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The Importance of Translators in Computer-Assisted Translation and Machine Translation

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ABSTRACT: With the rapid advancement of computer technology, the application of Computer-Assisted Translation (CAT) and Machine Translation (MT) in the translation industry has become increasingly widespread. However, this does not mean that the role of translators is diminished. This article will provide a detailed analysis of how translators still hold a central position in the context of computer-assisted and machine translation. The article emphasizes the unique value of translators in ensuring translation quality, conveying cultural essence, resolving linguistic ambiguity, meeting the requirements of specialized fields, optimizing the use of translation tools, and promoting collaboration between humans and machines. The aim is to highlight the irreplaceability of translators in the contemporary translation technology environment.

Keywords: Computer-Assisted Translation; Machine Translation; Translators; Translation Quality

I. INTRODUCTION

In today's era of accelerating globalization, the speed of information dissemination has reached unprecedented levels, leading to an explosive growth in translation demands. To address this growth, Computer-Assisted Translation (CAT) and Machine Translation (MT) technologies have emerged, bringing unprecedented opportunities to the translation industry while also presenting new challenges.

CAT systems enhance the efficiency and quality of translation work by integrating tools such as Translation Memory (TM), Terminology Databases, and Concordance Search. Translation Memory stores previously translated sentences or paragraphs, allowing for quick retrieval of existing translations when encountering similar texts. This saves time and ensures consistency in translations. Terminology Databases help maintain the accuracy and uniformity of specialized terms, which is particularly important for technical documents and legal files. [1]

On the other hand, MT technology has evolved from rule-based to statistical translation, and more recently to neural network translation. In recent years, with the advancement of deep learning technology, Neural Machine Translation (NMT) has significantly improved the quality and automation of translations. NMT, by simulating the way human neurons work, can better handle semantics and contextual relationships, thereby providing more accurate translation results and greatly enhancing the quality of machine translation. [2]

Despite the significant progress in CAT and MT technologies, the core role of translators in the translation process remains indispensable. Translators need not only a solid foundation in language skills but also a deep understanding of cultural backgrounds to accurately convey the emotional nuances and cultural connotations of the original text. Additionally, when faced with complex and varied text content, translators must possess critical thinking skills to address errors or inaccuracies that may arise from machine translation. Therefore, translators are not only executors of language conversion but also guardians of translation quality, playing an essential role in the planning, execution, and post-editing of translation projects.

II. ADVANTAGES AND DISADVANTAGES OF COMPUTER-ASSISTED TRANSLATION

2.1 Advantages of Computer-Assisted Translation

2.1.1 Improving Translation Efficiency

Through translation memory technology, CAT tools can automatically retrieve and provide previously translated similar texts, terms, and phrases. Translators do not need to re-translate the same content, saving a significant amount of time and effort and significantly improving translation efficiency. This is particularly useful for handling large volumes of repetitive or similar texts, such as technical documents and product manuals.

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2.1.2 Ensuring Translation Quality

CAT helps ensure consistency in terminology and uniformity in translation style, preventing inconsistencies that may arise from different translators or the same translator working at different times. This avoids confusion in terminology and stylistic inconsistencies. [3] Additionally, it provides features like grammar and spelling checks, helping translators reduce minor errors and thereby enhance the overall quality of the translation.

2.1.3 Fully Leveraging Translators' Expertise and Creativity

Unlike machine translation, CAT does not replace translators in making translation decisions but provides references and assistance. Translators can assess, modify, and improve the suggestions provided by the computer based on their professional knowledge and understanding of the original text. This allows them to fully utilize their expertise and creativity to handle various complex linguistic phenomena and cultural connotations, making the translation more accurate and better suited to the target language's expression habits.

2.1.4 Promoting Team Collaboration

In collaborative translation projects involving multiple people, CAT tools enable real-time sharing and collaborative work among team members. Project managers can easily assign tasks and monitor progress, while team members can share resources such as translation memory databases and terminology databases. They can also communicate and discuss translation issues in a timely manner, ensuring the smooth progress of the entire project and improving team efficiency and quality.

2.1.5 Enhancing the Management and Utilization Efficiency of Language Assets

CAT tools help translation companies and translators better manage and accumulate language assets, such as translation memory databases and terminology databases. These language assets can be continuously updated and improved, providing richer and more accurate reference materials for future translation projects. This further increases translation efficiency and quality, creating a virtuous cycle.

2.2 Disadvantages of Computer-Assisted Translation

2.2.1 Translation Quality

Firstly, computer-assisted translation (CAT) cannot fully consider the cultural connotations, emotional nuances, and rhetorical techniques of language as human translators can. As a result, translations often appear rigid and mechanical, lacking the natural fluency and aesthetic appeal of language. This deficiency is particularly evident in the translation of texts with high linguistic demands, such as literary works and advertising slogans. Secondly, despite continuous advancements in computer technology, CAT still has limitations in understanding the semantics, context, and cultural background of the source language. [4] It may fail to accurately determine the precise meanings of words and sentences in specific contexts, leading to translation errors or inaccuracies. This is especially true for expressions with ambiguity, metaphors, and culturally specific meanings, where understanding deviations are likely to occur. Lastly, translation memory databases, a crucial component of CAT, may have issues with recall rates in their fuzzy matching functions, meaning they cannot always accurately find highly similar existing translations for the text to be translated. Sometimes, even if similar segments are found, the match may not be ideal, requiring translators to spend extra time adjusting and modifying them.

2.2.2 Technical Tools

Firstly, some professional CAT software is powerful but complex to operate, with a high learning curve. New translators need to invest time and effort to become familiar with the software's various functions and operational procedures to fully leverage its advantages. For example, software like SDL Trados has a complex interface with many features hidden deep within, and there are few guidance documents and tutorials available, making it difficult to learn. Secondly, regarding compatibility issues, CAT tools may have problems working with certain file formats, operating systems, or other software. [5] For instance, when importing or exporting specific file formats, issues like formatting errors and data loss may occur, causing inconvenience in translation work. Lastly, when handling large-scale translation projects, CAT software may consume a significant amount of system resources, requiring high-performance computer hardware. If the computer configuration is low, it may result in slow software operation, lagging, or even crashes, affecting translation efficiency.

2.2.3 Applicability

Firstly, not all types of texts are suitable for CAT. For texts that require a high degree of creativity and flexible language expression, such as literary works, poetry, and art reviews, the effectiveness of CAT is often unsatisfactory. These texts require the translator's creativity and keen linguistic sensitivity for translation. In contrast, CAT's advantages are more evident when dealing with highly standardized texts with a high repetition rate of terminology, such as

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technical documents and legal files. Secondly, in cross-cultural communication, accurately translating words is not enough. It is also necessary to consider the characteristics of the target culture and the audience's acceptance habits, making appropriate cultural adjustments to the translation. CAT's capabilities in this area are relatively weak, and it cannot automatically adapt the translation to different cultural backgrounds and audience groups. This requires translators to intervene manually based on their cultural literacy and experience.

2.2.4 Corpus Construction

Firstly, the cost of updating and maintaining a corpus is high. Although the quality and timeliness of translation memory and terminology databases are crucial for the effectiveness of CAT, establishing and maintaining a high-quality, large-scale corpus requires a significant investment of time and effort, including tasks such as collecting, organizing, proofreading, and updating the corpus. Moreover, as language continues to evolve, the corpus must be updated in a timely manner to ensure its accuracy and effectiveness, which is a long-term and challenging task for translation teams or companies.

Secondly, in collaborative translation projects involving multiple people, while CAT tools can achieve a certain degree of corpus sharing, various issues may arise in practice, such as inconsistent terminology used by different translators and non-uniform corpus versions, affecting the efficiency of team collaboration and the consistency of the translation. Lastly, for some commercial CAT software, the corpus resources are often limited, and users may need to purchase additional corpora or create their own.

III. ADVANTAGES AND DISADVANTAGES OF MACHINE TRANSLATION

3.1 Advantages of Machine Translation

3.1.1 High Efficiency and Convenience

The greatest advantage of machine translation is its efficiency and convenience. Compared to human translation, machine translation can complete the translation of large amounts of text in just a few seconds, making it particularly effective for handling urgent or large translation tasks. [6] This instant translation capability is supported by computer technology, allowing machine translation to be performed anytime and anywhere.

3.1.2 Low Cost

Machine translation is highly cost-effective. Many translation software and online services are free, allowing users to access these services through the internet, which greatly reduces translation costs. In contrast, human translation requires paying translators and takes time, so machine translation has a significant economic advantage.

3.1.3 Multilingual Support

Machine translation systems typically support translations between multiple languages, covering a wide range. This makes them very useful for handling multilingual projects and meeting the needs of globalization and diverse communication.

3.2 Disadvantages of Machine Translation

3.2.1 Lack of Cultural Sensitivity

Machine translation faces significant challenges when dealing with culturally specific language because it cannot understand and experience the subtle differences of specific cultures like humans can. Different cultures have unique language systems that include slang, jargon, puns, and idioms, which pose difficulties for machine translation, making it hard to produce translations that align with cultural values and norms.

3.2.2 Insufficient Contextual Understanding

Machine translation often fails to accurately understand context when dealing with polysemous words or complex sentence structures, leading to frequent mistranslations. This is because machine translation systems lack the ability to combine words with context and cannot creatively refine language to produce precise translations.

3.2.3 Need for Post-Editing

Although machine translation has advantages in speed and cost, its translation quality typically requires human post-editing to ensure accuracy. Due to the limitations of machine translation in handling complex texts and cultural connotations, manual proofreading is necessary to ensure the accuracy and fluency of the translation.

IV. THE ROLE OF TRANSLATORS IN CONTROLLING TRANSLATION QUALITY

4.1 Adjusting Lexical Accuracy

Although machine translation and computer-assisted translation can generate initial translation results, they still have deficiencies in grammatical and lexical accuracy. Machine translation cannot correctly grasp the meaning of the original text, and translators need to use their linguistic knowledge to correct these errors and ensure that the translation conforms to the grammatical rules of the target language. For example:

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Example 1: Chinese: 他是个老油条.

Incorrect translation: He is an old fried dough stick. (He is an old fried dough stick) — This is a typical literal translation error.

Correct translation: He is a sly person. Or He is a seasoned veteran.

Example 2: English: He is in the pink.

Incorrect translation: He is wearing pink clothes. Machine translation might literally translate "in the pink" as "wearing pink," ignoring that it is an idiom meaning "in good health."

Correct translation: He is in good health.

In summary, many polysemous words require translators to choose the most appropriate meaning based on the context. For instance, the word "bank" means "bank" in "He works at a bank," but it means "a pile" in "There is a bank of snow beside the road." Machine translation might provide the most common meaning, but translators need to accurately judge based on the context. Another example is the word "light," which as a noun can mean "light; lamp," and as an adjective can mean "light; bright; light-colored." In "The light in the room is too bright," it means "light," and in "She wears a light dress," it means "light-colored." Relying solely on machine translation can lead to incorrect results, requiring translators to discern and adjust.

4.2 Adjusting Style and Tone

Different types of texts have different style requirements, such as formal business documents, vivid literary works, and concise scientific papers. Machine translation often fails to accurately grasp these stylistic characteristics.

Take literary works as an example. When translating the sentence from "The Old Man and the Sea": "He was an old man who fished alone in a skiff in the Gulf Stream and he had gone eighty-four days now without taking a fish," machine translation might result in “他是个独自在湾流中一条小船上钓鱼的老人，至今已八十四天没钓到鱼了。” However, an excellent translator would adjust it to match the concise and flavorful style of the original text: “老人独自驾着小船，在湾流中捕鱼，如今已是八十四天未钓到鱼了。” This translation better fits the style of a literary work and conveys the original sentiment more effectively.

In the case of a business contract, the sentence "Party A shall indemnify and hold Party B harmless from and against any and all losses, liabilities, damages, costs and expenses of whatsoever nature arising out of or in connection with the performance of this Agreement" might be translated by machine as: “因履行本协议而产生的或与本协议有关的任何性质的损失、责任、损害赔偿、费用和开支，甲方均应赔偿并使乙方免受损害”. This translation is clearly rigid and does not conform to the language standards of business contracts. The translator should adjust it to: “甲方应赔偿乙方，并使其免受因履行本协议而产生或与之相关的任何性质的一切损失、责任、损害、成本和费用的损害。” After this modification, the translation maintains a formal and rigorous style while better aligning with the expression habits of business texts. During the translation process, translators need to adjust the translation results according to the style and tone of the original text to ensure that the translation matches the original in style. For example, when translating literary works, translators should pay attention to preserving the emotional tone and artistic value of the original text.

4.3 Adjusting Word Order

Despite continuous advancements in machine translation technology, challenges remain in handling word order, requiring further human intervention and optimization strategies to improve translation quality. [7] Machine translation often struggles with the word order, syntax, logical relationships, sentence structure, clauses, semantics, and grammar of different languages. Due to the complexity of languages, it may fail to correctly analyze the hierarchy or logical relationships between pieces of information, resulting in translations that do not conform to the optimal expression of the target language. Therefore, adjustments to word order are necessary to align with the expression habits of the target language.

4.3.1 Word Order Errors

Word order errors occur when the arrangement of words or sentence components does not conform to the grammatical rules or customary usage of a language, leading to confusing sentence structures, unclear meanings, or unnatural-sounding sentences. These errors can occur at various levels, including phrases, sentences, and even paragraphs. For example:

English original: "He came to the airport half an hour earlier in order to have a better look over the airport."

Machine translation: "他提前半个小时来到机场以便更好地看看这个机场。"

Manual adjustment: "为了更好地看看这个机场，他特地早到了半个小时。"

In this example, the machine translation directly follows the order of the original text, while the manual translation places the purpose adverbial at the beginning of the sentence, aligning with the Chinese expression habit.

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4.3.2 Sentence-Level Errors

Sentence-level errors refer to mistakes that occur at the sentence level, involving the structure, components, and grammatical rules of sentences. These errors can lead to unclear, incomplete, or non-standard sentence meanings. For example:

Chinese original: "虽然铝的强度不及钢，但是当铝与少量的钢、锰和镁制成合金，并经过热处理后，其强度可以接近钢的强度。"

Machine translation: "Although aluminum is not as strong as steel, when aluminum is alloyed with a small amount of steel, manganese, and magnesium, and after heat treatment, its strength can be close to that of steel."

Manual translation: "Aluminum, though much less strong than steel, can be given a strength approaching that of steel when it is alloyed with small quantities of copper, manganese and magnesium, and subjected to heat treatment processes."

In this example, the machine translation does not adjust the primary and secondary information of the sentence, while the manual translation places the main information "its strength can be close to that of steel" at the beginning of the sentence, aligning with English expression habits. These examples illustrate the potential issues machine translation may encounter in handling word order and the necessity of manual post-editing to improve translation quality.

V. THE KEY ROLE OF TRANSLATORS IN CONVEYING CULTURAL CONNOTATIONS

5.1 Handling Culture-Specific Expressions

Every language carries specific cultural connotations, and many expressions have different meanings in different cultures, which is where machine translation often encounters problems. [8]

For example, the English phrase "a piece of cake" means "something easy." If translated literally into another language, it might be confusing. A direct translation like "一块蛋糕" (a piece of cake) loses its intended meaning. However, translators can find appropriate equivalents in the target language culture. For instance, in French, it can be translated as "C'est du gâteau" (This is cake, also meaning something is easy), and in Chinese, it can be translated as "小菜一碟" (a piece of cake).

Another example is the Western expression "the apple of one's eye," which literally means "the apple in one's eye," but actually refers to "a cherished person or thing." Translators need to convey this cultural connotation accurately. Machine translation might only provide a literal translation, leading to misunderstandings.

There are also culturally specific expressions with ethnic characteristics, such as "功夫 (kung fu)" and "太极 (tai chi)" in Chinese culture. These terms have established English equivalents internationally, and translators must use these fixed translations accurately to ensure the correct conveyance of cultural connotations. Machine translation might simply translate "功夫" as "gongfu" based on its pronunciation, without considering its cultural significance and the accepted international translation.

5.2 Cross-Cultural Communication Awareness

Translators act as bridges in cross-cultural communication and must consider the cultural receptivity of the target audience. [9] In computer-assisted translation and machine translation, translators should adjust content that may cause cultural conflicts.

For example, when translating texts with religious connotations, such as stories from the Bible, which involve specific religious concepts and symbols like "the Ark of the Covenant," translators need to add annotations or provide simple explanations for audiences unfamiliar with Christian culture. Machine translation might only translate these terms directly without considering the cultural background differences of the readers.

When translating literary works with ethnic characteristics, such as classical Chinese mythological stories, which contain unique concepts like "天庭 (heavenly court)" and "神仙 (immortals)," translators should choose appropriate translation methods based on the understanding habits of the target culture. They might translate "天庭" as "heavenly court" and explain its meaning in Chinese mythology, rather than translating it literally to avoid comprehension barriers due to cultural differences. In translating promotional materials for cultural products, it is even more important to handle cultural connotations carefully. For instance, when translating about the traditional Chinese festival "端午节 (Dragon Boat Festival)," translators need to explain the origins and customs of the festival (such as dragon boat racing and eating zongzi) to foreign readers, helping them better understand the cultural significance behind the festival. Machine translation often cannot provide such in-depth cultural explanations.

VI. THE IMPORTANCE OF TRANSLATORS IN HANDLING AMBIGUOUS SEMANTICS

6.1 Ambiguity in Language

There is a significant presence of ambiguous

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semantics in natural language, such as vague quantifiers (some, many, etc.) and vague adjectives (tall, short, etc.). These ambiguous semantics can have different meanings in different contexts, and machine translation often struggles to accurately determine the meaning of these ambiguous terms in specific contexts. However, translators can rely on their understanding and experience, combined with the context, to accurately handle these vague expressions, making the translation more logical.

For example, the term "a few" means "一点, 一些," which is a vague concept of quantity. In the sentence "There are a few apples on the table," it can be understood that there are a small number of apples on the table, but the exact number is not clear. If translated by a machine, it might simply be rendered as "There are some apples on the table." However, a translator can further optimize the translation based on the context. For instance, if the previous text mentioned a family preparing to eat fruit, "a few" might imply that the number of apples is insufficient for the whole family. The translator could then render it as "桌上只有几个苹果(there are only a few apples on the desk)".

Another example is the word "tall." In the sentence "He is a tall man," it refers to someone who is relatively tall, but there is no absolute standard for what constitutes "tall." If describing a basketball player, "tall" might mean over two meters in height; if describing an average person, being over 1.85 meters might be considered "tall." Translators need to determine the appropriate translation based on the specific context, whereas machine translation would find it difficult to accurately grasp the semantic differences that arise due to contextual variations.

6.2 Understanding Metaphors and Rhetorical Devices

There is no rigid translation model or standard for translating literary texts. [10] Currently, the shortcomings of computer-assisted translation technology in literary translation are quite evident. Literary works are highly literary, and translators need to actively exercise their subjective initiative to understand the meaning of the original text, and then strive to reproduce the deeper connotations and ideas that the original author intended to express in the translation. The translation should also reflect a certain level of literary quality, rather than merely conveying the meaning of the original text. If the translation only conveys the meaning of the original text and neglects its literary quality, the artistic charm of the work will be greatly diminished. Taking the works of Mo Yan, a Nobel Prize winner in Literature from our country, as an example, without excellent translators and high-quality translation work, his works would not have been widely accepted by foreign readers, let alone win the Nobel Prize in Literature.

Metaphors, symbols, and other rhetorical devices are widely used in literature and everyday language. They often imply one thing through another, and machine translation often fails to understand the deeper meanings behind these rhetorical devices.

Take metaphors as an example. In the English sentence "Time is a thief," "time" is metaphorically described as a "thief." If translated directly by a machine, it might result in "Time is a thief," which is correct in literal meaning but fails to convey the deeper implication that time stealthily takes away people's youth and opportunities. Translators need to analyze the use of rhetorical devices in the original text and find appropriate expressions in the translation to convey the same meaning and enhance the expressiveness of the translation. For example, it could be translated as “光阴似贼”（Time is like a thief）, which better reflects the connotation of the metaphor.

Another example is in poetry, where the line "My heart is like a singing bird" uses the rhetorical device of simile. Translators should not simply translate it as “我的心像一只正在唱歌的鸟”, but rather, based on the emotions and artistic conception of the poem, translate it in a more poetic way, such as “我的心宛如一只欢歌的小鸟”（My heart is like a joyful singing bird） which better reflects the charm and effect of the original poem's rhetorical device. If relying solely on machine translation, the literary quality and emotional color would be greatly reduced.

VII. THE IRREPLACEABLE ROLE OF TRANSLATORS IN ADAPTING TO SPECIFIC DOMAIN NEEDS

7.1 Professional Domain Knowledge

Different professional fields, such as medicine, law, and finance, have their own specific terminology and concepts, which demand a high level of accuracy in translation. Computer-assisted translation and machine translation often fall short in this regard.

Take the medical field as an example. The term "myocardial infarction" might be translated by a machine as “心肌梗塞”, but a professional translator would accurately translate it as “心肌梗死” according to the norms and conventions of the medical field. In medical literature translation, there are many complex terms and concepts, such as "neurotransmitter"（神经递质） and "antibiotic resistance"（抗生素耐药性）.

For "antibiotic resistance", if a translator lacks medical knowledge, they might not accurately understand that it refers to the ability of pathogens like bacteria to resist antibiotics, leading to translation errors that can affect the dissemination and understanding of medical information.

In the legal field, terms like "due process of law"（正当法律程序）and "statute of limitations"（诉讼时效法规）have specific legal connotations. For instance, "plea bargain"（辩诉交易）a concept unique to the American legal system, involves a negotiation mechanism between prosecutors and defendants. If a translator is not familiar with legal knowledge and relies solely on machine translation, they may fail to accurately convey its meaning, leading to serious misunderstandings in legal document translation or international legal exchanges.

7.2 Style Characteristics of Domain Texts

Texts in different fields also vary in style. For example, scientific texts require rigor and accuracy, while legal texts emphasize normativity and logic. Translators need to optimize their translations based on these characteristics.

Scientific texts are often intended to convey scientific research results or technical information. For instance, an academic paper on quantum physics will contain numerous professional terms, complex formulas, and logically rigorous expositions. Translators must maintain this rigor and should not arbitrarily change the logical structure and terminology of the original text. The concept of "quantum entanglement"（量子纠缠） must be accurately translated while ensuring the scientific validity and readability of the translated paper.

Reports in the financial field need to convey market information and financial data clearly and concisely. For example, when translating a bank's financial statement analysis report, translators must accurately translate terms like "liquidity ratio"（流动性比率）and ensure that the translation conforms to the expression habits of the financial industry, allowing readers to quickly understand the content of the report and provide accurate basis for financial decision-making. By grasping the style characteristics of texts in different fields, translators can make their translations more in line with the requirements of professional domains, which is something that computer-assisted translation and machine translation cannot fully achieve.

VIII. CONCLUSION

Computer-assisted translation and machine translation have brought significant changes to the translation industry, but the importance of translators has not diminished as a result. Translators play an irreplaceable role in controlling translation quality, conveying cultural connotations, handling ambiguous semantics, adapting to specific domain needs, optimizing the use of translation tools, and collaborating with machines. In the future development of translation, translators should continuously improve their professional competence and better integrate with modern translation technologies to meet the growing demand for translation and promote the high-quality development of the translation industry. Regardless of how technology advances, translation, as a cross-language and cross-cultural communication activity, cannot be separated from the wisdom and efforts of translators as the core subject.

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