

# Thoughts on computer-aided translation technology in the era of artificial intelligence

Jingzhou Duan, Haisong Li

Hubei Business College, Wuhan 430079, China

**Abstract:** With the advent of the era of artificial intelligence, the development of computer-aided translation technology has attracted wide attention. As an emerging translation tool, computer-aided translation technology has great potential in realizing translation efficiency and accuracy. However, based on the background of the era of artificial intelligence, the practical application of computer-aided translation technology still faces some challenges, such as the optimization of human-computer interaction, the handling of terminologies and cultural differences. Therefore, further research and development of computer-aided translation technology is very necessary. Based on this, this paper takes the era of artificial intelligence as the background, mainly carries out the corresponding analysis and research on the computer-aided translation technology, in order to provide a reference for the academic circle.

**Key words:** Artificial intelligence; Computer-aided translation; Technical research

With the rapid development of science and economy in China, we have entered the age of artificial intelligence. Under this context, more and more work needs to be assisted by computers. Therefore, in order to effectively improve the efficiency and quality of translation work, we apply computer-aided translation technology in daily translation work, which brings great convenience to translators and learners.

## 1. Classification of computer-aided translation technology in the era of artificial intelligence

### (1) Rule-based computer-aided translation technology

Rule-based computer-aided translation is a traditional method of machine translation, which makes use of pre-defined rules and rule bases to carry out translation processing. This approach is primarily based on human-formulated grammar and semantic rules, as well as resources such as dictionaries and translation memories. Its core idea is to analyze the source language text into a grammatical structure, convert it into an equivalent grammatical structure of the target language by applying a series of rules, and then generate a corresponding translation. The application of rules-based computer-aided translation technology has the following advantages:

First, it relies heavily on precise grammatical and lexical rules. This means that the rules of translation need to be strictly defined and coded before they can be translated using this technique. This often requires specialized knowledge of linguistics and computer science to ensure the accuracy and reliability of the translation. When formulating the rules, we also consider the structural differences between languages and the context dependence of the translation to obtain more accurate and smooth translation results.

Second, this kind of translation technology has high controllability and customizability. By updating and adjusting the rule base, we can optimize the translation quality for specific fields or specific languages. This method can adapt to different translation needs, and can also deal with relatively complex language structures and professional terms, thus providing more accurate and professional translation results.

Third, this translation technique can also be enhanced in combination with other language processing tools and resources. For example, auxiliary resources such as dictionaries, part-of-speech tagging tools, bilingual corpora and professional terminology banks can be utilized to improve the accuracy and efficiency of translation. By introducing machine learning and statistical methods, automatic learning and adjustment of rules can also be achieved, thus further improving the quality of translation.

However, rule-based computer-aided translation technology also has some limitations. One is that building and maintaining huge rule bases often requires a significant investment of manpower and time. Second, due to the complexity and diversity of rules, it may be difficult to translate some linguistic features and phenomena. Thirdly, it is difficult to deal with ambiguities in semantics and context, which may lead to mistranslation or inaccuracies.

### (2) Statistics-based computer-aided translation technology

Statistics-based computer-aided translation or statistical machine translation is a popular machine translation method. Its main idea is to translate based on the statistical information of large-scale bilingual parallel corpus. This method makes use of a large number of bilingual sentence pairs and realizes the automation of translation by analyzing the statistical rules of these sentence pairs.

In this kind of translation technology, statistical translation model is commonly used. Based on a known parallel corpus, the model counts possible translation candidates for sentences in the target language and makes translation choices according to the probabilities of these candidates. Usually, this process involves some probabilistic model, such as the phrase translation model, etc.

Compared with rule-based computer-aided translation, this method has higher flexibility and adaptability. It does not need to define complex rules in advance, but can be translated by learning language rules and translation preferences from the existing bilingual corpus. Therefore, this translation method can deal with more complex and diverse sentence structures and linguistic phenomena. In fact, this translation method has achieved great success in practical application. For example, in online translation tools and computer-aided translation software, this method has become the mainstream, which can provide people with relatively accurate and smooth translation results, so that translators can complete the translation task more efficiently.

However, there are some limitations and challenges with statistics-based computer-aided translation technology. One is that it is highly

dependent on large bilingual parallel corpora, which means that without sufficient training data, translation quality may be degraded. Second, it may not perform well when dealing with some complex sentence structures and linguistic phenomena, such as some highly ambiguous sentences, for which this method may not accurately select the best translation result.

### (3) Computer-aided translation technology based on neural networks

Computer-aided translation technology based on neural network or neural machine translation is a method that has attracted much attention in the era of artificial intelligence in recent years. A neural network is a computational model that simulates the structure of the neural network of the human brain to realize learning and reasoning by simulating the connection and information transfer between neurons. It mainly relies on a large-scale translation corpus, and through the training of the neural network model, the computer can automatically learn the translation rules and language patterns, so as to obtain high-quality translation results. The application of computer-aided translation technology based on neural network has the following advantages:

First, this translation technology can better capture the complexity and context of the language. Neural network model can model sentence structure and semantic information through multi-layer network structure, so as to help people better understand the relationship between the source language and the target language, so as to make the translation result more accurate and smooth.

Second, this translation technology has better adaptability and generalization ability. By training a large-scale translation corpus, neural network models can automatically learn various semantic and syntactic features, so that they can be well adapted to translation tasks in different fields and language pairs, which makes neural network-based computer-aided translation technology better in handling translation tasks in complex and specialized domains.

Third, this translation technology can also be combined with other advanced technical means, such as attention mechanisms and deep learning algorithms. The attention mechanism can make the model focus more on the important information between the source language and the target language, and improve the accuracy of the translation results. And deep learning algorithms can further improve the performance and effect of neural network models.

## 2. Development prospect of computer-aided translation technology in the era of artificial intelligence

### (1) Advantages and limitations of computer-assisted translation technology

Computer-aided translation technology has been widely used in the era of artificial intelligence. Although it has many advantages and potential, it also has certain limitations.

In terms of advantages, computer-aided translation technology can improve the efficiency and quality of translation. With the help of artificial intelligence technology, computers can automatically detect and proofread errors in translation, and provide valuable term and phrase bases, as well as automatic translation tools. The application of these functions can greatly reduce the human labor and time costs in the translation process, which is conducive to improving the accuracy and consistency of translation.

In addition, computer-aided translation technology can expand the scope and application field of translation. With the continuous development of the Internet and the acceleration of globalization, the demand for translation has exploded. At present, it is already difficult for traditional manual translation methods to fully satisfy the needs of large-scale translation, while computer-aided translation technology can greatly improve the efficiency and coverage of translation through automatic translation and automatic verification functions, and can better meet the needs of multi-field and multi-language translation.

However, computer-aided translation technology also has some limitations. First, although artificial intelligence technology has made great progress in the field of translation, compared with human language processing and understanding, computer translation ability is still very limited. In particular, computer-assisted translation technology still faces many challenges when it comes to translation involving culture, context, language habits and other aspects. Second, due to the complexity and diversity of human language, computer-aided translation technology still has some difficulties in dealing with special fields, professional terms and colloquial expressions. Thirdly, due to the problems of lexical meaning, grammar and pragmatics, computer-aided translation has some limitations in dealing with ambiguity, polysemy and context.

In a word, computer-aided translation technology has important application significance and value in the era of artificial intelligence. It can improve the efficiency and quality of translation, expand the scope of translation and its application field. However, we must also be aware of the limitations of computer-aided translation technology in terms of translation capability and adaptability. These limitations should be further studied and improved in the future to achieve greater breakthroughs and applications of computer-aided translation technology.

### (2) The future development direction of computer-aided translation technology

Based on the background of the era of artificial intelligence, computer-aided translation technology will inevitably have a very broad development space in the future.

First, the accuracy and fluency of machine translation can be further improved. Although the current machine translation system has reached an acceptable level in some scenarios, there are still some problems, such as processing long sentences and obtaining the correct semantics from the context. Therefore, an important development direction in the future is to improve the translation quality of machine translation through deep learning and other technologies, so that its translation ability is closer to the human level.

Second, the advantages of artificial intelligence and human translators should be better combined to achieve the goal of human-machine collaborative translation. Artificial intelligence can help translators improve their work efficiency, such as reducing the repetitive work of

translators through automatic text alignment and the construction of term banks. At the same time, AI can also provide functions such as real-time translation suggestions and automatic error correction to help translators improve their translation quality. Therefore, the organic integration of artificial intelligence and translator's professional knowledge and experience to achieve the best effect of human-machine collaborative translation is also an important direction for its future development.

Third, translation technology based on big data and cloud computing should be actively explored. With the continuous development and popularization of modern technologies such as the Internet and big data, the number of translated texts has also begun to explode, and traditional translation methods have been unable to cope with such large-scale translation needs. Therefore, the future development direction should focus on exploring how to deal with massive translated texts through big data and cloud computing, improve the efficiency and quality of translation, and maximize the advantages of big data and cloud computing, so as to improve the accuracy and adaptability of the system.

Fourth, attention should be paid to the development of multimodal translation technology. Traditional machine translation generally relies on text information, but in real life, non-text information such as images and sounds are also very important translation content. Therefore, the future development direction should also pay attention to the integration of multi-modal translation into computer-aided translation technology, through the combination of image recognition, speech recognition and other technologies to achieve more comprehensive translation functions.

To sum up, the future development direction of computer-aided translation technology can be explored from the aspects of improving translation quality, realizing human-computer collaborative translation, utilizing big data and cloud computing, and developing multi-modal translation, so as to meet the translation needs and challenges in the era of artificial intelligence.

## Conclusion

In a word, with the continuous development of modern science and technology, we have entered the era of artificial intelligence. In this context, computer-aided translation technology, with the addition of many new technologies, can not only effectively improve the efficiency of translation, but also improve the quality of translation. It is believed that in the future, with the continuous development of modern science and technology, especially the development and application of artificial intelligence technology, computer-aided translation technology is bound to be further optimized and upgraded.

## References:

- [1] Junsong Wang, Weiqing Xiao, Qiliang Cui. Technology-driven translation model in the era of Artificial Intelligence: Evolution, motivation and Enlightenment. *Shanghai Translation*, 2023(04):14-19.
- [2] Haixia Xue. Application of Artificial Intelligence technology in computer-aided translation software [J]. *Information and Computer (Theoretical Edition)*, 2023, 35(03):179-181.
- [3] Wensha Zhou. Analysis on computer-aided translation methods and their applications [J]. *Overseas English*, 2022(04):42-43. (in Chinese)