and the data provider. The presentation layer of the B/S structure consists of the server structure and the generic web browser; the server layer is implemented by all kinds of applications on the server and provides the data service layer. Operating within this framework the user interface is created using the WWW Browser, with limited transaction reason in the browser and the majority of the transaction logic on the application server. The data layer provides services of DBMS by storing and retrieving data. As a result, it considerably streamlines the customer computer load and minimizes the system’s cost maintenance, upgrading, and load, lowering total user costs [12]. Figure 2 depicts the three levels of the B/S architecture paradigm structural figure.

The suggested work employs B/S architecture, which not only increases response time and efficiency but also creates a small database through a computer terminal. The use of this B/S architecture system has two important advantages: it not only increases reaction speed and efficiency, but it also helps to minimize storage pressure and deal with storage restrictions. Because the system relied on the B/S architecture, it has the potential to enhance reaction times and efficiency while also reducing storage requirements by storing fundamental data in a small data repository through computer terminals and in the system’s database [13].

2.4. System Function Modules. System function modules play important role in our system design. It explains the procedure of our system design and its work. This section explains the function modules of the proposed system.

(i) The word translation function: Under the state of the computer network, users can complete English-Chinese translation and other related operations through this module and can also realize offline queries. The word bank can provide users with English translation.

(ii) The vocabulary database: The vocabulary database can provide users with storage and memory services for the English translation of unfamiliar words, i.e., the pronunciation of words and detailed explanations, etc. It can also provide practical example sentence analysis of words. Again, the pronunciation function module system can provide a standard pronunciation query service for words and then the user management functions. This module is designed to provide users with software function setting services. The function of this module is to provide the software function setting service for users, i.e. clear cache, delete raw word bank, turn off voice pronunciation function, etc. And also system update status can be checked regularly to prompt users to update in time.

(iii) The thesaurus management module: Users can add terms with their learning requirements to this module, so they can search up word information offline. You may also make corrections. Furthermore, real-time corrections of word explanations and sample sentences may be made to improve word information.

2.5. System Framework Design. The framework of the interactive English-Chinese machine translation system is designed based on B/S three-tier architecture. B/S’s three-
layer architecture is called browser/server architecture. B/S three-layer architecture, known as browser/server architecture, is developed based on C/S two-tier architecture, which is optimized in many aspects. The merits and demerits of B/S and C/S architectures are compared in Table 1.

### 2.5.1. System Framework

This section contains the suggested framework, which is a layered structure that indicates the proposed programs and how they would interact. Figure 3 explains the framework of B/S-based interactive English-Chinese machine translation system.

The specific functions of each layer are as follows:

- **Interface layer**: This layer is also recognized as the bridge layer or the user layer. It is primarily in charge of the interface between users and the system. This layer facilitates the user’s connection to our system. It sends and receives requests and answers between users and our system.

- **Business logic layer**: It is accountable for replying to requests of user and implementing various businesses. It is the core layer of the system, which is accountable for replying to user requests, implementing various business processes, and then feeding the results back to users [14].

- **Data access layer**: This layer facilitates access to data contained in our model. In simple words, it is responsible for reading, writing, and managing the database. The major functions of this layer are how to access data, where to store data, and how to regulate this data.

### 2.6. Speech Recognition Hardware

The speech recognition hardware is a microprocessor-based high-capacity device
based on the STM32F103VET6 with many circuits and interfaces. A microprocessor is a device that has several circuits and connections. The STM32F103VET6 device is a high-performance 32-bit processor based on the CM3 core that provides low power, low voltage, and outstanding performance while also supporting real-time capabilities [15]. Table 2 shows the relevant parameters of STM32F103VET6 chip. Furthermore, the processor’s core hardware contains a microphone, amplifier filter circuit, LCD, audio converter chip, speaker, and other elements, the roles of which are as follows:

(i) The role of the microphone is to collect the words of the vocalist.
(ii) The role of the amplification filter circuit is to increase and denoise the speech.
(iii) The role of the amplifier filter circuit is to increase and denoise the voice, to improve the quality of the voice signal.
(iv) The role of the liquid crystal display is to display the speech processing process and results.
(v) The role of the audio conversion chip is to convert the speech into text form.
(vi) The role of the speaker is to play out the translated target language.

<table>
<thead>
<tr>
<th>Table 2: B/S STM32F103VET6 chip technical parameters.</th>
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<tbody>
<tr>
<td>Name</td>
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<tr>
<td>CPU</td>
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<tr>
<td>Size/bit</td>
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<tr>
<td>Clock frequency/MHz</td>
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<td>RAM size/B</td>
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<tr>
<td>Power dissipation/mW</td>
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<td>FLASH capacity/B</td>
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<td>Memory capacity/kB</td>
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<td>Processor speed/MHz</td>
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<td>Number of pins</td>
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<td>Number of timers</td>
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<td>Number of PWM channels</td>
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<td>GPIO</td>
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3. Experimental Test Analysis

This section verifies the effect of the application proposed communicating English-Chinese machine translation system based on B/S architecture. In the experimentation, design a translation system based on Deep Learning [5] and create a communicating English-Chinese translation system based on comparable algorithms for extraction of feature [6].

Matlab and TinyOS2.x were used to create the experimentation of simulation for the English literary conversion teaching platform. For English literature translation, the number of data transmission frames is set to 1200, the number of English text-packets to be interpreted is set to 128 Mbit, the number of drill sample sets for business English literature is set to 12, and the extreme sampling period of semantic characteristics is set to 24. According to the aforementioned simulation parameter settings, the correctness of the translation of business English documents using this platform is examined using this approach and the old way. The test results are displayed in Figure 4. As shown in the picture, the correctness of business English conversion utilizing this technique is excellent, and the output conversion fault is modest.

The English translation teaching platform’s time responsiveness was additionally examined, with the results given in Figure 5. By examining this graph, we can see that the strategy used in this research to construct the platform of English literary conversion teaching has a minimal time above in English translation.

The investigational platform of a memory-assisted lengthy character English automatic translation system is
developed in this paper, and the system performance is tested in all aspects. In order to clarify the particular data recall rate of both systems, the translation impact of the conventional system and the optimized system created in this study are compared and studied, and the test results are displayed in detail in Figure 6.

In general, recurrent outcomes in translation findings are not permitted. Yet, there are a few variations in data structure features across recurring outcomes in vast Internet data clusters. Repeated results can never be eliminated; they can only be greatly reduced. As a consequence, the recurrent translation probabilities of various systems are compared, and the findings are depicted in Figure 7.

According to the above figure, while there are recurrent translations in the planned system, there are not many recurrent results, and the likelihood of recurrent translation is small. However, the system in [5] and the system in [6] have substantially greater repetition rates than the technique suggested in this study. As a result, we may conclude that the suggested technique has certain benefits in terms of recurring translation likelihood.

The absence results in the translation result, like the recurring translation probability, are not allowed to exist in general. As a result, the lower the probability of a lost translation, the better the scheme. Figure 8 shows a comparison of the probability of missing translation.

The above graph demonstrates that the developed system’s lost translation probability is always smaller than that of the other two techniques, with the greatest value of this scheme’s missing translation probability being less than 0.22. In terms of missing translation, the suggested technique clearly outperforms the other two alternatives. The rationale for this is that, throughout the design phase, this method may assist in obtaining similarities between various English languages and in removing incorrect language parts.

4. Conclusions

This research offers a design strategy for a business English literary translation teaching platform based on the B/S three-layer architecture to address the challenges of low accuracy of English-Chinese machine translation system outputs and poor error correction rate of existing methods. It utilizes contextual characteristic matching and an adaptive semantic variable discovery approach for automatic lexical feature examination of business English literature conversion, correcting translation differences in a specific business environment, and increasing translation accuracy, respectively. The creation of a memory-assisted long-character English improves the translation method in this study. As a result of testing approach of this study, the system can conduct memory-assisted tasks quickly while retaining high reliability and accuracy, and its whole performance is excellent.
The results show that the system is capable of rapidly developing a memory-assisted automatic translation of long characters with decent correctness and dependability. Furthermore, its inclusive performance is greater, making it a feasible candidate for real-world applications.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that he has no conflicts of interest.

References


