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Research Article

Design and Implementation of an Interactive English Translation System Based on the Information-Assisted Processing Function of the Internet of Things

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As a new type of language expression, interactive translation is widely used in English, and based on the Internet of Things technology, text harmony and glyphs are combined for information exchange. This design adopts B/S mode to realize the relational query of document content. This paper adopts the B/S architecture mode to design, implement, and test its functional modules and related data analysis to provide a friendly interactive English translation system service to the user group. In this paper, the development of the Internet of Things information-assisted translation system mainly focuses on the semantic embedding and correlation analysis based on the Internet of Things as well as the realization of interactive functions. On this basis, an interactive English translation process based on corpus and text data sets is designed and completed. This method can not only effectively solve the problems of large amount of text and high difficulty of expression but also can make the translation more concise and clear to achieve the required expression effect of the original text. At the same time, the system can automatically perform statistical analysis on the translation results to verify the accuracy and completeness of the translation results, providing reference value for subsequent function implementation. In this paper, we mainly study the realization of interactive functions and propose solutions to its existing problems and deficiencies. The experimental results show that the average BLEU of the system in this paper is 0.985, which indicates that the translation quality of the system is good and the interaction with users is improved.

1. Introduction

In modern Chinese dictionaries, the interpretation of the meaning of words is "meaning." English literature today defines it as a noun, symbol, or word expressed as a sentence or a work is a meaning. However, due to the semantic characteristics of the language itself and the semantic meaning caused by some human factors, it is difficult to accurately convey the semantic meaning, so people began to seek translation to solve this problem. In modern Chinese dictionaries, the meaning of the word translated is expressed through language, but its essence is not a grammatical meaning but a semantic form. In English, we can understand semantics as "meaning," so it is also difficult for English translation. The research of this topic has important theoretical significance and practical application value: firstly, the direct dialogue and real-time communication between the user and the translation can be realized through the development of the Internet of Things information exchange platform; secondly, it can store the mobile phone in the database for easy reading and storage and improve its utilization rate; finally, through the realization of the functions of the system, the user experience can be combined with the translation information to improve interactivity and reduce costs, etc.

The main research direction of this subject is interactive translation system. By combining with traditional text decoding technology, a new and efficient method of language translation based on Internet of Things information is designed. The details are as follows: (1) the key technologies involved in the interactive translation process are systematically described, including language feature extraction,

translation process testing, and text recognition and (2) the system introduces the method of assisting English translation based on Internet of Things technology.

2. Related Work

Regarding the research of the English translation system, many scholars have provided a lot of references. Liu et al. proposed a novel interactive attention mechanism that enables automatic speech recognition and text translation to be performed synchronously and interactively in a single model [1]. Chen and Huang designed an interactive online English teaching system based on Internet of Things technology. He proposed three topologies for building an online English teaching system based on the Internet of Things [2]. Yuan et al. proposed a language analysis research for English translation system based on fuzzy algorithm. He first analyzed English-language features, then used the Gaussian blur algorithm to denoise the images in the translation system, and finally display the image recognition results [3]. Ban and Ning created neural machine translation models using an end-to-end encoder and decoder framework. The machine automatically learns its functions and converts the data into word vectors in a distributed fashion, which can perform the mapping between source and target languages directly through neural networks [4]. Sangeetha and Jothilakshmi proposed a speech-to-speech translation (SST) system that mainly focuses on translation from English to Dravidian (Tamil and Malayalam) [5]. The research of the English translation system is often related to information-assisted processing, so the relevant research results of information-assisted processing are introduced next.

Regarding the research on information-assisted processing, many scholars have provided a lot of references. Muga et al. developed a coupled model of heat and mass transfer to predict the beef temperature and moisture content during briquettes processing using Infrared-Assisted Hot Air Drying (IRHAD) [6]. Tatsuo et al. proposed an information processing method that includes defining a virtual space for the immersion of a user wearing a head-mounted display (HMD) [7]. The data from these studies are not comprehensive, and the results of the studies are open to question. Therefore, it cannot be recognized by the public and thus cannot be popularized and applied. Therefore, this study combines the above two aspects and also solves the pain points of the previous research results.

3. Design and Implementation of Interactive English Translation System

Translation is an important part of English, and it is also considered as a language conversion, which includes many links in this process [8, 9]. As a new discipline and the field of technical science, English-Chinese bilingualism and cognitive linguistics are closely related [10]. As a new emerging language, information-assisted speech recognition based on the Internet of Things network has attracted widespread attention from people from all walks of life and developed rapidly after its emergence [11]. At the same time, due to the development of network communication technology and the high popularity of the Internet, the development of network communication technology has also brought new challenges to the speech recognition system, making people have more needs for the translation of Internet of Things information [12]. And these demands will provide more extensive, flexible, and diverse and more pertinent, more practical, and more maneuverable texts for interactive English translation based on the Internet. As an emerging technology, the interactive translation system based on the Internet of Things has many advantages in information processing such as rapid retrieval and high accuracy; speech recognition can achieve matching of various types of texts and pictures, etc. [13, 14].

3.1. Theoretical Basis of Related Technologies

3.1.1. Network. The network is the medium of information exchange, which can effectively connect language, data, and other media and realize the mutual communication between voice, text, and other forms [15, 16]. Interactive translation systems are built on the Internet. Text transmission is used when traditional English is used as a carrier of information transmission [17, 18]. With the combination of Internet of Things technology and communication protocol (ICT), there is a new way to complete two-way communication based on Web platform integration network communication function-interactive electronic document translation software (BLOCKP), this translation system has cross-platform features. It transforms text documents in the traditional sense into functions that are highly readable, easy to read and understand, and capable of real-time interaction and control. In the traditional text information processing process, the interactive electronic document translation system needs to go through a large number of paper materials for printing, transmission, and storage [19, 20]. The integrated network communication function based on the Web platform can effectively realize the two-way communication between the user and the translation. At the same time, it also provides readers with a convenient, fast, and efficient service method (PBL) that can provide users with feedback on their reading experience anytime, anywhere. In addition, the interactive electronic document translation system has the characteristics of strong flexibility in the process of traditional text information processing [21]. It can interact on different platforms according to the needs of users and has better flexibility and controllability [22, 23].

3.1.2. Service Platform. The functions of the service platform mainly provide users with text retrieval and voice translation as well as other related auxiliary information [24, 25]. (1) *Text retrieval.* The tool can quickly obtain the required text, pictures, videos, and other resources from the database and generate a document for users to use after the translation is completed. At the same time, you can also search the Internet for topics you want or are interested in to communicate, which facilitates the interaction between readers. In addition, it helps to improve users' interest in English

learning and make them more active in the translation process [26]. (2) *Speech decoding function*. The tool can quickly obtain the required information from the text and process it so that readers can get help in time when they encounter problems in the translation process. (3) *Voice translation*. It can convey the meaning that it needs to express to the translator, and at the same time, it can also realize the functions of direct dialogue with the original author or indirect inquiry of the translator to complete the English word decoding task. The interactive text body developed based on the auxiliary language of the Internet of Things technology has the following characteristics: (1) it facilitates the communication and interaction of users and (2) it is convenient for the defense when encountering problems in the translation process.

3.1.3. The Concept and Calculation Method of Interactive English Translation. Interactive translation is an important English translation method, which has a certain degree of commonality in terms of language ontology and translation methods. In the process of text information extraction and processing, the most basic is to perform a logical and semantic analysis on the translation. Therefore, based on the Internet of Things technology, the research on the relationship between interactive English reading function, word recognition function, and related word reading ability is realized. The interactive translation method based on text information extraction is an effective method to realize the functions of semantic association analysis, sentiment tendency prediction, and reasoning. In the process of English translation processing, the translation of the text is realized through semantic mining and inference of the original content. In this paper, from the process of extracting and processing text information, it is divided into three parts: semantic analysis, sentiment prediction, and related word recognition. Semantic analysis is to extract text information and interpret these different texts as effective and logical relationships according to their content characteristics. In the process of translation, it should be noted that necessary consideration should be given to the sentence structure and expression when connecting words between sentences and chapters. For the same meaning, there may be multiple expressions (such as word order). When a sentence is split into multiple participles for decoding, corresponding processing methods must be made for this situation, which is also an important part of the translation process. In the process of translation, the related words are analyzed to find the relationship between sentences. Based on the above analysis, it is necessary to classify the interactive English translation methods in the translation process so as to facilitate further research on their functions and implementations. Emotional tendency prediction is based on the Internet of Things technology, which builds a bridge between text and sentences to achieve emotional communication with the original text. This translation method uses language as an intermediary to convey information. Therefore, in the process of translation, language is used as an intermediary to realize the transmission of information. In this process, the translator must express it correctly, which is also the bridge between the text and the user.

3.1.4. Interactive English Translation Algorithm Based on Internet-of-Things Information-Assisted Processing. In the interactive English translation system based on Internet of Things information processing, when translating, it is first necessary to search and analyze the text content. Then, according to the specific vocabulary, discourse, and other data types and attributes input into the database by the user, it is judged whether the original text to be translated is semantic. If it is the same word, it can be classified and stored according to different methods; otherwise, it can be stored again if it does not belong to the next category of the semantic class. Based on the Internet of Things information processing interactive English translation algorithm and according to the specific situation in the translation process, the convolutional neural network algorithm is used to realize the translation of the translated text. The interactive English translation system based on Internet of Things information processing mainly has two methods for semantic analysis of the translated text. The first is to use the word vector as an input variable to describe the relationship between words and sentences; secondly, according to a certain connection between the translation and the original text, an association model is established to identify the author or his location, and what has happened or changed in what he said; finally, the text content is classified and stored in the database based on the text type.

A convolution kernel X of size $\omega * \xi$ performs a convolution operation on the input text S:

$$a = \sum_{\varpi=1}^{\omega\xi} x_{\varpi} s_{\varpi} = X^T S. \tag{1}$$

The generated network is H, the discriminant network is E, and the loss function is given as follows:

$$M^{(E)}\left(\rho^{(E)}, \rho^{(H)}\right) = -\frac{1}{2} F_{s-Q_{\text{data}}} \log E(s) - \frac{1}{2} F_{s-Q_a} \log(1 - E(H(a))). \tag{2}$$

Among them, ρ is the neural network parameter variable.

Total loss function:

$$W\left(\rho^{(E)}, \rho^{(H)}\right) = F_{s-Q_{\text{data}}} \log E(s) + F_{s-Q_a} \log(1 - E(H(a)))$$
$$\arg\min_{H} \max_{E} W(E, H). \tag{3}$$

Let $H(a) = s$, then we have

$$W = \int q_{\text{data}}(s)\log E(s) + q_h(s)\log(1 - E(s)). \tag{4}$$

Let $g(s) = q_{\text{data}}(s)\log E(s) + q_h(s)\log(1 - E(s))$, and take the derivative of $g(s)$ as follows:

$$\frac{\mathrm{d}g(s)}{\mathrm{d}E(s)} = \frac{q_{\text{data}}(s)}{E(s)} + \frac{-q_h(s)}{1 - E(s)} = 0. \tag{5}$$

Finally, get $E^*(s)$ as follows:

$$E^*(s) = \frac{q_{\text{data}}(s)}{q_{\text{data}}(s) + q_h(s)},$$

$$W(H, E^*) = \int q_{\text{data}}(s)\log\frac{q_{\text{data}}(s)}{q_{\text{data}}(s) + q_h(s)}\mathrm{d}s + \int q_h(s)\log\frac{q_h(s)}{q_{\text{data}}(s) + q_h(s)}\mathrm{d}s. \tag{6}$$

KL divergence is given as follows:

$$KL(Q\|R) = \sum Q(s)\log\frac{Q(s)}{R(s)}. \tag{7}$$

JS divergence is given as follows:

$$JS(Q\|R) = \frac{1}{2}KL(Q\|N) + \frac{1}{2}KL(R\|N), \tag{8}$$

where Q and R are two different probability distributions, $N = 1/2(R + Q)$.

$$JS(Q\|R) = \int q(s)\log\frac{q(s)}{q(s) + r(s)/2}\mathrm{d}s + \int r(s)\log\frac{q(s)}{q(s) + r(s)/2}\mathrm{d}s. \tag{9}$$

The optimal generator should satisfy $q_{\text{data}} = q_h$.

Consistency of recurrent network is given as follows:

$$\begin{aligned} s &\longrightarrow H(s) \longrightarrow G(H(s)) \approx s, \\ z &\longrightarrow G(z) \longrightarrow H(G(z)) \approx z. \end{aligned} \tag{10}$$

A least-squares loss is used instead of the cross-entropy form as follows:

$$\begin{aligned} M_{\text{GAN}}(H, E_Z, S, Z) &= F_{z-Q_{\text{data}(z)}}[\log E_Z(z)] + F_{s-Q_{\text{data}(s)}}[\log(1 - E_Z(H(s)))], \\ M_{\text{GAN}}(G, E_S, S, Z) &= F_{s-Q_{\text{data}(s)}}[\log E_S(s)] + F_{z-Q_{\text{data}(z)}}[\log(1 - E_S(H(z)))]. \end{aligned} \tag{11}$$

In CycleGAN network,

$$\min W_{\text{LSGAN}}(H) = \frac{1}{2}F_{a-q_a(A)}\left[(E(H(a)) - 1)^2\right]. \tag{12}$$

The loss is calculated using the $L1$ norm as follows:

$$M_{\text{cyc}}(H, G) = F_{s-q_{\text{data}(s)}}[\|G(H(s)) - s\|_1] + F_{z-q_{\text{data}(z)}}[\|H(G(z)) - z\|_1]. \tag{13}$$

Complete loss function is given as follows:

$$L(H, G, E_S, E_Z) = M_{\text{GAN}}(H, E_Z, S, Z) + M_{\text{GAN}}(G, E_S, S, Z) + \eta M_{\text{cyc}}(H, G), \tag{14}$$

where η is the adjustment weight of the loss.

The final optimized function is given as follows:

$$H^*, G^* = \arg\min_{H,G}\max_{E_S,E_Z} M(H, G, E_S, E_Z). \tag{15}$$

IS Score is given as follows:

$$\text{IS}(H) = \exp\left(F_{S-q_h}E_{KL}(q(z|s)\|q(z))\right). \tag{16}$$

FID Score is given as follows:

$$\text{FID}(s, h) = \|\sigma_s - \sigma_h\|_2^2 + \varsigma\left(\tau_s + \tau_h - 2(\tau_s\tau_h)^{1/2}\right). \tag{17}$$

Among them, σ is the mean, ς is the sum of the diagonal elements of the matrix, τ is the covariance, s is the real sample, and h is the generated sample.

In this paper, the convolutional neural network algorithm is used to systematically learn the words and sentences of the corpus and then translate and output the results according to the input content.

3.2. System Requirements. In the development process of the interactive translation system, requirement analysis is a very important link. First of all, it is necessary to clarify for which functional modules the user needs to have a preliminary understanding, then make a detailed investigation and analysis of this basic information and auxiliary languages, and determine whether the interactive English translation method that needs to be applied can be successfully realized according to the investigation results. Finally, based on the Internet of Things technology, artificial intelligence, and other intelligent technologies, the corresponding interactive software system platform and the hardware connection method of the related interface circuit will be designed to provide convenient conditions for the subsequent development work. In the process of software development, requirement analysis is the most important part of the whole system design and implementation and also provides a basis

for the subsequent programming in the software development stage. It analyzes the system functions, interface circuits, and related data requirements in detail.

3.2.1. System Functions. The main functions of this system include the following points: (1) *the transmission of translation information*. After the user publishes the translation, it is necessary to perform text and speech recognition to determine whether there is a translation. If there is no character or grammar error, you need to return to the Chinese prompt and re-enter; otherwise, the word or sentence is not allowed to use other parts of the Internet of Things directly to realize the interactive translation function. (2) *Conversion of translation information*. After the user publishes the translation, text recognition needs to be performed to determine whether to use the IoT auxiliary language, then convert these words or sentences into RNG words or other natural expressions; finally, convert English words or periods into Chinese words. (3) *Reception of translation information*. After the translation is accepted, the Chinese text needs to be returned and translated into English words or sentences for the user to read, then the Chinese text is converted into RNG words or other natural expressions for the readers to understand and use.

3.2.2. System Data. In the design of the interactive translation system, data storage is very important, and it will provide necessary and accurate, complete, and timely feedback for the translation to readers. This paper mainly provides an overview of the information-assisted language library for the Internet of Things. First, analyze the field structure: the function module consists of two parts. The first part is used to publish information; the second part is to accept instructions and send commands to the server to perform corresponding operations (such as translation) to complete the data that need to be processed in the interactive process, including text types and images. These data will be analyzed in detail here. *Text type*. This function module provides users with an interactive document that can select corresponding attributes according to their needs and can quickly respond to the required information. This classification method belongs to the structure based on graphs and fields, and its characteristics are as follows: first, it defines semantics by simply describing the language and words; secondly, the different objects in the text are interconnected, strongly correlated, and have a high degree of autonomy or predictability features, etc.; finally, it is a graphic-based interactive document, and the text type has obvious interactivity.

3.3. System Design. In the design and implementation of the interactive translation system, it is mainly through the testing and analysis of functions. This article will introduce the process of assisted language translation based on IoT technology. The method consists of two parts: one is to test the user and translation and the other is to operate the user interface, such as the login button, text box single-page display, and data display module, both use the program control code to automatically complete the task execution to realize the target text recognition and interactive reading process. In addition, it is also necessary to consider the block design of functions and divide different parts into multiple small sections and deal with them separately.

3.3.1. System Architecture. The architecture of the interactive translation system based on the Internet of Things is shown in Figure 1. This program adopts B/S mode (as shown in Figure 2), that is, the translation is completed on a browser, and the result is displayed directly on the page. The B/S mode unifies the client and concentrates the core part of the system function realization on the server, which simplifies the development, maintenance, and use of the system. The algorithm has the characteristics of good fault tolerance and strong practicability; in addition, it can also realize the function of connecting and interoperating with other applications through various interfaces; finally, it has technical support such as powerful and friendly interface and data statistical analysis. (1) *System architecture*. Design based on B/S structure is the most critical link in the development of this translation system. In this translation system, the design of B/S mode is mainly to realize the interactive English translation mechanism based on Internet of Things technology. The method can fully utilize the resources and devices on the network to exchange information. At the same time, the translation results can also be sorted out through the data statistical analysis function. (2) *System function module*. This part mainly implements the interactive translation mechanism based on the Internet of Things technology. In this translation process, users can input different types and corresponding content in the text box and then choose the realization of the translation mechanism according to the required information. Mainly based on the Internet of Things technology, text and picture information are effectively combined in an interactive translation system. The function module can automatically generate corresponding graphics and texts after inputting different types and contents to the user and display them to the relevant interface. (3) *Statistical analysis of data*. The required data and results can be obtained through statistical analysis, and this method can be used when a large number of historical records need to be saved, backed up, or deleted.

3.3.2. The Main Interface of the System. According to the above functions, we can develop the main interface of the interactive translation system, that is, between the user and the administrator, and between the text and the picture. (1) *Registration/login*. After the user completes the construction of the basic module of the IoT information auxiliary language mentioned in this design, the user can register or log in through the mobile app. This part needs to implement two aspects: the first is to provide an input box in the page, and the second function option is "view," where you can click the button to enter a content under any column to use it directly or exit to the system among; (2) *text classification*. This part needs to realize the automatic recognition of the translated

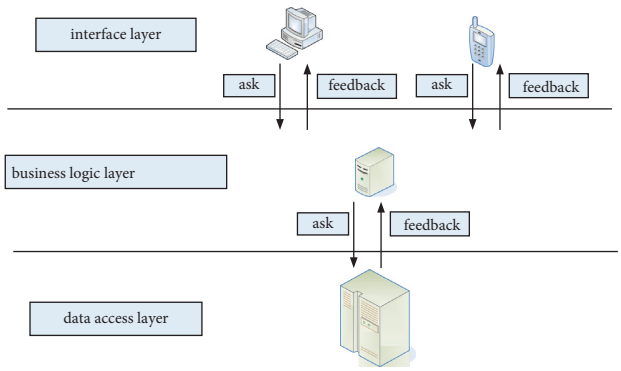

Figure 1: The architecture of the interactive translation system based on the Internet of Things.

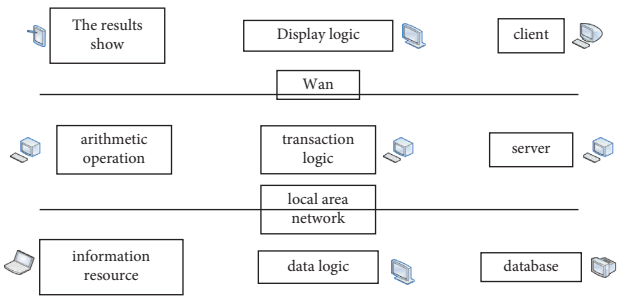

Figure 2: B/S three-tier architecture diagram.

text. When translating, the specific meaning can be distinguished by inputting keywords; (3) data storage area; (4) interactive interface; (5) other content such as function options and interface instructions should be included, and detailed records should be made to save the document file, and you can use and query the running results of this translation program and user feedback information and other related issues. According to the above analysis, it can be concluded that the system is an interactive English translation system based on the basic module of the auxiliary language of the Internet of Things, which can realize the recognition, storage, and transmission of the translation.

3.3.3. Collection of System Data. When collecting the data of the interactive English translation system, it is necessary to use a unified Internet of Things technology to collect and store relevant information. In this paper, various forms such as text and images are involved. The information mainly includes the following: (1) text content and (2) multimedia image data such as pictures, audio, video, and animation files. The collection and storage of this information are processed through radio frequency technology. In the interactive English translation system, two functions need to be implemented: one is text and images, that is, users publish to the database, and the other is the speech recognition module. The input data are preprocessed and sent to the neural network, and the word content is recognized by ANN. ANN is an artificial neural network, which abstracts the human brain neuron network from the perspective of information processing, establishes a simple model, and forms different networks according to different connection methods. The hardware of the speech recognition module is shown in Figure 3.

The STM32F103VET6 chip is a high-performance, 32-bit processor based on the CM3 core, with low power, low voltage, and excellent performance combined with real-time functions. The technical parameters of the STM32F103VET6 chip are shown in Tables 1 and 2.

3.4. Implementation of Interactive English Translation System. The interactive translation system based on the context of the Internet of Things is a new type of English vocabulary, and its functions mainly include text, voice, and picture information retrieval. In this paper, two different forms of interactive translation are implemented: (1) the combination of semantically related etymology and word templates and (2) online reading auxiliary translation language and automatic decoding are completed to modify the translation and return to the original interface and then judge whether the translation content needs to be supplemented according to the prompt input by the user. Based on the interactive translation method of semantic correlation type etymology and word template, two different forms of text information retrieval are realized, and its functions include voice, picture, and text, and the translation is modified through automatic decoding. In addition, the system needs to be evaluated, and the evaluation adopts the method of manual evaluation (see Figure 4).

3.4.1. System Design Purpose and Implementation Process. The design of this interactive translation system is to realize the auxiliary processing function of Internet of Things information and to express the corresponding semantics through words with high similarity with the text. In this process, it is necessary to convert the words and sentences into specific vocabulary and then complete the translation according to the specific words. The first thing we need to do is complete all the steps required for a translation task: the first step is to determine the relationship between sentences and words, the second step is to convert these sentences or paragraphs into corresponding semantic forms, the third step is to convert the converted semantics into word forms, and the fourth step is to convert the resulting the corresponding semantic meaning in the text. In this interactive translation system, we need to complete such a task: first, determine whether there are similarities between each sentence; secondly, how to express, it first needs to determine the relationship between sentences; then, we need to convert each sentence into corresponding words; the next step is to connect words between different levels in the same way; finally, the converted text is converted into the characters that need to be used between the corresponding levels, and proofreading is done after the decoding is completed.

3.4.2. The Software System of the Interactive English Translation System. The software system of the interactive translation system is mainly composed of three parts (as

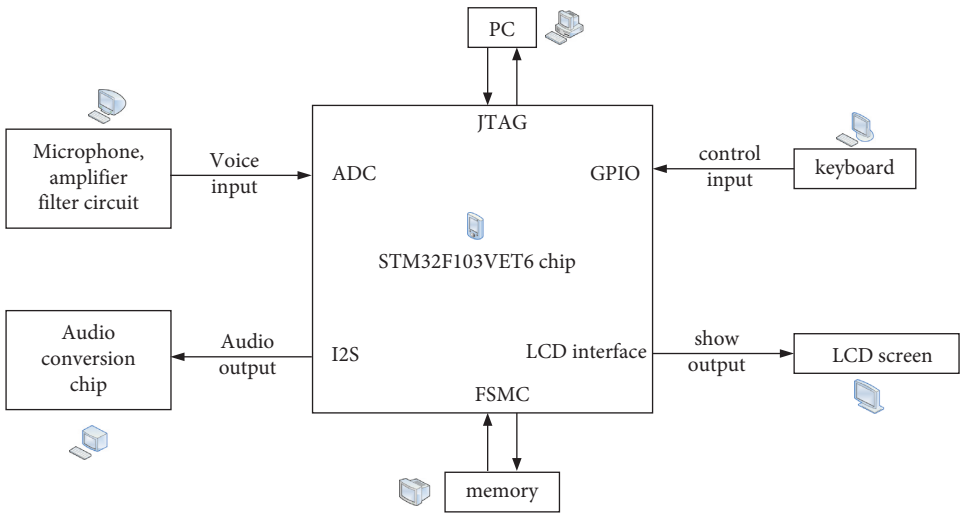

Figure 3: Speech recognition module hardware.

Table 1: STM32F103VET6 chip technical parameters 1.

Name	Parameter	Name	Parameter
CPU	Arm 32-bit Cortex-M3	Dissipated power (mW)	434
Size (bit)	32	FLASH capacity (B)	524288
Clock frequency (MHz)	72.0	Memory capacity (KB)	512
RAM size (B)	65536	Processor Speed (MHz)	72

Table 2: STM32F103VET6 chip technical parameters 2.

Name	Parameter	Name	Parameter
Number of pins	100	GPIO	80
Number of timers	8	Supply voltage range (V)	2~3.6
Number of PWM channels	16	Operating temperature range (°C)	−40~85

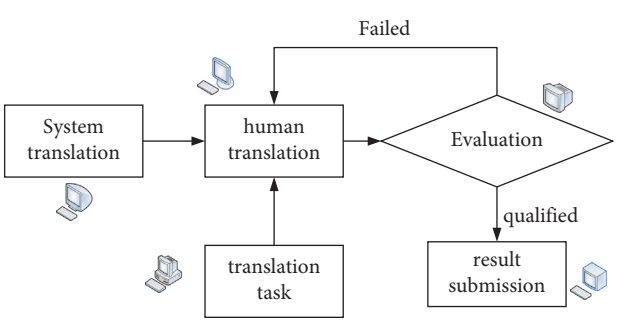

Figure 4: Flowchart of manual evaluation.

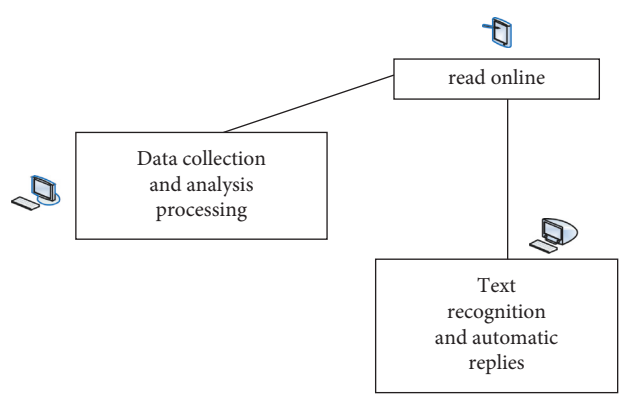

Figure 5: System software architecture.

Figure 5): the first module is data acquisition and analysis processing, including text recognition and audio signals. The detailed information is saved in the background database. This module implements the classification of English words. The second subfunction is online reading. This function is to facilitate real-time communication between readers and translation authors, provide assistance, and feedback the original content to the translator team. At the same time, it can also send English translation suggestions to users through the voice interface to guide the translation work of the translation; the last part is used for text recognition and automatic reply to the original text. When readers encounter problems in translation, the module will automatically reply to the original text.

3.4.3. Interactive Function. The interactive function is designed to automatically process the translation during the translation process. Through the conversion between text, pictures, and other information, two-way transmission with

the original text is realized. On this basis, it is also necessary to consider whether the channel capacity and the network environment are compatible (that is, different users can get the same format or content). There are two issues: (1) data transmission speed from the current situation, the development trend of communication technology has been very impressive. But at the same time, we should also see the challenges brought by the high-speed development process—low-speed, low-frequency, and other undesirable phenomena are becoming more and more obvious. Therefore, in order to ensure high efficiency and accuracy, the problem of channel capacity should be considered in the translation process. (2) It is important to think about how to improve the data transmission speed, that is, to realize the fast and efficient transmission of information content by selecting the transmission medium.

Based on the above factors, an interactive English translation system model—RM-test algorithm—is proposed, and the final design and test work are completed on this basis. The basic principle of the RM-test algorithm (see Figure 6) is as follows: first, translation data are given by the translation system, then the text data are transmitted to the decoding layer through the network, the information is matched in the decoding layer, and finally, the original text is returned to the database. The translation system is an interactive English word decoder, which can automatically identify the text data and give the corresponding translation.

3.4.4. Maintenance of Interactive English Translation System. The maintenance process of the interactive translation system mainly includes the following aspects: (1) it needs to revise the translation to ensure that the translation conforms to the original design specifications. In case of errors, omissions, or inappropriate words used by users when using English, it is necessary to explain to readers in a timely manner. At the same time, it is necessary to strengthen the processing and reply function of user feedback information and the construction of an online message mechanism; (2) for some professional terms, it is necessary to avoid repeated translations to cause semantic confusion. It is necessary to add auxiliary words in the interactive word decoding and make necessary and reasonable modifications before applying them to the translation.

4. Interactive English Translation System Performance

The operating environment of the system is shown in Table 3.

The technical parameters of the translation output machine are shown in Table 4.

The specific situation of the corpus used by the system is shown in Table 5.

300 typical sentences of different lengths were extracted from the corpus analysis database for testing, and the time of pattern feature extraction is shown in Figure 7; this time it includes the time of statement preprocessing and lexical analysis. A support memory bank of 1000 sentences was first built and tested with another 200 sentences. The system tested the time spent on learning in the following two cases: (1) learning without classification, that is, learning with the simplest memory, and directly storing the input sentences or patterns in the memory bank. (2) It utilizes lazy learning for categorical storage, forming different clusters; Figure 7(b) presents the average time spent in two different cases.

Figure 7(a) shows that the time for feature extraction increases gradually with the number of words in the source pattern. Figure 7(b) shows that as the memory bank increases, so does the time spent on learning. Compared with simple memorization, lazy learning takes about 40% more time. This is the downside of lazy learning, which trades time for improved retrieval speed.

The accuracy of the translation is divided into four levels: A (almost completely correct), B (mostly correct), C (a small part of it is correct), and D (almost completely incorrect). Figure 8 presents the evaluation of translation accuracy for each similarity condition. The examples of the feature index translation failure are concentrated, and then, full-text search is used to realize the translation, and the analysis of the translation results is shown in Figure 8(b).

Figure 8(a) shows that when the similarity of the analogy matches is greater than 80%, most of the translation results retain the meaning of the source text. Only a small fraction (about 24.1%) requires users to make simple modifications based on the analogy-matched reference information to form a more accurate translation. Figure 8(b) shows that although some of these sentences can be retrieved using full-text search to find similar patterns, in most cases, these retrieved patterns are not very helpful for translation of the source text. Not only the similarity is low but also the same part is not enough to provide enough information for the translation of the source text.

In the process of testing the system, in the case of 3000 memorized data, the time of full-text search and translation in the two cases of indexing with abstract features were compared as shown in Figure 9. In addition to the search method, the factor affecting the translation time is the size of the library. For this reason, this paper presents the translation time when the library size is different as shown in Figure 9(b).

It can be seen from Figure 9(a) that the translation time using full-text retrieval is about ten times as long as that using feature indexing, which is enough to show that the abstract feature-constrained retrieval method greatly speeds up the memory search time, thereby significantly improving the translation speed.

The system translation test indicators include BLEU (Bilingual Evaluation Research) and online translation speed. The BLEU value is [0, 1]. The closer the BLEU value is to 1.0, the higher the translation quality, and the more accurate the interaction. Figure 10 is the test result of the BLEU index, and Figure 10(b) is the test result of the online translation speed index.

Figure 10 shows the translation of three test samples using different systems. The BLEU index value of the system in this paper is 0.98 in the Chinese-English system and 0.99 in the English-Chinese system, which is higher than in other

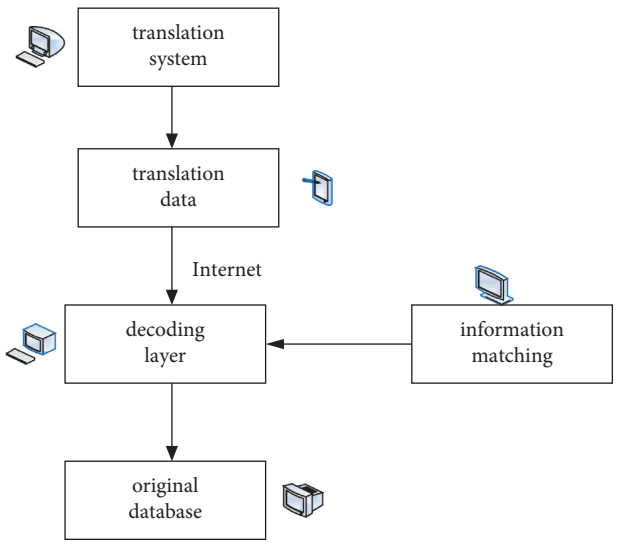

Figure 6: Schematic diagram of the RM-test algorithm.

Table 3: System operating environment.

Name	Environmental parameters	Name	Environmental parameters
Operating system	Windows 7	RAM	2 GB
Database	Microsoft SQL server 2016	Development language	VRML, HTML, C++
CPU	Pentium$^{(R)}$ dual-core CPU E5400 2.70 GHz	Hard drive capacity	320 GB

Table 4: Technical parameters of translation output machine.

Name	Parameter	Name	Parameter
Display	3.1-inch retina touchscreen	Power supply	DC 5 V/2 A
Camera	Autofocus HD camera	Battery	2500 mAh
Microphone	12S four-microphone array	Interface	Type-C
System interface	Chinese-English	Flash	LED fill light
Network standard	Mobile/Unicom/Telecom 4G/3G/2G	Processor	8-Core high-speed processor

Table 5: Corpus situation.

Numbering	Expected	Numerical value	Types of contextual translations
1	Number of conversations	9452	2
2	Number of sentences	396585	2
3	Total word count	6895698	2
4	Glossary	596694	2

systems. The BLEU index value of the system in this paper is larger and the translation speed is faster, which solves the problem of translation lag and error in the current translation system and improves the interaction with users.

5. Discussion

Through the above test results, we can draw the following conclusions. (1) The assisted translation system based on the Internet of Things can realize the correlation between English words and translations. Due to the large amount of textual information in interactive online reading, language communication in the traditional sense is many-to-one or one-to-one. Therefore, when translating based on interactive network technology, it is necessary to consider issues such as the relevance between the user and the source word and the channel perception in order to achieve the desired effect. (2) Based on the interactive function of the interactive online translation system, the text information contained in the source language lexicon can be retrieved and matched and stored in the database. Therefore, the software has good real-time performance and accuracy.

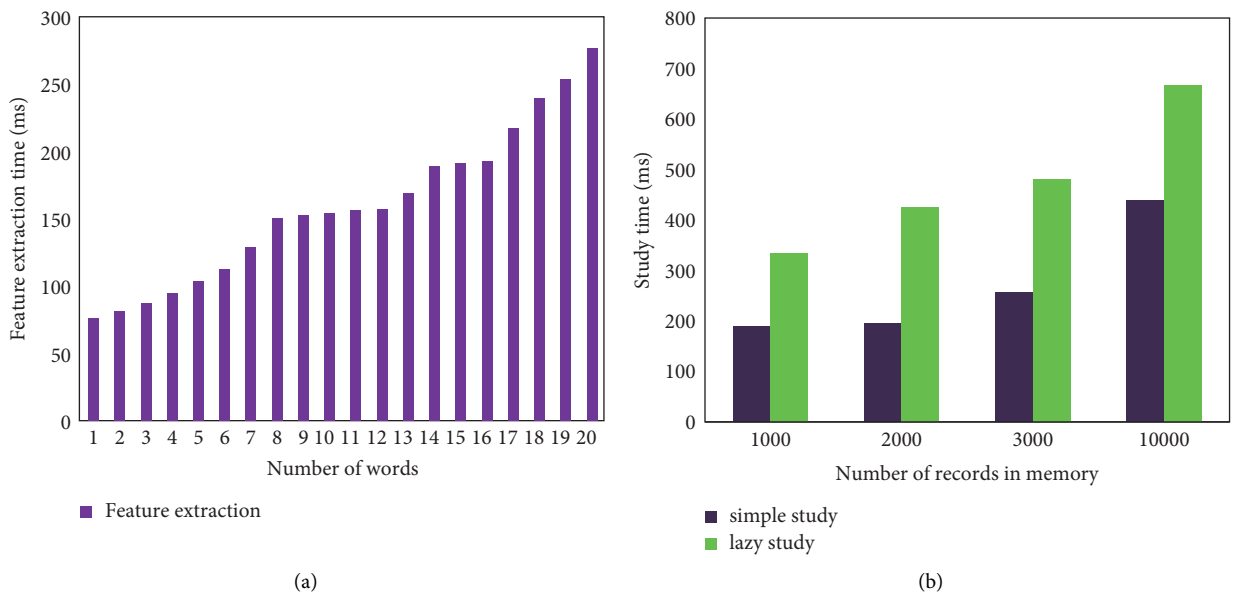

Figure 7: Duration of feature extraction and learning.

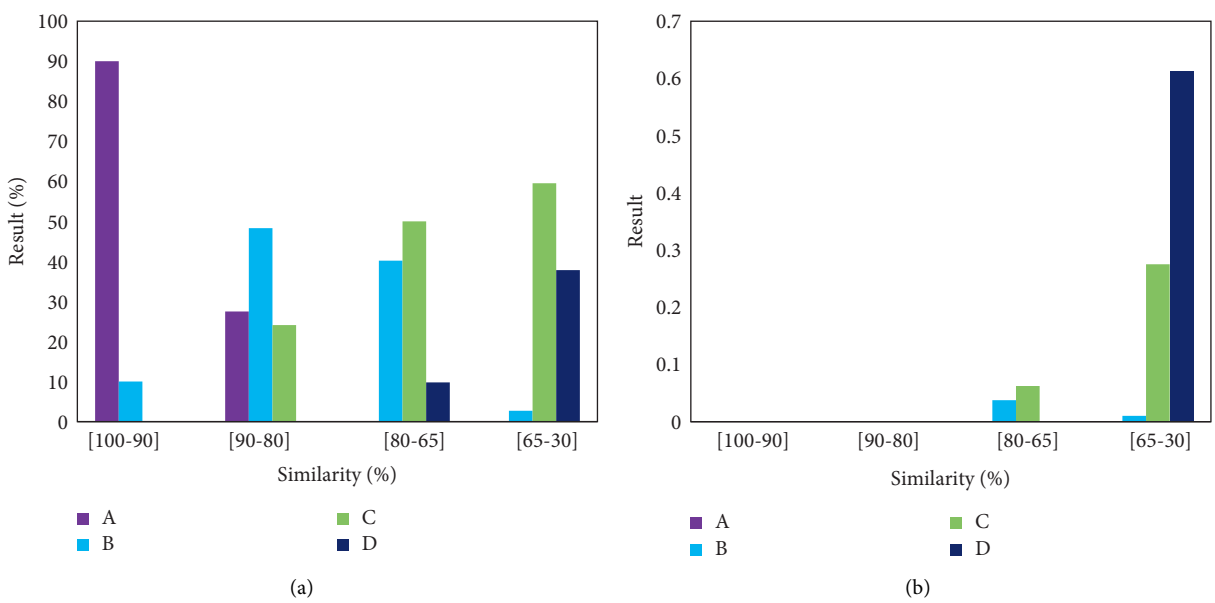

Figure 8: Evaluation and translation results.

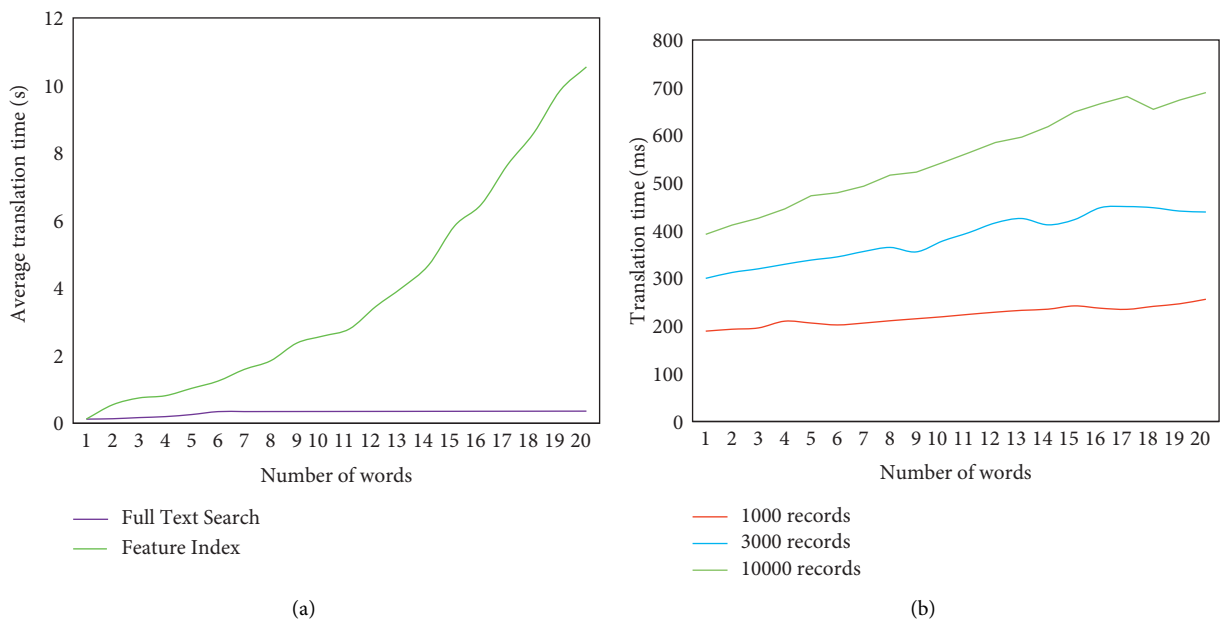

Figure 9: Translation duration.

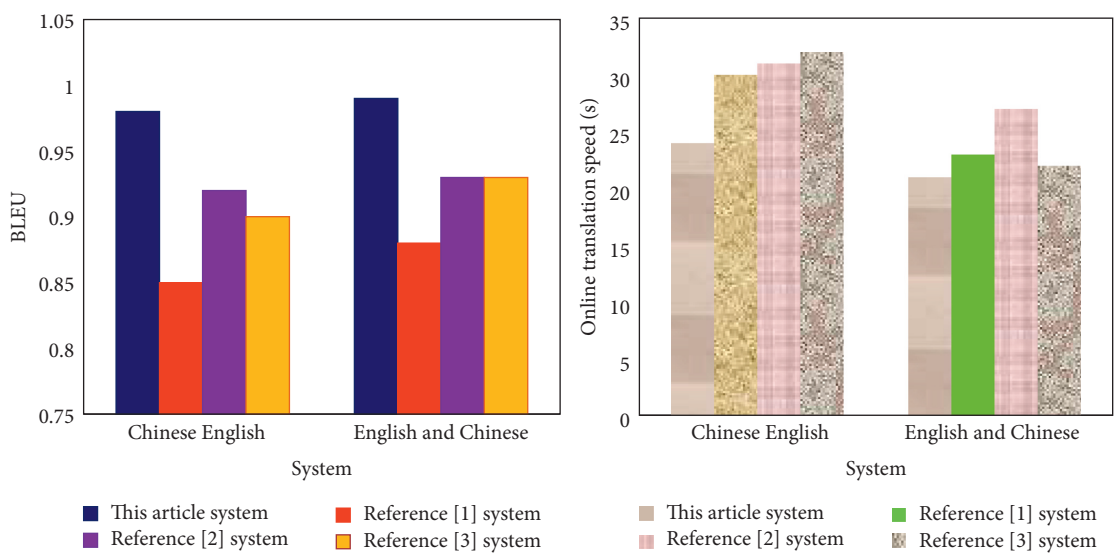

Figure 10: System translation performance test results.

6. Conclusion

In order to translate English efficiently and accurately, this research designs an interactive English translation system. The following conclusions are drawn from the work done in this paper: (1) the translation method based on corpus and correlation analysis is an effective, practical, and realistic method, but it cannot be directly applied to the English translation because the method itself is not a huge amount of text. At the same time, because this process requires a lot of data support, we only briefly introduce and verify it in this paper to achieve related functions. (2) The interactive translation method based on data mining is an efficient and practical translation method. It can effectively retrieve different types of text information such as sentences and parts of speech in the English translation, so this technology has a high research interest value. (3) This translation method can not only solve the problem of huge amount of text and difficult to retrieve but also provide more convenience for English translation. For example, in the process of reading, sentences and parts of speech can be distinguished and relevant information can be extracted. In this paper, we can

find that the interactive translation method based on the Internet of Things can not only achieve text information retrieval but also provide more convenience for English translation. There are still many shortcomings in the paper. For example, due to the consideration of time, energy, and other factors during translation, the original meaning cannot be accurately expressed after the interactive translation is modified. Therefore, the paper focuses on web design based on IoT-assisted languages rather than the study of interaction mechanisms during translation.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this article.

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