UDC 81’322.4:004.738.5+81’25-051
DOI https://doi.org/10.32782/tps2663-4880/2025.39.1.30

HUMAN AND MACHINE TRANSLATION STRATEGIES: A COMPARATIVE ANALYSIS

СТРАТЕГІЇ ЛЮДСЬКОГО ТА МАШИННОГО ПЕРЕКЛАДУ: ПОРІВНЯЛЬНИЙ АНАЛІЗ

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The article deals with the evolution of translation strategies, comparing traditional methods with contemporary machine translation technologies. The analysis encompasses a wide range of approaches, from direct and indirect translation to neural network-based models. The key theme is the examination of differences in decision-making processes during translation and the exploration of the advantages and limitations of each approach.

The main challenge is the accuracy of content transmission and the consideration of context in translation. Human translators have the ability to adapt texts, taking into account not only grammatical and lexical norms, but also other factors such as emotional nuances, styles and tones, which is important for maintaining the appropriateness of the translation. At the same time, machine translation, even with the most advanced technologies, may struggle with texts that require a high level of cultural and stylistic context. For example, in the context of literary and fictional texts, machine translation systems have been observed to underperform with regard to capturing the nuances and depth of meaning that are characteristic of human translation. Moreover, the article discusses the potential for combining human and machine translation. It is important to note that for certain types of texts (e.g., technical or scientific ones), machine translation can be highly effective, especially when dealing with standardized terms and expressions. However, for more complex and creative texts, such as literary or marketing materials, human translation remains indispensable. In the future, the use of combined systems that integrate the advantages of both approaches may achieve high accuracy while preserving context in translation. Furthermore, the article focuses on the development of new machine translation methods aimed at improving accuracy and contextual understanding. At the same time, the limitations of existing technologies and the challenges faced by researchers in addressing issues related to context, style, and cultural adaptation of texts are discussed.

One of the important topics is the role of cultural context in translation. Human translators are able to consider cultural differences and the specific characteristics of each language, which allows for more accurate and appropriate translations. Machine translation, on the other hand, often encounters difficulties in understanding cultural aspects and is not always able to adequately convey meaning when it has strong cultural ties. The article also emphasizes the importance of integrating cultural aspects into machine translation to ensure more accurate and relevant results.

Key words: translation, translation strategies, machine translation, neural networks, translation algorithms, cultural context, stylistic aspects, contextual translation, translation accuracy, combined translation models, literary translation, text adaptation, scientific text translation, translation of cultural aspects.

Стаття розглядає еволюцію стратегій перекладу, порівнюючи традиційні методи з сучасними технологіями машинного перекладу. Аналіз охоплює широкий спектр підходів, від прямого та непрямого перекладу до моделей на основі нейронних мереж. Ключовою темою є дослідження відмінностей у процесах прийняття рішень під час перекладу та вивчення переваг і обмежень кожного підходу. Головним викликом є точність передачі змісту та врахування контексту в перекладі. Люди, що професійно займаються перекладом, мають здатність адаптувати тексти, враховуючи не лише граматичні та лексичні норми, але й інші фактори, такі як емоційні нюанси, стилі та тони, що важливо для збереження відповідності перекладу. Водночас машинний переклад, навіть з використанням найсучасніших технологій, може мати труднощі з текстами, які вимагають високого рівня культурного та стилістичного контексту. Наприклад, у контексті літературних та художніх текстів спостерігалося, що системи машинного перекладу не справляються з передачею нюансів та глибини значення, які характерні для перекладу людиною. Крім того, у статті обговорюється потенціал поєднання людського та машинного перекладу. Важливо зазначити, що для певних типів текстів (наприклад, технічних або наукових) машинний переклад може бути дуже ефективним, особливо при роботі зі стандартизованими термінами та виразами. Однак для більш складних та творчих текстів, таких як літературні або маркетингові матеріали, людський переклад залишається незамінним. У майбутньому використання комбінованих систем, які інтегрують переваги обох підходів, може досягти високої точності, зберігаючи контекст у перекладі. Крім того, стаття зосереджується на розробці нових методів машинного перекладу, спрямованих на підвищення точності та контекстуального розуміння. Водночас обговорюються обмеження існуючих

технологій та виклики, з якими стикаються дослідники у вирішенні питань, пов'язаних з контекстом, стилем та культурною адаптацією текстів. Однією з важливих тем є роль культурного контексту в перекладі. Фахівці з перекладу здатні враховувати культурні відмінності та специфіку кожної мови, що дозволяє робити більш точні та відповідні переклади. Машинний переклад, з іншого боку, часто стикається з труднощами в розумінні культурних аспектів і не завжди здатний адекватно передати зміст, що має сильні культурні зв'язки. Стаття також підкреслює важливість інтеграції культурних аспектів у машинний переклад для забезпечення більш точних та релевантних результатів.

Ключові слова: переклад, стратегії перекладу, машинний переклад, нейронні мережі, алгоритми перекладу, культурний контекст, стилістичні аспекти, контекстуальний переклад, точність перекладу, комбіновані моделі перекладу, художній переклад (літературний переклад), адаптація тексту, переклад наукових текстів, переклад культурних аспектів.

Problem Statement. Translation is recognised as a pivotal instrument in the realm of intercultural communication, facilitating the exchange of information between disparate linguistic communities. It plays a key role in the preservation of cultural heritage, the dissemination of knowledge and the development of international cooperation. In the contemporary globalised and technologically-driven environment, the mounting demand for expeditious translation of substantial textual volumes has catalysed the progressive development of machine translation (MT) technologies. The translation of large quantities of texts in a short space of time is of particular importance in areas such as business, science, technology and media.

However, despite advances in this area, human translation (HT) remains indispensable when complex context, cultural and stylistic nuances need to be taken into account. The translation of fiction, marketing materials and diplomatic texts, for instance, demands more than an understanding of linguistic content; it necessitates the conveyance of emotion, style and subtext, all of which frequently elude the capabilities of contemporary MT algorithms.

Moreover, there is an increasing necessity to examine the impact of artificial intelligence on the translation field, particularly with regard to the evolving professional requirements for translators, the incorporation of AI into workflows, and the prospects for human-machine collaboration. This prompts inquiries into the comparative effectiveness and limitations of machine translation in contrast to human strategies, as well as the prospects for the development of hybrid translation models. The relevance of this study is thus determined.

Literature Review. The field of translation research comprises a broad spectrum of subjects, ranging from the strategies employed by humans in translating texts to the development of machine translation algorithms. Scholars such as Vinay & Darbelnet investigated the classification of translation strategies, proposing approaches such as direct and indirect translation, which are fundamental to the analysis of translation processes [3]. Contemporary scholars focus on adapting these strategies to machine translation systems, using neural network methods to improve contextual understanding of texts.

Studies, including those by Marina Sanchez-Torron and Philipp Koehn, emphasize the advantages of machine translation (MT) in terms of speed and handling large volumes of text [13]. Recent advancements, particularly in Transformer-based technologies like those used in Google Translate and DeepL, have significantly improved MT systems. These innovations enable faster processing and better performance in many translation tasks, as demonstrated in various comparative studies on MT efficiency and usability.

Hatim and Munday's research extensively discusses how cultural factors influence translation processes and outcomes. For instance, in their book "Translation: An Advanced Resource Book", they emphasize the socio-cultural aspects of translation, including the impact of ideology, power structures, and cultural nuances on the production and reception of translated texts [6]. They argue that machine translation systems often fail to account for these complexities, leading to translations that may be linguistically accurate but lack cultural and contextual depth.

The integration of cultural and stylistic elements into machine translation, as well as the development of models that can effectively combine the strengths of human and machine translation, remain unresolved issues. The present research is informed by these considerations.

Research Aims and Objectives. The objective of the article is to provide a comparative analysis of translation strategies in human and machine translation, with the aim of identifying their respective strengths and weaknesses. The study also aims to develop recommendations for the optimal use of these approaches in different areas. Given the current challenges in the field of translation, the work intends to identify opportunities for the harmonious integration of human and machine strategies to improve translation efficiency.

In order to achieve the above objective, the following tasks have been delineated:

– to analyse the main translation strategies used by people, taking into account the context, cultural and stylistic features of the texts;

– to describe the principles of operation and algorithms that underlie modern machine translation systems;

– to carry out a comparative analysis of the effectiveness of human and machine translation using examples of texts of different genres and styles;

– to identify the strengths and weaknesses of each approach in the context of practical translation tasks;

– to provide recommendations on the use of hybrid translation models that combine the advantages of human and machine approaches;

– to assess the prospects for the development of machine translation technologies, taking into account cultural and stylistic features.

In the process of translation, the following aspects are of key importance: the translation must be contextual, the stylistics of the source text must be taken into account, and the semantic integrity of the text must be preserved. Human translation (HT) facilitates profound immersion in cultural and contextual nuances, while machine translation (MT) exhibits its superior efficiency and precision when handling substantial volumes of texts. Comparing these two approaches allows for an assessment of their effectiveness based on a text type and task specifics.

Discussion

Human translation

Human translation is complex, demanding not only technical accuracy but also a deep understanding of cultural contexts, stylistic features, and emotional nuance. It is important to consider not only the lexical meaning of words, but also their connotations and cultural associations. The main task of the translator is to convey not only the literal meaning, but also the style, tone and general atmosphere of the original text. This often requires moving beyond literal translation to looser adaptations that accurately reflect the meaning within the new cultural context.

One of the key strategies of human translation is the cumulative adaptation of the text to the cultural characteristics of the target audience. This involves not only literal translation, but also the selection of appropriate cultural analogues. For example, the English proverb “The early bird catches the worm” can be translated literally, but for the German audience the idiomatic equivalent “Morgenstund hat Gold im Mund” (morning hour has gold in its mouth) will be more understandable and culturally relevant. This approach allows not only to convey the meaning, but also to preserve the cultural connotation. Similarly, other proverbs or idiomatic expressions require adaptation to convey their full meaning in German.

Another important strategy is transposition, which involves changing the grammatical structure without changing the main meaning. This is especially important when the structure of the languages from which and into which the translation is made is significantly different. For example, the English “I can't wait to meet you” could be translated into German as “Ich kann es kaum erwarten, dich zu treffen”. Here, the word order and sentence structure are altered compared to a more literal translation, but the meaning remains the same. Transposition helps to preserve the naturalness of the language and ensure ease of perception of the text. By modulating the perspective or meaning of an expression, one can convey a situation more accurately and emotionally. It is often used when translating idioms. For example, the English “It's raining cats and dogs” is literally translated as “Es regnet Katzen und Hunde”, which while understandable, isn't a common German idiom. Therefore, the translator may use the idiomatic equivalent: “Es schüttet wie aus Eimern” (“It's pouring like buckets”). Such modulation allows you to preserve the emotional colouring and meaning, even if the literal translation would be less impactful or natural.

Cultural adaptation during translation frequently necessitates the modification of textual components. This may involve the addition of explanatory elements or the removal of culturally specific references to ensure comprehension for the target audience. For example, in English, the expression “I will have a cup of tea” is often used, which literally translates into German as “Ich werde eine Tasse Tee haben”. Such a translation, while grammatically correct, may sound a bit formal or unnatural to German speakers. A more natural and common way to express this in German would be “Ich trinke eine Tasse Tee” (“I drink a cup of tea”) or simply “Ich nehme eine Tasse Tee” (“I'll have/take a cup of tea”). Here, the use of “trinke” or “nehme” instead of the more literal “werde haben” makes the phrase more natural and idiomatic for the German language.

However, translation can be not only successful, but also erroneous. One of the most common mistakes is literal translation, when the translator does not take into account the context or cultural differences. For example, the English “I'm feeling blue”, which means “I am sad”, can be mistakenly translated as “Ich fühle mich blau”, which while literally correct, isn't a common way to express sadness in German. A more natural translation would be “Ich bin Traurig” or “Ich fühle mich Traurig”. Another mistake can occur when translating the idiom “to kick the bucket”, which means “to die”. The literal translation “den Eimer treten” does not convey the true meaning of the phrase and can be misleading. A more appropriate German idiom would be “den Löffel abgeben” (“to give up the spoon”) or “ins Gras beißen” (“to bite the grass”).

Human translation offers several key advantages, but also presents certain limitations that influence its efficacy across diverse domains. A primary strength of human translation lies in its capacity for nuanced contextual comprehension. Unlike machine translation systems, a human translator can interpret not only individual lexical items but also the overarching meaning of a text. This ability is particularly important for complex texts where meanings are context-dependent. A human translator can discern, for instance, whether a passage constitutes a technical description or, conversely, an emotionally resonant phrase within a literary work. This sensitivity allows for a high degree of accuracy, capturing the subtle nuances of language.

A significant advantage of human translators lies in their capacity to account for cultural nuances. Beyond the accurate rendering of words, human translators possess the ability to adapt texts, ensuring not only comprehension but also cultural appropriateness for target language speakers. In literary translation, for instance, a translator can select cultural equivalents for expressions or phrases possessing specific cultural significance in one language but lacking direct counterparts in another. This approach facilitates the preservation of not only content but also the stylistic and idiomatic characteristics of the source material.

Furthermore, the creative approach of a human translator is essential, particularly when dealing with literary and journalistic texts. Translating such materials necessitates conveying not only the semantic meaning but also preserving emotional tone, stylistic features, and the author's idea. A human translator can adapt the rhythm, metaphors, and overall atmosphere of the original text, ensuring that the translation resonates with the same impact and expressiveness. These subtle nuances are often beyond the capabilities of automated translation systems.

Despite its advantages, human translation also presents significant disadvantages. A primary limitation is the time required for completion. Human translators can process only a finite amount of text within a given timeframe, a constraint particularly problematic when dealing with substantial volumes of material. Texts requiring meticulous attention can necessitate considerable time investment, potentially posing a disadvantage for those requiring rapid turnaround.

Another key concern is cost. Human translation is significantly more expensive than machine translation, as human translators require compensation for both their expertise and the time dedicated to the task. The cost of translation is contingent upon the complexity of the subject matter, the language pair involved, and the urgency of the project. These factors can render the process prohibitively expensive for many, particularly small businesses or individuals operating with limited budgets.

Finally, human translation is prone to mistakes. Despite possessing advanced qualifications, translators are not infallible. Errors can arise from insufficient contextual understanding, the selection of inappropriate terminology, or simply from fatigue. Such mistakes can have significant repercussions, particularly in specialized domains such as technical, medical, or legal translation, where even minor inaccuracies can lead to serious consequences.

In conclusion, while human translation remains essential for tasks requiring accuracy, cultural sensitivity, and the conveyance of emotional content, its inherent limitations (including slowness, high cost, and the potential for human mistakes) restrict its applicability. Machine translation can be a useful option in some situations, but it has weaknesses, particularly with understanding context and emotion.

Machine translation

Machine translation (MT) is dependent on algorithms that employ neural networks and process extensive training data, thereby enabling systems to translate with considerable speed and accuracy. A key feature of this process is the capacity of neural networks to «learn» from example texts, allowing systems to progressively enhance translation quality by analysing numerous translation possibilities and selecting the optimal rendering. For instance, widely used systems such as Google Translate and DeepL have demonstrated substantial improvements in translation accuracy, particularly with technical or scientific texts, where terms and phrases typically possess clear and unambiguous meanings.

To illustrate this point, consider the following example from a technical text: the phrase “the engine operates at a maximum efficiency of 95%” is translated by Google Translate as “der Motor arbeitet mit einem maximalen Wirkungsgrad von 95%”. This translation is both accurate and appropriate, as the terms in both languages possess clear, standardised meanings, and the system effectively conveys this meaning. It is evident that phrases within clearly defined contexts pose minimal translation challenges, as the algorithm is capable of readily identifying corresponding terms in dictionaries and based on its training data.

Nevertheless, machine translation frequently encounters significant challenges when applied to literary or philosophical texts. The meaning of words can be contingent upon context, stylistic linguistic features, or cultural distinctions, all of which are

difficult to reproduce algorithmically. For instance, the German phrase, “Die Welt ist meine Vorstellung” (Schopenhauer), might be translated by a machine translator as “The world is my representation.” While this is formally accurate, it fails to convey the profound philosophical connotations inherent in Schopenhauer's statement. It is important to acknowledge the complex semantic history of the German term “Vorstellung”, which in philosophical discourse signifies a subjective interpretation of reality, diverging from the more rudimentary notion of an “impression”. Consequently, machine translation is unable to consistently capture these nuances, and the resulting translation may deviate considerably from the author's intended meaning.

These examples show that while modern machine translation systems have improved significantly, their capabilities are still limited in cases where translation requires a deep understanding of a context, cultural differences, and philosophical or literary meanings.

Comparison of LP and MP

Comparing human translation (HT) and machine translation (MT) is pivotal for evaluating the effectiveness of each method, as both have distinct strengths and weaknesses depending on a text type. This study compared key text categories to assess how translation approaches vary based on context and accuracy requirements. The results clearly demonstrate that machine translation excels with technical texts, where terminological accuracy and clarity of instruction are important. However, human translation maintains a significant advantage for literary and journalistic texts, which demand a more nuanced, flexible, and creative approach.

Cultural adaptation during translation frequently necessitates the modification of textual components. This may involve the addition of explanatory elements or the removal of culturally specific references to ensure comprehension for the target audience. For instance, while a machine translation of the English technical instruction “Connect the red wire to the positive terminal” might produce a grammatically correct German sentence like “Verbinden Sie den roten Draht mit dem Pluspol”, this literal translation might not be sufficient in certain contexts. Depending on the target audience's familiarity with technical terminology, the translator might choose to add further clarification, such as “Verbinden Sie den roten Draht mit dem Pluspol (dem positiven Anschluss)”, or even provide a visual aid. Conversely, if the instructions are intended for a highly specialized audience already familiar with electrical diagrams and conventions, the simple, literal translation might be perfectly adequate, and any further explanation would be redundant. The key consideration is always ensuring clarity and comprehension for the specific target audience.

However, when it comes to translating literary texts, the situation changes. Machine translation, while it can provide a formally correct translation, is not always able to convey the emotional and stylistic subtext that is inherent in literary works. For example, the phrase “Ihr Lachen war wie eine Melodie” requires a more sensual approach to convey the beauty and emotional content of this phrase. A machine translator can translate it literally as “Her laughter was like a melody”, but this sounds mechanical and does not convey the emotional colouring that was embedded in the original. A human translator, on the other hand, can rework this translation, preserving the meaning but adding an emotional nuance, for example, “Her laughter sounded like a melody”, which much better conveys the atmosphere and beauty of the expression.

This study also investigates the nuanced differences between machine and human translation within journalistic texts, highlighting the pivotal role of human translators in preserving emotional and stylistic integrity. While machine translation can achieve factual accuracy, it often falls short in capturing the subtle emotional undertones and stylistic choices inherent in journalistic writing. Specifically, the analysis reveals that human translators excel in adapting text to resonate with the target audience, maintaining the original's emotional impact and call to action. By comparing machine-generated translations with human-crafted alternatives, this research demonstrates the superior capacity of human translators to convey not just information, but also the intended emotional and stylistic message, exemplified by the transformation of “Breaking the Chains of Injustice” into a more impactful “Shattering the Chains of Injustice”. This highlights the essential, irreplaceable role of human translators in contexts where conveying emotional and stylistic fidelity is essential.

Thus, comparing MT and HT shows that each of these methods has its strengths and weaknesses. Machine translation is very effective in technical texts, where accuracy and speed are the main criteria, while human translation remains indispensable in cases where stylistic, emotional and cultural nuances need to be taken into account, as is the case in literary and journalistic texts.

Conclusions. The article has discussed that both human and machine translation possess unique advantages and limitations, making each most effective in specific contexts. Machine translation (MT) has proven highly efficient for technical texts, where

terminological accuracy and rapid processing of large datasets are critical. Leveraging algorithms and large language corpora, MT can swiftly process vast amounts of information, an important advantage in fields such as science, technology, and commerce. However, human translation (HT) remains indispensable when translation demands nuanced cultural understanding, emotional colouring, and stylistic sensitivity. Humans can not only convey the precise meaning of words but also interpret context, account for cultural differences, and produce a text that fulfills the stylistic requirements of the original.

While machine translation (MT) continues to evolve and improve in accuracy, it still has limitations, particularly in conveying the emotional and cultural meanings that are important in literary and journalistic texts. Human translation (HT), on the other hand, is characterised by its slowness and high cost, which limits its applicability in certain domains.

Future research should explore hybrid translation models that exploit the strengths of both MT and HT. Integrating artificial intelligence with human supervision, balancing the speed and accuracy of MT with the creativity and cultural sensitivity of HT, is a promising approach. For example, MT could provide an initial translation that a human translator could then refine and adapt, taking into account stylistic and emotional considerations.

The development of neural networks with enhanced contextual and linguistic understanding is a promising research direction, expected to improve AI's ability to accurately translate complex texts. The goal is to create AI translation systems that achieve a closer approximation of human translation quality, while still leveraging the inherent speed of automation.

In addition, the development of multimodal translation systems, capable of handling not only text but also images, video and audio, is opening up new opportunities for automated translation in areas such as film, tourism and education. The integration of these technologies will significantly improve the quality of translation in multimedia contexts where both accuracy and speed are essential.

In conclusion, future research should prioritise the use of human supervision to integrate machine translation technologies. This approach will facilitate the creation of more versatile and efficient systems capable of meeting the diverse requirements of different text types and specific translation scenarios.

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