Optimization of Computer-Aided English Translation Teaching Based on Network Teaching Platform

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Abstract. Since the beginning of the 21st century, the infiltration of network, information, and computer multimedia teaching into education and teaching has greatly promoted the teaching reform of various subjects in middle schools, while also endowing subject teaching with rich connotations. Especially the English classroom teaching has been a huge challenge. Aiming at the status and existing problems of professional English translation teaching in colleges and universities, this article optimizes the current computer-assisted English translation teaching. This article firstly refers to the cloud-computing model to design a new computer-assisted translation system to optimize English teaching. The system hardware is divided into four layers: user layer, service layer, computing layer, and storage layer. Secondly, in order to improve the accuracy and reliability of automatic translation of long-character English with memory-assisted English, this paper proposes an automatic English translation algorithm based on the B/S framework to optimize and improve the computer-assisted translation system. The experimental results show that the new computer-assisted translation system proposed in this paper can not only achieve better translation performance, but also can effectively and quickly realize the intelligent translation of memory-assisted long-character English, with high data recall rate, high accuracy and reliability. The system has good compatibility and can provide students with a better English teaching translation system, which is worthy of promotion and practical application.

Keywords: Optimization; Computer Aided; English Translation Teaching; Network Teaching Platform
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1 INTRODUCTION

With the increasingly powerful functions of computer-aided translation software, especially the combination of terminology management and translation memory, more and more translators realize the importance of computer-aided translation technology [1-2]. As one of the contents of the undergraduate teaching quality and teaching reform project in colleges and universities, the importance of professional English courses is self-evident. However, the current professional English teaching situation is not optimistic [3-4]. The first is the outdated teaching method. Among them, 46% of the students reported that the teachers used monotonous pure translation or a combination of reading and translation teaching methods in the classroom. The second is the backward teaching methods. Among them, 58.4% of teachers do not use any multimedia teaching methods. Professional English translation teaching is mostly based on teacher-centered and text translation teaching mode. This model lacks students' active participation and teacher-student interaction, and does not pay enough attention to the combination of translation practice and theory, which greatly affects the improvement of translation teaching effects.

In recent years, some colleges and universities have developed the specific application of computer-assisted translation (CAT) technology in English teaching, and made great efforts to promote the use of English teaching models and teaching methods based on computer-assisted translation technology, and achieved good teaching results. Although the teaching of translation courses and related content should be carried out in a computer network environment. However, professional English translation teaching for senior non-English majors has not adopted the computer-assisted translation-teaching model. Therefore, we urgently need to reform the translation-teaching model of professional English to meet the requirements of the new situation for professional English teaching. Arnal et al. [5] explored the preferences of students and studied the grouping of learners according to their preferences to enhance their learning ability. Akhtar et al. [6] used student-related information as a data source, and concluded that users' online learning behavior has obvious non-uniformity. Sharifi et al. [7] conducted a comprehensive research on the domestic teaching system. In view of the existing differences, it proposes optimization strategies to provide good decision-making support and suggestions for the construction of English classroom teaching system. Xie [8] proposed a new English translation algorithm for the low accuracy problem in the current translation model. This algorithm helps to realize the construction of translation system for English teaching. Kan [9] used multiple linear regression and BP methods to construct a translation model, and obtained a prediction accuracy of 90%, which has a great early warning effect for teachers to interfere with students' learning.

Existing computer-assisted English teaching models generally have problems such as poor information utilization, low intelligence, and low personalization [10]. This article firstly refers to the cloud-computing model to design a new computer-assisted translation system to optimize English teaching. Secondly, in order to improve the accuracy and reliability of automatic translation of long-character English with memory-assisted English, this paper proposes an automatic English translation algorithm based on the B/S framework to optimize and improve the computer-assisted translation system. The experimental results show that the new computer-assisted translation system proposed in this paper can not only achieve better translation performance, but also can effectively and quickly realize the intelligent translation of memory-assisted long-character English, with high data recall rate, high accuracy and reliability. The system has good compatibility and can provide students with a better English teaching translation system, which is worthy of promotion and practical application.

2 OPTIMIZATION OF COMPUTER AIDED ENGLISH TRANSLATION

2.1 Hardware Optimization Design of Machine-Aided Translation System based on Cloud Computing Mode

The machine-assisted translation system must have a large amount of language information, which is recorded in a unified database. In order to realize the translation of large-scale language data, this paper designs a distributed processing framework that can store files in different ways, reduce unnecessary information interaction in the system, and reduce the complexity of the system's work process, to achieve the purpose of efficient translation. The system designs different translation methods for different types of languages. For small and simple languages, direct translation is used. For large and complex languages, distributed translation is used. Combining the two methods can improve translation efficiency. The hardware structure of the machine-assisted translation system designed in this paper based on the cloud-computing model is shown in Figure 1.

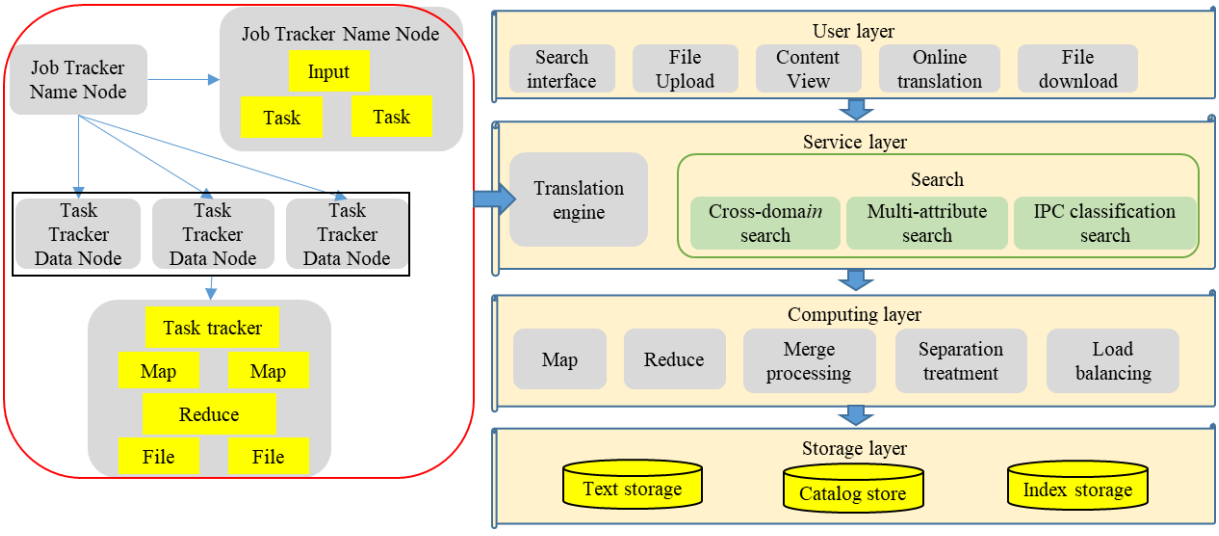

Figure 1: The overall hardware structure of the machine-assisted translation system based on cloud computing mode.

Looking at Figure 1, we can see that the hardware of the machine-assisted translation system designed in this paper based on the cloud-computing model is divided into four layers, namely the storage layer, the computing layer, the service layer, and the user layer. The storage layer is responsible for storing text, directories, and indexes. The computing layer calculates the translated information in the form of cloud computing, and processes various information after merging, separating, and equalizing. The service layer is mainly responsible for providing users with translation indexes and helping users to search for languages. The user layer can provide online translation services, file download services, file upload services, and content viewing services.

The designed storage structure load is consistent with the distributed framework, and a large number of different types of data can be stored in it. The stored data can be read multiple times, the stored data is classified through the catalog, and the stored data name is recorded in the catalog, which is convenient for users to query. Separate storage reduces the interaction between the client and the system and reduces the data throughput of the server.

The translation module designed in this paper is divided into online translation and offline translation. The offline translation module takes full advantage of cloud computing and can translate more information in a short time. If the amount of information to be translated is small, the advantages of cloud computing are difficult to realize, and online translation can be used to complete the translation work.

2.2 Offline Translation Algorithm Optimization

Offline translation is specifically for text documents with a large amount of data, and the translated data is uploaded to HDFS in text mode. After determining the storage location, the data will be batch processed through Hadoop and Map Reduce to get the result. The process of offline translation work is shown in Figure 2.

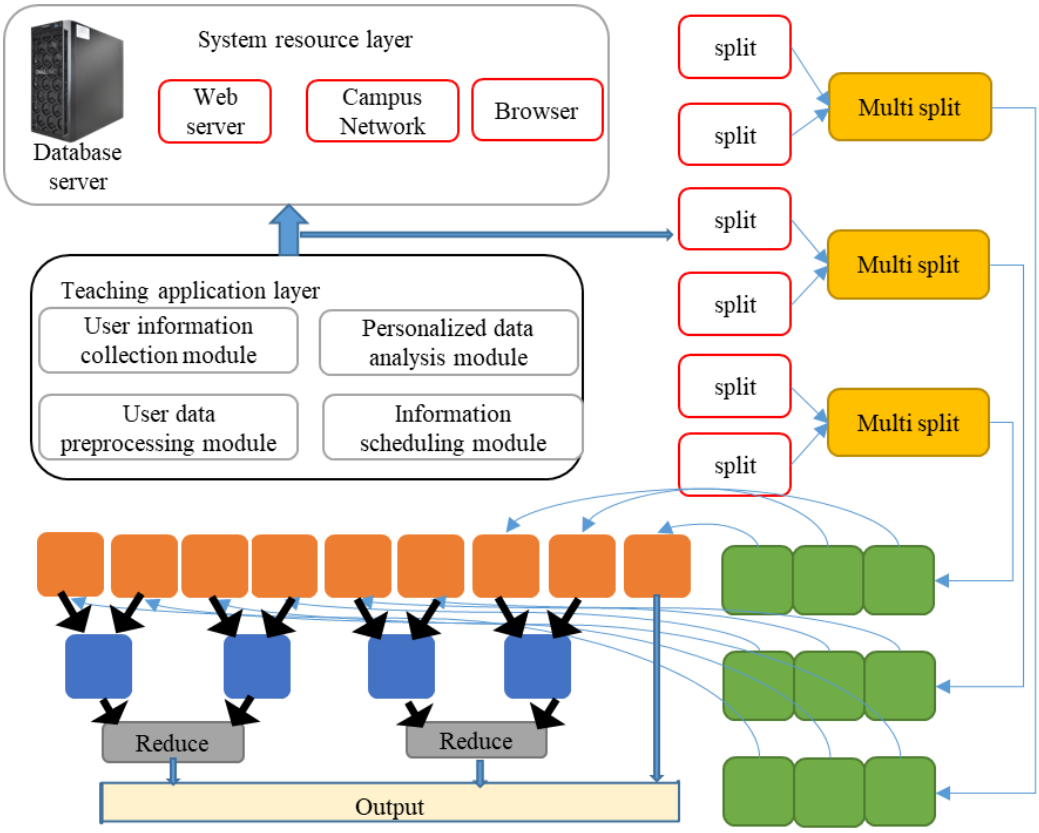

Figure 2: Offline translation work process.

Observing Figure 2 we can see that the translated file will be divided into a unified logical block merged into a logical block and then start the Map task. The file will be formatted before translation, and the translation result will be stored on the local disk. Files with the same value are stored on the same HDFS and named after the key value.

Users can use keywords to search for the text they want to translate. In addition to keyword searches, this article also quotes multi-attribute search and IPC classification search. Retrieval work refers to matching keywords with indexes in the catalog data. If the match is successful, the search result can be displayed. If the match fails, the search result will not be displayed. Due to

the various types of languages being translated, the keyword search designed in this article introduces multiple dictionaries to realize cross-domain language search.

2.3 Online Translation Algorithm Optimization

In order to realize the optimized design of the memory-assisted long-character English automatic translation system, the machine English translation algorithm is designed first. Use the natural semantic feature analysis method to analyze the case set of memory-assisted long-character English translation. The memory-assisted long-character English phrase is decomposed into semantic ontology models matching the contextual semantic features through the semantic segmentation method, and the memory-assisted long-character English semantic segmentation model is shown in Figure 3.

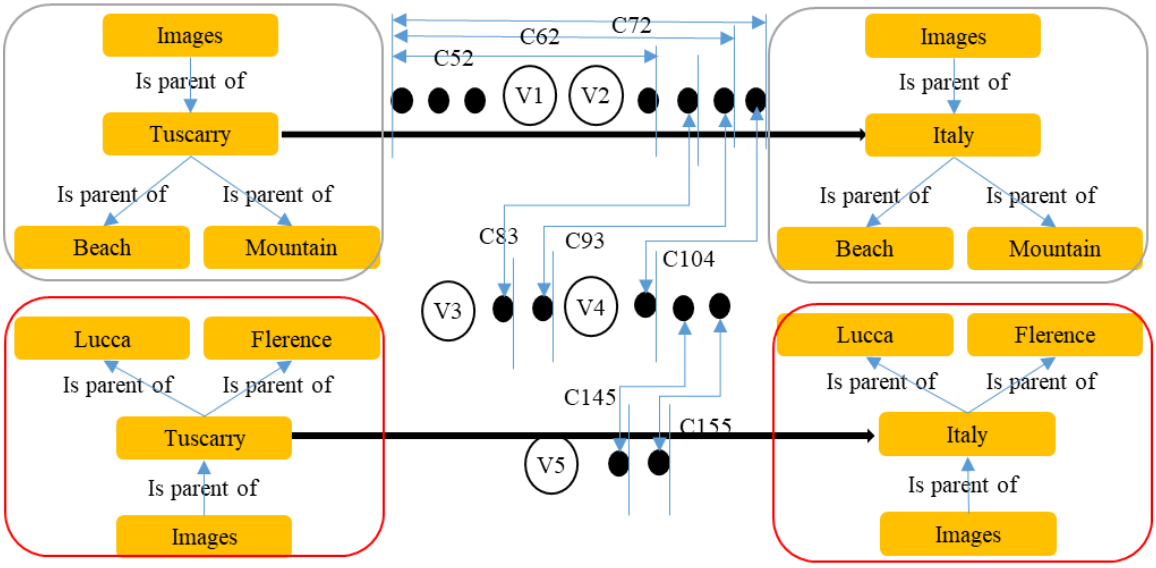

Figure 3: English semantic segmentation model of memory-assisted long characters.

According to the English semantic segmentation of memory-assisted long characters shown in Figure 3, fuzzy mapping processing is performed. Suppose the constraint coefficients a ∈ [0, A] of two semantic mappings are expressed as the memory-assisted long character translation accuracy evaluation set M, which is the set of real words after the concept-related field is matched, where A is the synonym feature matching of the semantic ontology model collection, using fuzzy semantic optimal solution calculation method, semantically organizing and creating content in English translation, using topic word feature matching method to analyze the content relevance function of memory-assisted long-character English phrases:

$$\phi(a)=\begin{cases} m_i, i=round(a) \\ a-i, else \end{cases} \tag{1}$$

Among them, round is a character-matching operator, constructing machine translation ontology fragments to predict the reliability of English translation, and obtaining ontology mapping:

$$\{a\in[0,A]\}\to M*[-1,1] \tag{2}$$

The binary semantic information feature extraction is performed on the semantic relevance feature quantity of the clause, and the output is obtained as:

$$\{m', a'\} = \{\lambda_1(m_1, a_1), \lambda_2(m_2, a_2), ..., \lambda_k(m_k, a_k)\} \quad (3)$$

Relevance search is performed on each English word piece of memory-assisted long characters, and the optimized semantic feature extraction output is obtained:

$$\{m', a'\} = \sum\{\lambda_i(m_i, a_i)\} \quad (4)$$

Based on the above-mentioned feature extraction results of the English translation of memory-assisted long characters, a semantic topic vocabulary is constructed.

Based on the two-tuple semantic feature relevance extraction method, a detailed analysis of the memory-assisted long-character English vocabulary, extracts the body text from it, and obtains the text similarity of the memory-assisted long characters, namely:

$$\sin(m, a) = \sum\{\lambda_i(m_i, a_i)\} * \sum\{\lambda_j(m_j, a_j)\} / (|\sum\{\lambda_i(m_i, a_i)\}| * |\sum\{\lambda_j(m_j, a_j)\}|) \quad (5)$$

Taking the position of the long character English vocabulary in the text as the carrier, adaptively matching the context to obtain a set of fuzzy concepts. Based on the contextual thinking and attribute fields embodied in the long-character English vocabulary, the concept set of the translation output vector is appropriately revised to obtain the correlation between the semantic word length and the part of speech of the text. Realize contextual self-service matching according to the specific location of the text to obtain the interactive information feature amount between words. According to the feature feedback of the interactive information between words, the translation is adjusted appropriately, the translation algorithm is optimized, the automatic translation is realized, and the calculation result of the translation rule is obtained.

In the operation of the system, the network topology occupies an important basic position. Based on the computer transmitting the access request to the system, interacting with the database, and timely feedback the translation results to the user. In this process, it is not only necessary to bring users a convenient and good experience, but also to take into account the storage constraints of the computer terminal. Based on the system requirements, the system adopts the B/S framework, which can not only significantly improve the response speed and efficiency, but also build a small database through a computer terminal, and store basic information based on its own database. In this way, storage pressure is relieved and storage restrictions are dealt with.

3 EXPERIMENTAL RESULTS AND ANALYSIS

3.1 Analysis of Translation Performance of Large and Small Files

Perform experiments based on the above parameters, select the computer-aided translation optimization system and traditional optimization system studied in this article, analyze the translation time of small files and large files, and perform specific analysis of the performance of the two systems based on the experimental results.

1) Translation time for small files

Observing Figure 4, we can see that when the processed file is 10 KB, the translation time of the computer translation system based on language database, the translation system based on language rules, and the machine translation system based on cloud computing are all 25 s. As the number of translated files increases, it increases in a linear fashion. When the processed file is 1 MB, the translation time of the translation system based on language rules is 150 s, the translation time of the machine translation system based on the language database is 120 s, and the translation time of the machine translation system based on cloud computing is 110 s. When the file size is 10 MB, the translation time of the translation system based on language rules is 350 s, the translation time of the machine translation system based on the language database is 330 s, and the translation time of the machine translation system based on cloud computing is 320 s.

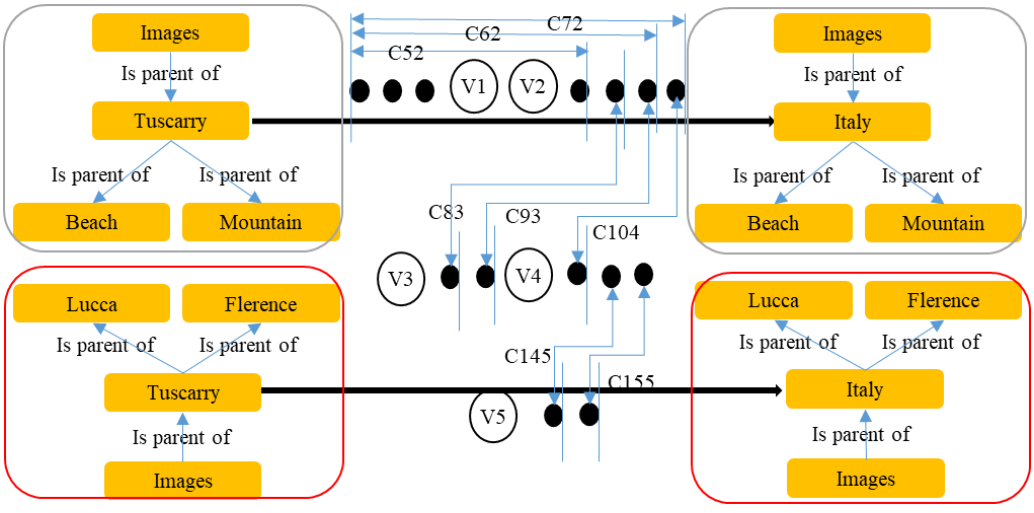

Figure 4: Small file translation time.

2) Translation time for large files

Analyzing Figure 5 shows that when translating large file data, the machine translation system designed based on cloud computing always takes less time than the other two systems. It can be seen that the system studied in this article can perform relatively accurate translation in a short time, no matter whether it is a large file or a small file.

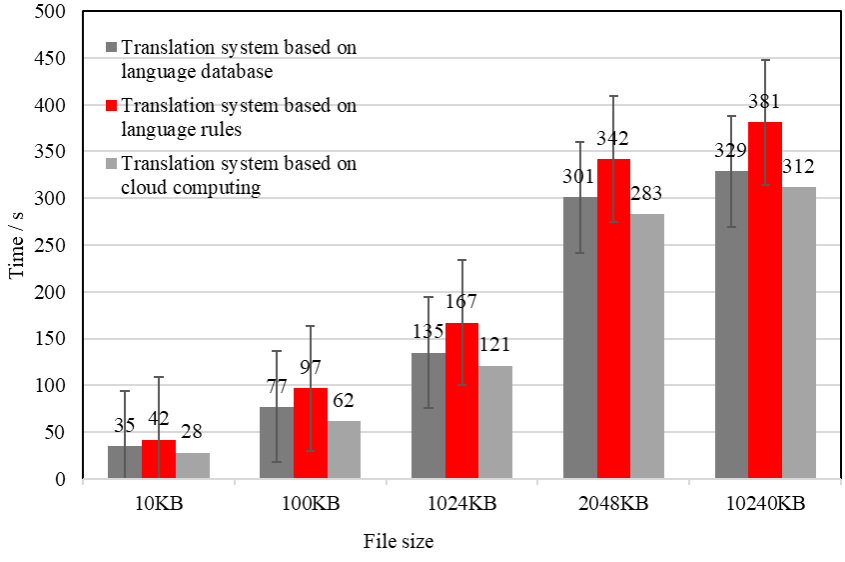

Figure 5: Large file translation time.

3.2 Analysis of Overall Translation Performance

The performance test of the long-character English automatic translation system developed above requires the use of different systems to compare the translation effects and analyze the data recall rate of the English translation of the two different systems. The test results are shown in Figure 6.

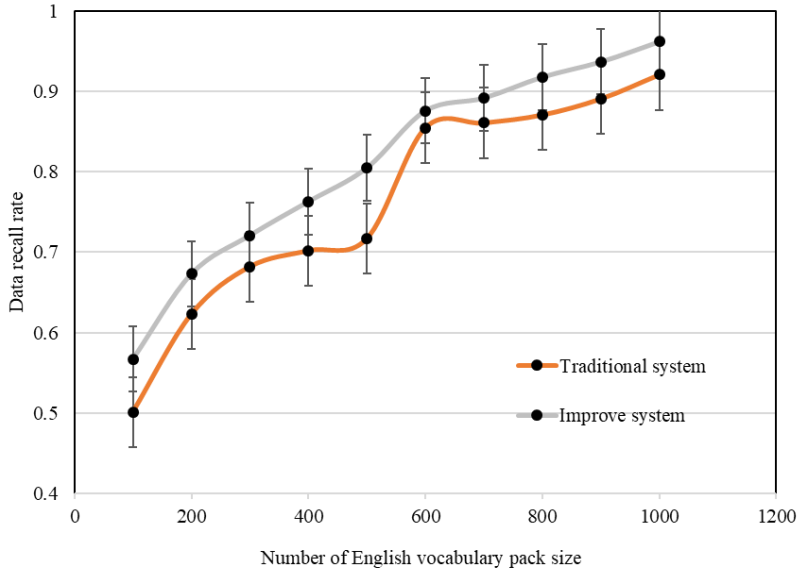

Figure 6: Data recall rate comparison results.

Analyzing Figure 6 shows that the data recall rate of the traditional system generally increases with the increase of the English vocabulary package size, and the increase speed is first and then slow. When the vocabulary package size is 1000Gibt, the maximum data recall rate is 92%. The overall data recall rate of the improved system increases significantly with the increase in the size of the English vocabulary package. The increase rate is first slow and then fast. When the vocabulary package size is 1000Gibt, the maximum data recall rate is 96%. Comparing the experimental results of the traditional system and the improved system, the data recall rate of the improved system is greater than that of the traditional system, indicating that its translation accuracy is high.

Context matching performance is a key indicator reflecting the accuracy of system translation. Two different systems are used to translate English, and the context matching performance comparison results of the two different systems are shown in Figure 7.

Analyzing Figure 7 shows that the context-matching rate of the traditional system increases greatly with the increase of the English vocabulary packet size. When the English vocabulary packet size is 100Gbit, the context-matching rate reaches the maximum 94%. The context-matching rate of the improved system increases rapidly with the increase of English vocabulary package size. When the English vocabulary packet size is 100Gbit, the context-matching rate reaches the maximum 96%. Comparing the experimental results of the traditional system and the improved system, the context matching performance of the improved system for English translation is better, indicating that the translation accuracy is better.

Based on the above experimental results, the improved memory-assisted long-character English automatic translation system has high data recall rate, high context matching rate, good translation accuracy, and is feasible and effective.

3.3 Analysis of Teaching Effect

Take 500 students from a university as the experimental objects, each group of 50 people, and a teacher will give the lecture. The result is shown in Figure 8. It can be seen from Figure 8 that in this final exam, the scores of students who used the system in this paper were significantly higher

than those who did not use the system in this paper, indicating that the system in this paper can effectively improve academic performance.

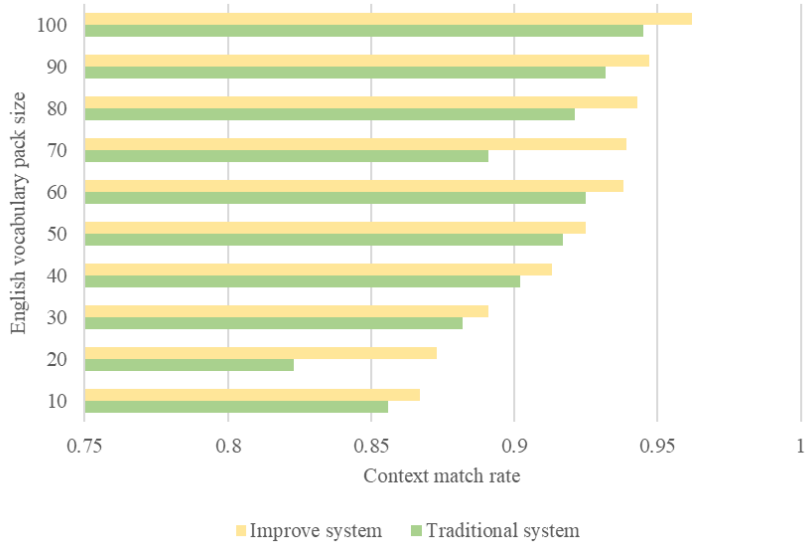

Figure 7: Context matching performance comparison.

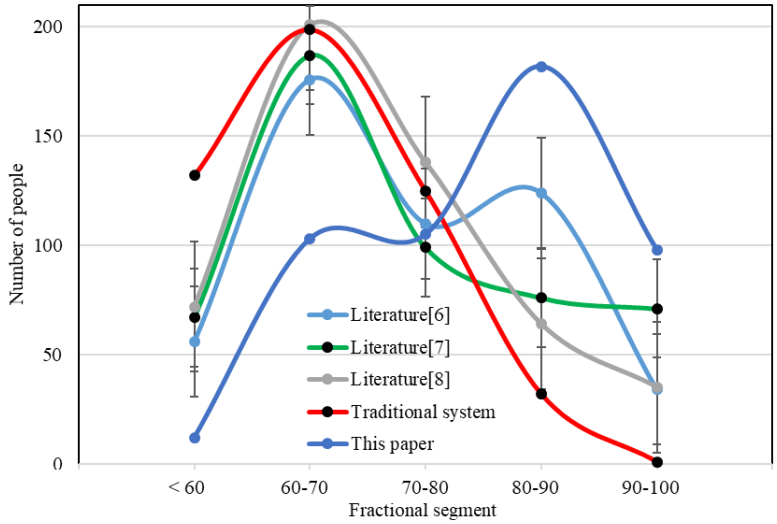

Figure 8: Comparison of the number of people in each score segment.

4 CONCLUSION

This article firstly refers to the cloud-computing model to design a new computer-assisted translation system to optimize English teaching. Secondly, in order to improve the accuracy and reliability of automatic translation of long-character English with memory-assisted English, this paper proposes an automatic English translation algorithm based on the B/S framework to optimize and improve the computer-assisted translation system. A new machine-assisted translation system is established based on the traditional translation system. The system can analyze the difference between the translated language and the translated language in a short

time, break the sentence structure to be translated, and calculate the similarity. A memory bank is also designed inside the system, which can memorize a variety of translation structures, introduce a large number of dictionaries, and select words and sentences in the dictionary for repeated matching during translation until a valuable translation is generated. The experimental results show that the new computer-aided translation system proposed in this paper can achieve better translation performance. The system has good compatibility and can provide students with a better English teaching translation system, which is worthy of promotion and practical application.

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