DIFFERENCES BETWEEN MACHINE TRANSLATION AND HUMAN TRANSLATION

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Abstract. *This article analyzes the differences between machine translation and human translation from linguistic, technological, pragmatic, cultural, and psychological perspectives. The study examines the nature, capabilities, and limitations of machine translation systems, as well as the specific features, advantages, and disadvantages of human translation. The article highlights the speed of machine translation systems, their multilingual support, multimodal capabilities, and advantages in real-time translation. At the same time, it analyzes the shortcomings of machine translation, such as its inability to fully understand metaphors, idioms, cultural connotations, and complex scientific or legal texts. The intercultural adaptability, stylistic accuracy, creativity, and responsibility of human translation are emphasized. Although machine translation systems are expected to become the primary tool for translating everyday and urgent texts in the future, it is noted that complex, diplomatic, scientific, and creative texts will always require human intellect and expertise.*

Keywords: *machine translation, human translation, artificial intelligence, neural networks, natural language processing (NLP), linguistic differences, cultural connotation, stylistics, context, translator's role, translation quality, pragmatic analysis, multimodal translation, real-time translation.*

Introduction

In the 21st century, the globalization of worldwide processes, the rapid development of scientific and technological progress, and the expansion of intercultural relations have made translation activity one of the essential needs of society. Particularly over the past decade, advances in artificial intelligence, neural networks, and natural language processing (NLP) technologies have brought machine translation systems to a qualitatively new stage. Systems such as Google Translate, DeepL, and ChatGPT have become capable not only of conveying general meaning but also of producing grammatically relatively accurate translations while taking context into account.

At the same time, the role of the human translator has not lost its significance. Translation is not merely the transfer of words from one language to another; it is a process of accurately conveying cultural, pragmatic, stylistic, and semantic layers of meaning. Human intellect, experience, linguistic sensitivity, and the ability to perceive subtle nuances in communication have not yet been fully replaced by any automated system. This article analyzes the differences between machine translation and human translation from linguistic, technological, pragmatic, cultural, psychological, and practical perspectives.

Machine translation (MT) is the process of automatically translating a text or speech from one language into another using a computer program or artificial intelligence. The main objective of MT is to perform the translation process without human involvement, or with minimal human participation, thereby increasing speed and reducing language barriers. Machine translation is

developed at the intersection of such fields as computational linguistics, artificial intelligence, corpus linguistics, and mathematical modeling. It translates by taking into account the semantic (meaning), syntactic (grammatical structure), and pragmatic (contextual) features of a text; however, this process varies depending on the underlying technologies used.

Human translation is a process of meaning transfer carried out by a professional translator, based on a deep knowledge of the language system, an understanding of cultural context, and an accurate interpretation of communicative intent. Translation performed by a human involves not only transferring words from one language to another, but also identifying the deep semantic content, implicit meanings, stylistic features, and cultural connotations of the text, and recreating them in accordance with the norms of the target language. After receiving a text, the translator analyzes it from semantic, syntactic, and pragmatic perspectives, understands the author's intention, tone of speech, and situational context, and on this basis selects the most appropriate translation option. The distinctiveness of human translation lies in the translator's role as an intercultural mediator who produces a contextually adapted, natural, and stylistically appropriate translation. Idioms, metaphors, jargon, and proverbs – elements deeply rooted in culture – are accurately interpreted and adapted to the target language.

Moreover, because human cognition embodies creativity and linguistic sensitivity, a translator is capable of accurately rendering complex, ambiguous texts, as well as those containing humor, irony, or satire. Human translation is a process that requires responsibility, ethics, emotional understanding, and experience, ensuring a depth and naturalness that machine translation systems cannot fully achieve. Therefore, in fields requiring precision and creativity – such as diplomatic, legal, scientific, medical, and literary texts – the role of the human translator remains unparalleled. Capabilities of Machine Translation:

- The capabilities of machine translation are extensive, and modern translation systems based on artificial intelligence and neural networks significantly reduce language barriers today. First of all, MT systems are able to translate simple and moderately complex texts with considerable accuracy. This is because they learn from large corpora of parallel texts and can identify semantic relationships between words and phrases. As a result, translating everyday content – such as online articles, image captions, and social media messages – has become extremely convenient through automated means.
- One of the most important capabilities of MT systems is real-time speech translation. Contemporary applications can listen to spoken language during a conversation and produce a translation within seconds. This is particularly helpful during international meetings, communication with foreign guests, or online conferences.
- In addition, machine translation can detect and translate text found in images and photographs. This process is based on Optical Character Recognition (OCR) technology. For example, using a smartphone camera, users can scan foreign-language menus, street signs, advertising banners, or documents and receive an instant translation. A more advanced technology is multimodal translation, in which the system analyzes text not in isolation but together with images, contextual cues, and visual information. For instance, the objects, actions, and layout within an image may influence the translation process. With the development of modern language models, this type of integrated translation has become increasingly common in everyday life.
- Furthermore, rapid communication in multilingual chats represents one of the major achievements of MT systems. In messaging platforms, when a user writes in one language, the

system automatically translates the message into the interlocutor's language, and vice versa. This enables instant communication between representatives of different countries.

- Overall, machine translation systems today have evolved into powerful multifunctional platforms that support not only text translation, but also speech, image-based content, multimodal information, and real-time communication.

Although modern machine translation (MT) systems are trained on large volumes of data, they still cannot fully capture human reasoning, cultural understanding, and contextual analysis. As a result, in certain situations, MT outputs may lack sufficient accuracy or misinterpret the meaning of a text. The main limitations of MT are detailed as follows:

Firstly, understanding metaphors, proverbs, and idioms remains one of the most challenging aspects for MT systems. These units often convey figurative rather than literal meaning. For example, English idioms such as "break the ice," "spill the beans," and "hit the sack" may appear grammatically simple, but they carry hidden semantic weight that MT systems cannot always recognize. Consequently, literal translations may occur, distorting the intended meaning.

Secondly, inadequate comprehension of cultural connotations continues to be a problem. Each language carries unique socio-cultural layers in which words and expressions have symbolic, emotional, or historical significance. MT systems fail to fully understand this deep cultural context, which can result in neutral or incorrect renderings of meaning. This is particularly evident in literary, journalistic, or socio-analytical texts.

Thirdly, satire, irony, and humor are rarely properly understood in machine translation. Much of humor relies on wordplay, cultural stereotypes, or logical incongruities. MT systems process these elements syntactically rather than semantically, so the essence of humor is often lost. Consequently, irony may be translated as a serious statement, and satire as a straightforward narrative.

Fourthly, precision in complex scientific, technical, or legal texts is another significant limitation. Such texts involve highly specialized terminology, complex syntactic structures, and subtle semantic distinctions. Human translators consider communicative intent, legal responsibility, and scientific accuracy, whereas MT systems process text based on statistical or neural model predictions, which can lead to reduced accuracy and misunderstanding.

Fifthly, MT systems rarely account for personal context. For example, adjusting style according to the interlocutor's age, gender, or status, managing formality, or integrating information from previous conversations is naturally handled by human reasoning. Machine translation, however, relies on general language models, resulting in a lower degree of adaptation to the audience.

Another important limitation is the generation of "fabricated" information – that is, producing meaning not present in the original text. Neural MT systems may sometimes introduce information that does not exist in the source or misinterpret the original idea. This can lead to serious errors in contexts such as information security, scientific translation, or official document translation. Overall, while machine translation is a significant achievement of modern linguistic technologies and accelerates communication, it has not yet reached the level of human reasoning in complex semantic, pragmatic, and cultural analysis. Therefore, in many professional fields, the role and supervision of human translators remain essential.

Advantages and Disadvantages of Machine Translation. Firstly, MT operates very quickly. Compared to a human translator, automated systems can transfer meaning from one language to another within seconds. This capability is particularly valuable in rapid communication, online

interactions, and real-time translation. For example, when a foreign tourist addresses local residents or during multilingual discussions at international meetings, MT serves as a convenient tool. Secondly, machine translation can process large volumes of text almost instantly. Texts containing several thousand, or even tens of thousands, of words can be prepared in just a few minutes. This, in turn, saves both time and labor resources.

Thirdly, MT covers a wide range of languages. Many systems can translate over 100 languages worldwide, while some even support less commonly used or rare languages. This greatly facilitates communication between different cultures and linguistic communities. Fourthly, machine translation is generally offered as a free or very low-cost service. Online translation platforms provide virtually unlimited access for most users. Compared to hiring a professional translator, this is a highly cost-effective option. Fifthly, MT is a convenient tool for language learners. Students can efficiently use it to quickly find word meanings, understand the general content of texts, check pronunciation, or memorize new vocabulary. In some cases, MT can create simplified versions of texts, making the learning process easier.

Disadvantages of Machine Translation

First disadvantage – frequent semantic errors. MT systems can generate grammatically correct sentences, but their semantic accuracy is not always high. Hidden meanings, logical connections, or subtle pragmatic distinctions in sentences may be misinterpreted. This is particularly risky in scientific, technical, or professional texts.

Second disadvantage – neglect of cultural connotations. Language is closely intertwined with culture. MT cannot deeply analyze cultural context: proverbs, irony, historical references, or words with emotional nuance may be translated incorrectly. As a result, the translation may appear vague or awkward.

Third disadvantage – insufficient stylistic adaptation. A human translator perceives the style, tone, and level of formality of a text and selects the most appropriate rendering accordingly. MT, however, often produces neutral text with a uniform tone, paying little attention to stylistic subtleties. Distinguishing between literary texts, speech styles, or formal and informal expressions remains a complex task for MT.

Fourth disadvantage – risk for confidential documents. Online translation platforms may store data on servers, use it to retrain models, or transmit it to third parties. Therefore, translating personal, commercial, or government-sensitive documents through MT can be unsafe.

Fifth disadvantage – errors in terminology. MT systems may select incorrect terms, apply contextually inappropriate variants, or choose inaccurate equivalents for scientific terminology. This poses serious problems for scientific articles, medical documents, contracts, and legal texts.

Advantages and Disadvantages of Human Translation. Human translation is a complex and creative process carried out by a professional translator, enabling a deep understanding of languages and cultures, precise interpretation of semantic content, and accurate communication of pragmatic intent. The main advantages of human translation lie in the translator’s ability to comprehend the text thoroughly and consider the hidden meanings and emotional tones behind words and sentences. Additionally, human translators can identify intercultural differences, adapt the content to the target language, and prevent misinterpretations. In formal texts – such as legal, scientific, or diplomatic documents – they ensure accuracy and reliability. Human translators also strive to maintain stylistic coherence, preserving the style, tone, and voice of the author while conveying it appropriately to the audience. Responsibility, creativity, and cognitive skills are among the greatest strengths of human translation compared to automated systems.

However, human translation also has its limitations. Compared to machine translation, it is slower, as analyzing each text, understanding context, and adapting meaning requires considerable time. Professional translation services can also be costly, especially for complex or confidential documents. When translating large volumes of text, human factors such as fatigue may affect both quality and speed. Moreover, human translation cannot always provide instant real-time results, which can be a limitation in online chats or rapid information exchange scenarios.

Conclusion

Human translation stands out for its accuracy, cultural adaptability, and high stylistic quality, but it faces certain constraints in terms of time, resources, and speed. In the future, machine translation (MT) systems are expected to become increasingly sophisticated, with enhanced capabilities based on artificial intelligence. Currently, MT systems have achieved significant progress in understanding context, semantically processing long texts, and even correctly interpreting cultural elements. Furthermore, the development of neural networks and transformer models allows MT systems to translate complex texts quickly and efficiently, significantly accelerating global communication and knowledge exchange.

Nevertheless, human translators will not disappear. On the contrary, they will continue to hold unique importance. Complex, formal, diplomatic, creative, and political texts will always require human cognition, creativity, and intercultural sensitivity. For instance, in literary works, diplomatic negotiation documents, scientific research, or legal contracts, the subtle meaning of each word, stylistic tone, and authorial intent is crucial – elements that artificial intelligence cannot yet fully comprehend.

Thus, while MT systems are likely to serve as the primary tool for translating everyday, rapid, and straightforward texts, the role of human translators will persist in areas that demand high accuracy, contextual adaptation, and cultural sensitivity. The experience, responsibility, and creativity of human translators cannot be fully replaced by automated systems in the near future. In the 21st century, globalization and technological advancement have sharply increased the importance of translation. Machine translation systems, powered by artificial intelligence and neural networks, enable fast, multilingual, and multimodal translations.

However, they cannot fully grasp complex, creative, cultural, and contextual aspects. The role of human translators remains indispensable for accurately rendering complex scientific, diplomatic, legal, and literary texts with stylistic fidelity and intercultural awareness. In the future, although automated systems may become the primary means for translating everyday and rapid texts, human cognition, creativity, and responsibility will continue to be essential in specialized fields. In this way, machine and human translation complement each other, playing a vital role in enhancing the efficiency of global communication.

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