

Research on the Technological Development of AI Large Model and Its Application on Translation Practice in the GenAI Era

Zulin Song^{1*}

¹ School of Foreign Studies, Minzu University of China, Beijing, China

Email Address

24301966@muc.edu.cn (Zulin Song)

*Correspondence: 24301966@muc.edu.cn

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Abstract:

This study focuses on the technological evolution and practical application of the DeepSeek large model in the field of translation in the era of Generative Artificial Intelligence (GenAI). The report first sorts out the technological development context of large language models from early machine translation to the GenAI stage, and analyzes the core characteristics of the DeepSeek model in terms of context awareness, domain adaptation, and multimodal interaction. Secondly, it systematically explores its specific applications in scenarios such as translation assistance (terminology construction, sentence pattern optimization, processing of culture-loaded words), translation teaching (innovation of interactive paradigms, personalized feedback), and quality evaluation. Furthermore, it analyzes the core issues in the application of the technology, such as ideological bias, factual errors, technical dependence, and data ethics. Finally, it proposes optimization paths such as constructing a “human-machine collaboration” translation paradigm, improving the technical specification system, and enhancing translators’ digital literacy. The research shows that the DeepSeek large model brings efficiency innovations to translation practice, but it is necessary to seek a balance between technological empowerment and humanistic values to promote the high-quality development of the translation field in the intelligent era.

Keywords:

GenAI, DeepSeek Large Model, Translation Practice, Technological Evolution

1. Introduction

This paper focuses on the application of the DeepSeek large model in translation practice in the GenAI era. In recent years, the rapid development of artificial intelligence technology is accelerating its penetration into all walks of life, profoundly reshaping human society, and the translation industry is no exception [1]. Driven by the global digital wave, the technological revolution centered on Generative Artificial Intelligence (GenAI) is profoundly reshaping all areas of social production and life. As a key carrier of cross-cultural communication, translation practice is also facing unprecedented opportunities and challenges for reform. At present, the vigorous

development of artificial intelligence is reshaping the nature and types of translation with revolutionary force. Technology has blurred the boundary between oral and written translation. Human-assisted machine translation, machine-assisted human translation, and human-machine collaboration make it difficult to distinguish the subject of translation—human translation or machine translation. Therefore, the invasion of artificial intelligence is constantly refreshing the connotation and extension of translation activities. With the arrival of the AI era and the gradual expansion of market demand, language translation has stepped out of the classroom. Therefore, focusing on social needs makes it inevitable to reconstruct new models of translation teaching [2]. As a representative achievement in the GenAI era, the DeepSeek large model, with its strong language understanding, generation, and logical reasoning capabilities, is redefining the process, quality, and boundaries of translation. To fully understand the contemporary significance of this topic, it is necessary to analyze from multiple dimensions such as technological evolution, educational reform, industry demand, and practical dilemmas.

2. Analysis of Research Status

The current research in this field focuses on the technological evolution trajectory of the DeepSeek large model in the GenAI era, systematically sorts out its application status in translation practice, and analyzes the core issues in the application process based on existing research results. With GenAI's strong context awareness, logical coherence, and domain adaptability, the new generation of large language models represented by DeepSeek has shown great application potential in scenarios such as translation assistance, teaching, and quality evaluation.

2.1. The Technological Development Context of Large Language Models in the GenAI Era

2.1.1. Historical Logic of Technological Evolution

The combination of artificial intelligence and language processing can be traced back to 1954 when American scientists first realized an experiment on computer translation from Russian to English, which verified the possibility of machines simulating human language conversion ability [3]. From the late 20th century to the early 21st century, machine translation systems gradually evolved from rule-based and example-based models to corpus-based and statistical methods [3]. With the maturity of deep learning technology, large language models with the Transformer architecture as the core have achieved a qualitative leap. Through large-scale pre-training data and attention mechanisms, they can capture complex language rules and contextual associations. As a typical model in the GenAI era, DeepSeek continues the iterative logic of large language models in technology but further strengthens three aspects of characteristics: first, context awareness ability, which can process longer text sequences and maintain semantic coherence by optimizing the self-attention mechanism; second, domain adaptability, which supports rapid adaptation to the terminology system and expression norms of professional scenarios through fine-tuning; third, multi-modal interaction ability, which realizes the collaborative processing of cross-modal information such as text and voice [4]. These characteristics make its application scenarios in the translation field more abundant.

2.1.2. Theoretical Basis of Technological Empowerment

The core logic of large language models empowering translation practice is rooted in interaction theory. Interaction theory emphasizes the importance of interactive negotiation in language acquisition [5], and DeepSeek provides translators with an interactive environment of instant feedback and multi-round dialogue by simulating real communication scenarios, making up for the defect of delayed feedback in traditional translation practice. Constructivist theory emphasizes that learners acquire knowledge through active construction [4]. DeepSeek helps translators establish autonomous cognition of translation strategies by generating diversified translation samples and comparative analyses. From the perspective of the integration of technology and education, the application of DeepSeek conforms to the concept of “technology-enhanced learning” [4]. It does not replace the creative work of translators but releases translators’ cognitive resources by automatically processing mechanical tasks (such as terminology retrieval and grammar correction), enabling them to focus on high-level tasks such as cultural adaptation and pragmatic optimization.

2.2. Application Scenarios of DeepSeek Large Model in Translation Practice

2.2.1. Translation Assistance and Efficiency Improvement

In written translation practice, DeepSeek can undertake multiple auxiliary functions: first, dynamic construction of terminology banks, which can automatically identify professional terms through context analysis and provide translation examples in multiple contexts. For example, in legal translation, it can generate bilingual comparisons of terms such as “apparent agency” in real-time; second, optimization of sentence pattern conversion, providing suggestions for adjusting sentence patterns in line with the habits of the target language according to the structural differences between “subject-verb-object” and “subject-verb-adverbial” in Chinese-English translation; third, processing of culture-loaded words, providing adaptive translation schemes for words with cultural symbolic significance by associating with cultural background knowledge banks. In interpreting scenarios, DeepSeek combined with speech recognition technology can realize real-time subtitle generation and key information extraction, helping interpreters quickly grasp the logical context of the source language. In simulated conference interpreting training, the model can act as speakers with different accents, dynamically adjusting the speed and fluency complexity to improve interpreters’ adaptability [6]. Language intelligent tools enable translators to focus more on “the accuracy of meaning transmission and cultural adaptability” by “reducing the workload of mechanical work” [7].

2.2.2. Translation Teaching and Ability Cultivation

DeepSeek provides a new interactive paradigm for translation teaching. At the teaching design level, teachers can use the model to generate multiple versions of parallel texts to guide students to compare and analyze the differences between machine translation and human translation. For example, for texts related to the “Belt and Road” initiative, the model can generate both literal and free translation versions to help students understand the logic of choosing translation strategies [8]. In the learning feedback link, the model can conduct real-time diagnosis of students’ translations based on preset evaluation dimensions (such as vocabulary accuracy, sentence coherence, and cultural adaptability). The teaching concept of “integration of human intelligence and artificial intelligence” is reflected in translation teaching as follows: DeepSeek undertakes basic exercise correction and knowledge answering,

while teachers focus on cultivating high-level thinking. By designing translation tasks in ambiguous contexts (such as metaphor conversion in literary works), they guide students to reflect on the limitations of machine translation and cultivate the ability to use technology critically [9]. Traditional translation evaluation relies on manual marking, which has problems of low efficiency and inconsistent standards. DeepSeek realizes the standardization of the evaluation process by building a multi-dimensional evaluation system: at the basic level, it automatically detects explicit problems such as grammatical errors and terminology consistency in the translated text; at the advanced level, it evaluates the completeness of meaning transmission by comparing the semantic vector space distance between the source language and the target language. Therefore, to solve the current predicament of translation technology teaching, teachers and students urgently need to break through the cognitive limitation of the instrumental nature of translation technology entities, realize the knowledge nature of translation technology, and carry out the teaching and learning of translation technology under the guidance of the view of translation technology knowledge [10].

3. Thoughts on Domain Research

3.1. Ideology and Cultural Bias

The training data of large language models often imply specific cultural perspectives and value orientations. The training data of current mainstream models are mostly derived from Western contexts, and when dealing with texts involving ideological differences between China and the West, there may be tendentious translations. Western models may weaken the historical context of cultural relics ownership and focus on the adventurous nature of the narrative [11]. Although DeepSeek tries to balance multiple perspectives by optimizing training data, there are still potential risks: first, value presuppositions in professional fields, such as the possible implication of thinking patterns of specific legal systems in legal translation; second, cultural stereotypes, and the translation of related concepts may have a labeling tendency. These issues require translators to maintain cultural awareness and examine the model output from the ideological perspective.

3.2. Factual Errors and “Hallucination” Phenomenon

The “hallucination” problem of large language models (generating information that seems reasonable but is false) manifests as three types of errors in translation practice: first, mistranslation of proper nouns; second, confusion of time and space information; third, distortion of logical relations [6]. Such errors stem from the “statistical prediction” nature of the model - it pays more attention to the coherence of language forms rather than the authenticity of content. In professional translation scenarios, such errors may cause serious consequences. For example, mistranslation of dosage units in medical translation may endanger patients’ safety, which requires translators to establish a “human-machine mutual proofreading” mechanism, especially for multiple verifications of key information. From a technical perspective, large language models generate outputs through probabilistic calculations based on massive text data. When there is ambiguous information, contradictory statements, or low-frequency knowledge in the training data, the model will make inferences based on probable linguistic sequence rather than factual verification. This mechanism is highly prone to triggering “hallucinations” when processing low-frequency proper nouns, complex associations, or special logical structures. For instance, when translating

place names in a less commonly used language, the model may fabricate incorrectly named places with similar pronunciations due to insufficient training data. Moreover, the output results are completely in line with the grammatical and syntactic norms of the target language, making it difficult for non-professionals to detect the errors. In professional translation scenarios, such errors may lead to serious consequences, which requires translators to establish a “human-machine mutual proofreading” mechanism, especially for multiple verifications of key information. On the one hand, tools such as professional terminology databases can be used to cross-check the model outputs. On the other hand, a double verification process should be introduced, where two translators independently review the model’s translation results, and then ensure the accuracy of information by comparing the differences. For translation tasks in high-risk fields, a human final review responsibility system should also be established to clarify that human translators bear fundamental responsibility for the factuality of the final translation.

3.3. Risks of Technical Dependence and Ability Degradation

Over-reliance on large language models may lead to the weakening of translators’ core abilities. If translators rely on the model to complete wording and sentence-making for a long time, their ability to independently conceive translations will gradually degrade, and they will fall into a dilemma when facing complex contexts that the model cannot handle. In teaching scenarios, if students directly apply the model’s translations without independent reflection, they will form “technology-dependent learning”, which hinders the cultivation of translation thinking [8]. There may also be potential problems such as some foreign language learners’ enthusiasm for learning being reduced, losing learning motivation, and inhibiting the improvement of foreign language learners’ language and innovative thinking abilities [12]. This risk is particularly prominent in literary translation because machines can hardly fully capture the emotional tension and aesthetic value of the text. For example, in poetry translation, the model may accurately convey the literal meaning but lose the rhythmic and metaphorical connotations of the original poem. Therefore, how to maintain a balance between technical assistance and humanistic creativity has become a proposition that must be solved in the translation field.

3.4. Data Privacy and Ethical Norms

Translation practice often involves confidential information or intellectual property content, and there is a risk of privacy leakage in the data processing of the model. When uploading sensitive texts to the model, there may be problems such as information being stored, reused, or accidentally leaked. Especially in cross-border translation projects, cross-border data flow may also trigger compliance disputes. In addition, the ownership of translation results is not clear: if a translator modifies the model output, how to determine the originality of his work? Does the content generated by the model constitute a “work”? These ethical and legal issues have not yet formed unified norms, restricting the in-depth application of large language models in the professional translation field.

4. Prospects of Research

4.1. Constructing a “Human-Machine Collaboration” Translation Paradigm

The concept of “integration of human intelligence and artificial intelligence” is reflected in translation practice as a clear division of labor between humans and machines: DeepSeek is responsible for mechanical tasks such as terminology retrieval and format proofreading, while translators focus on creative work such as cultural adaptation and pragmatic adjustment. In specific operations, a “three-step working method” can be adopted: first, use the model to generate a preliminary translation draft, then the translator conducts in-depth revisions, and finally, the model checks the consistency of terminology. The teaching field should establish a dual-track model of “technology assistance-ability enhancement”. Teachers can design comparative analysis tasks, such as asking students to compare the differences between “machine translation+human modification” and “pure human translation”, to guide them to understand the advantages and limitations of technology [8]. At the same time, strengthen critical thinking training, encourage students to challenge the model output, and put forward better translation schemes.

From a technical support perspective, the construction of a “human-machine collaboration” translation paradigm relies on more intelligent interactive systems. A real-time collaboration platform based on natural language processing can be developed to enable dynamic dialogue between translators and DeepSeek. For instance, when a translator has doubts about a certain translation expression, the platform can automatically trigger the model’s interpretation function, presenting the basis for translation decisions, including information such as referenced parallel corpora and terminology database matching degrees, to assist translators in making more accurate judgments. This transparent collaboration mechanism can not only improve translation efficiency but also enhance translators’ trust in the model. In different translation scenarios, the weight distribution of human-machine collaboration should vary. For texts with strong timeliness such as news information, the proportion of automated processing by DeepSeek can be increased, with translators mainly responsible for verifying the accuracy of core information and unifying styles; in the translation of literary works, however, the dominant role of translators needs to be strengthened, and the model only undertakes auxiliary tasks such as basic semantic conversion and allusion tracing to ensure the accurate transmission of literariness and cultural connotations. This scenario-specific collaboration strategy can give full play to the respective advantages of humans and machines and meet diverse translation needs. To ensure the quality of collaborative translation, a multi-dimensional evaluation system needs to be established. In addition to traditional indicators such as translation accuracy and fluency, new dimensions such as human-machine collaboration efficiency and model assistance effectiveness should be included. Big data analysis can be used to provide data support for optimizing the collaborative process. Meanwhile, a third-party evaluation mechanism should be introduced, inviting experts in the translation field and technical experts to jointly formulate evaluation standards to ensure the objectivity and authority of evaluation results. The promotion of the human-machine collaboration model still faces some challenges, such as the model’s insufficient understanding of complex contexts and the need to improve the collaboration tacit understanding between translators and the model. To address these issues, on the one hand, it is necessary to continuously optimize the semantic understanding ability of the DeepSeek large model, enhancing its ability to capture cultural metaphors and emotional overtones through training with massive parallel corpora; on the other hand, it is essential to strengthen technical training for translators, enabling them to proficiently master the model’s functional characteristics and operational skills, thereby improving the

adaptability of human-machine collaboration. In addition, an industry-shared collaboration case library can be established to collect excellent examples of human-machine collaborative translation, providing references for translators.

4.2. Improving the Normative System for Technical Application

In the GenAI era, the DeepSeek large model has demonstrated tremendous potential in translation practice. However, it also faces risks of ideological biases and factual errors, which may exert adverse impacts on translation quality, the accuracy of information dissemination, and even social and cultural exchanges. Therefore, improving the standardized system for technological application is particularly crucial, among which establishing a multi-level review mechanism stands as a key measure. From a technical perspective, constructing domain-specific corpora and using them to fine-tune the model is an important means to enhance the translation accuracy of the DeepSeek large model in specific fields and reduce the risk of errors. Domain-specific corpora gather a large amount of standardized, accurate, and representative linguistic materials within the field. These materials enable the model to gain a deeper understanding of professional knowledge, terminological expressions, and language habits in the domain. Such fine-tuning based on domain-specific corpora can make the DeepSeek large model more in line with practical needs in specific translation scenarios and improve the reliability of translations. At the application level, it is equally indispensable to require manual review of content involving political, cultural, and professional terms [13]. Despite the extensive data training and technical optimization undergone by the DeepSeek large model, machine translation often struggles to fully and accurately grasp the subtle nuances when dealing with content that carries profound political connotations, unique cultural implications, or high professionalism. Terms in the political field are characterized by extreme solemnity and sensitivity; any deviation in their translation may lead to misunderstandings or even adverse political impacts. In terms of culture, there exist numerous differences between different cultures. For some cultural images, custom expressions, etc., machine translation may fail to accurately convey the underlying cultural connotations, thereby causing obstacles to cultural exchanges. Professional terms, due to the particularity of their fields, have strict definitions and standardized translations; translation errors may affect the accurate transmission of professional information. Manual review, relying on translators' professional knowledge, cultural literacy, and in-depth understanding of the context, can timely identify and correct potential problems in machine translation in these aspects, further ensuring the accuracy and appropriateness of translated content. It complements the optimization at the technical level, jointly building a more sound standardized system for technological application.

4.3. Promoting the Improvement of Translators' Digital Literacy

Translators' digital literacy should include three aspects of abilities: technology application ability, that is, proficiency in skills such as prompt design and parameter adjustment of the model; critical evaluation ability, being able to identify logical contradictions and factual errors in the model output; ethical judgment ability, adhering to professional standards on issues such as data use and result ownership. Colleges and universities' translation majors need to reconstruct the curriculum system, adding courses such as "Large Language Models and Translation Practice" and "Translation Ethics and Data Security", and cultivating students' technology application and risk prevention awareness through case teaching [13]. Industry

organizations can carry out certification training and include digital literacy in the evaluation criteria of translators' professional qualifications.

5. Conclusions

As a new technology driven by big data and artificial intelligence, GenAI is expected to deeply integrate into the knowledge production of translology in the future. It will make translology research pay more attention to big data thinking, computational thinking, human-machine collaboration thinking, and interdisciplinary thinking, thereby providing possibilities for solving complex translological issues and reconstructing the translology research system [14]. Large models such as DeepSeek have brought efficiency innovations and model reforms to translation practice. However, their applications still face multiple challenges, including ideological infiltration, factual errors, technical dependence, and ethical risks. The key to future development lies in constructing a collaborative paradigm of "people-oriented and technology-empowered": continuously optimizing the model's domain adaptability and output reliability at the technical level; establishing standardized human-machine collaboration processes and audit mechanisms at the application level; and cultivating compound translators with both profound language proficiency and digital literacy at the talent level. With the continuous evolution of GenAI technology, translation practice will gradually transform from "human-led-technology-assisted" to "human-machine coexistence - collaborative creation". In this process, it is necessary to always adhere to the humanistic nature of translation, make technology serve the essential goal of cross-cultural communication, and ultimately promote the high-quality development of the translation field in the intelligent era. In addition, we should actively face the crises and opportunities brought by artificial intelligence, break through the traditional research scope, further strengthen applied research on translation, continuously expand the field of artificial intelligence application in translation research, and highlight the outstanding contributions of translation and translation research in the process of human civilization development [15].

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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