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The Future Human Translator in the Age of Artificial Intelligence

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Abstract

This paper aimed at exploring the impact of artificial intelligence on future of human translators, focusing on the benefits and limitations of machine translation and the role of human translators in this new landscape. The method that is used is the analytical descriptive method, a questionnaire has been designed for data collection, the questionnaire answered by Sudanese professional translators. Furthermore, the paper aimed at exploring the impact of artificial intelligence on the translation profession, after analyzing the questionnaire the researcher found that the nature of human translators work will be changed in the following ten years, in addition, the demand for human translators will be decreased. and also the results showed that human translators can adapt the changing landscape of industry by developing new skills as well as focusing on high value tasks can help on adapting to the changing of the landscape industry.

مستخلص البحث

هدفت هذه الورقة إلى استكشاف تأثير الذكاء الاصطناعي على المترجم البشري ، مركزاً على فوائد وقيود الترجمة الآلية و دور المترجمين البشريين في هذا المشهد الجديد.

استخدم الباحث الطريقة الوصفية التحليلية للحصول على البيانات، قام الباحث بتصميم استبيان لتحقيق أغراض هذه الدراسة. تم توزيع الاستبيان على المترجمين السودانيين بغرض للإجابة عليه. علاوة على ذلك تهدف الورقة إلى استكشاف تأثير الذكاء الاصطناعي على المترجم البشري.

وبعد أن قام الباحث بتحليل نتيجة الاستبيان، وجد أنه سيطراً تغييراً في طبيعة عمل المترجم البشري وايضاً سينخفض الطلب على المترجم البشري الى اقل مما هو عليه الآن.

كما اظهرت نتيجة التحليل انه يمكن للمترجم البشري التكيف مع هذا التغيير عن طريق تعلم مهارات جديدة تتماشى مع سوق الترجمة، وايضاً التركيز على المهام ذات القيمة العالية يمكن أن يساعد في التكيف مع هذا التغيير.

1.1 Introduction:

The rapid advancement of artificial intelligence (AI) is transforming numerous industries, and translation is not excepted. AI- powered tools become increasingly sophisticated, they are being leveraged to improve the efficiency, accuracy and accessibility of translation services.

Emile Delavenay (2007) “the opportunity of subjecting the marital forms of language to analytical methods of machine capable of arithmetical and logical opportunities was too tempting to go long neglected. Moreover, the requirements of men in this atomic age are such that automatic translation corresponds to a real need of our time”

Ren Qingliang (2024) said that “the quick advancement of artificial intelligence technology has exerted a significant influence on people’s life, employment, research and production, among other fields”.

“recent advancement in AL, particularly in natural language processing and machine learning have led to the development of translation tools capable of generating translation at unprecedented speeds”.

Abdel Rahaman Mitib Altakhaineh (2025).

“The widespread adoption and use of large language models (LLMs) as the foundation for AI applications in applied computer science have significantly advanced tools for the translation of human languages”. Dominic Busch (2024). Machine learning algorithms can now analyze vast amount of linguistic data, enabling neural machine translation (NMT) systems to produce high-quality translations. However, the rise of AI in translation is also rises important questions about the role of human translators, the potential for job displacement, and the limitations of machine translation.

While AI excels in certain areas, such as processing large volumes of data and handling repetitive tasks human translators brings nuance, cultural understanding and creative flair to the translation process.

The interplay between human and machine translation is complex, and the future of industry will likely involve a blend of both. This exploration delves into the future of translation in the age of AI, examining the opportunities, challenges and implications of this technological shift, including the potential for increased globalization, improved communication and new business models.

1.2 Historical development of machine translation:

Machine translation evaluation has undergone significant development over the years, reflecting the evaluation of machine translation itself.

Historically, the evaluation of translation systems began to with subjective human assessment, where human judges would evaluate the quality of translated output. However, this approach was time-consuming, expensive and subjective.

Rusul Maitham Jasib and Zainab Najim Ubaid, (2024), on their study entitled Machine Translation explained that “the development of automatic evaluation metrics marked a significant millstone in the history of machine translation evaluation. One of the earliest and most widely used metrics is the BLEU (Bilingual Evaluation understudy)”. Bilingual Evaluation understudy measures the overlap between machine-generated translations and human references translations based on n-gram precision. Other automatic evaluation metrics have been proposed to address specific aspects of translation quality.

“With the widespread application of deep learning in recent years, machine translation technology has also attempted to combine with artificial intelligence, and natural network machine translation has arisen as a new model” Yutao Lin (2023).

Looking back at the linear history on machine translation, it's development can be simply divided in to two stages:

The first stage, from the 1940s to 1990s. this stage represented by the early machine translation based on semantics rules.

The first set of proposals for computer based machine translation was presented in 1949 by Warren Weaver, a researcher at the Rockefeller Foundation, "Translation memorandum". These proposals were based on information theory, successes in code breaking during the Second World War, and theories about the universal principles underlying natural language. in the 1960s in both the Soviet Union and the United States concentrated mainly on the Russian–English language pair. demand in the 1970s was for low-cost systems that could translate a range of technical and commercial documents. By the 1980s, both the diversity and the number of installed systems for machine translation had increased. A number of systems relying on mainframe technology were in use, such as SYSTRAN, Logos, Ariane-G5, and Metal. During the 1990s, encouraged by successes in speech recognition and speech synthesis, research began into speech translation with the development of the German Verb Mobil project.

The second stage started after the 1990s, this stage characterized by the widespread use of statistical data machine translation. In this stage the neural network translation technology developed by the

Google team over the past few years as a brand-new innovation, then it can be argued that machine translation has now reached its most advanced stage. The field of machine translation has seen major changes, large amount of research was done into statistical machine translation and example-based machine translation. In the area of speech translation, research was focused on moving from domain-limited systems to domain-unlimited translation systems. In different research projects in Europe (like TC-STAR) and in the United States (STR-DUST and DARPA Global autonomous language exploitation program), solutions for automatically translating Parliamentary speeches and broadcast news was developed. In these scenarios the domain of the content was no longer limited to any special area, but rather the speeches to be translated cover a variety of topics.

The past decade witnessed neural machine translation (NMT) methods which replaced statistical machine translation.

1.3 Neural Machine Translation:

The term neural machine translation was coined by Bahdanau et al and Sutskever et al who also published the first research regarding this topic in 2014. “Neural networks only needed a fraction of the memory needed by statistical models and whole sentences could be modeled in an integrated manner” Circle translation (2024).

Yutao Lin (2023) argued that “the technology of artificial neural networks works enhances the autonomy of machine translation. Biological neural networks are mathematically modeled by the artificial networks”

The first large scale NMT was launched by Baidu in 2015, followed by Google Neural Machine Translation (GNMT) in 2016. This was followed by other translation services like DeepL Translator and the adoption of NMT technology in older translation services like Microsoft translator. Neural networks use a single end to end neural network architecture known as sequence to sequence (seq2seq) which uses two recurrent neural networks (RNN). An encoder RNN and a decoder RNN. Encoder RNN uses encoding vectors on the source sentence and the decoder RNN generates the target sentence based on the previous encoding vector. Further advancements in the attention layer, transformation and back propagation techniques have made NMTs flexible and adopted in most machine translation, summarization and chat bot technologies. Circle translation (2024).

Yutao Lin (2023) outlined that “the most significant characteristic of artificial neural network is that it simulates the neuronal structure of the brain by connecting several artificial neurons through the linking of multiple artificial neurons”.

“One of the most notable aspects of the artificial intelligence era is the increased convenience, diversity, and efficiency of the data acquisition transmission and application techniques” Ren Qingliang (2024).

1.4 AI and Neural Machine Translation:

The advent of neural networks brought about neural machine translation (NMT), a breakthrough technology that uses deep learning algorithms to understand and generate translations based on context rather than word-for-word replacement. NMT has drastically improved the quality of machine translation, enabling tools to produce more fluent and coherent translations across multiple languages. Despite these advancements, AI-powered translation tools still struggle with certain aspects of language that require a deep understanding of cultural context, tone, and nuanced meaning—areas where human translators excel. This is where the limitations of machine translation become apparent, underscoring the continued relevance of human expertise in the translation service industry. Claire Larssonneur (2019).

1.5 Types of machine translation:

Neural Machine Translation: The advent of neural networks brought about neural machine translation (NMT), a breakthrough technology that uses deep learning algorithms to understand and generate translations based on context rather than word-for-word replacement. NMT has drastically improved the quality of machine translation, enabling tools to produce more fluent and coherent translations across multiple languages.

Despite these advancements, AI-powered translation tools still struggle with certain aspects of language that require a deep understanding of cultural context, tone, and nuanced meaning—areas where human translators excel. This is where the limitations of machine translation become apparent, underscoring the continued relevance of human expertise in the translation service industry.

Rule-Based Machine translation: this type relies on strict rules and dictionaries to translate texts. It can be effective for structured content but is limited by its need for constant manual updates as languages evolve.

Statistical machine translation: this type uses models form large datasets to create translations. It is often used for low-resource languages or specific, domain-specific content where NMT models may not be as effective.

1.6 Tools of machine translation:

The recent advancement in artificial intelligence, particularly in natural language processing and machine learning have led to the development of translation at unprecedented speeds.

Altakhaineh et al, (2025) outlined that “AI translation technology have revolutionized the way we communicate across language barriers”. “Developing deep learning algorithms and vast datasets, these tools can provide real-time translations that are increasingly accurate and contextually relevant” Moneus and Sahari (2024).

The rise of automated translation tools has introduced a new concept namely artificial intelligence translation. This development has led to the emergence of machine translation applications that aim to closely match human translations performance.

Altakhaineh et al, (2025) stated that “both every day internet user and organizations working globally require effective translations tools, which has contributed to the rapid rise in popularity of free online automatic translation service like google translate and Microsoft Bing translator” these tools often cater to users prioritizing speed, cost, and convenience over quality, with many not feeling the need for professional translation services.

Ibid emphasized that “computer aided translation tools (CAT tools) has become widespread in commercial translation, as software solutions continue to evolve and reshape social communication within the industry, which remains varied in its technological sophistication”

Chrysoula Gateiou 2024 “another highly powerful AI- influenced translation and interpretation (T&I) technology in the hands of professionals operating in the T&I industry is online translations tools. Tools of these sort utilizes core AI features, including ML, DL, NLP, and BD technology. In this category. We mention three greatly popular free translation tools, namely Google Translate (henceforth, GT), DeepL, and Linguee”

“Google Translate (GT) is one of the most widely used AI- based translation tools.it transitioned from statistical machine translation to neural to machine translation, this shift has allowed GT to produce more accurate and fluent translations”. Anas Alkhofi (2025).

1.7 Machine Translation vs. Human translation:

Machine Translation:

“the term machine translation (MT) refers to computerized systems responsible for the production of translation with or without human assistance.

W. John Hutchins (1995) explained that “machine translation excludes computer-based translation tools which support translators by providing access to online dictionaries, remote terminology databanks, transmission and receptions of texts etc.”

Limitations of machine translation:

Inability to Understand Cultural Context: Machine translation tools often lack the capability to interpret cultural context accurately. Languages are deeply influenced by the culture in which they

are spoken, and certain words, expressions, or phrases may carry meanings that differ significantly based on cultural context. For example, idioms, humor, and slang often do not translate directly, requiring an understanding of the cultural nuances to convey the intended message accurately.

1) Challenges with Specialized Terminology: Technical documents, legal contracts, medical records, and other specialized content require precise terminology and domain-specific knowledge. While machine translation systems can be trained on domain-specific datasets, they may still struggle to deliver consistent and accurate translations for highly specialized terms that require human expertise.

2) Lack of emotional tune and nuance: Language is not just a tool for communication but also an expression of emotions, intentions, and tone. Automated translation tools struggle to capture these subtleties, often resulting in translations that may be grammatically correct but lack the emotional impact or intent of the original content. Human translators, on the other hand, can interpret the tone and emotional nuance, ensuring that the translated message resonates with the target audience.

Inconsistent Quality Across Languages: Machine translation quality can vary significantly depending on the language pair. While NMT systems tend to perform well for widely spoken languages like English, French, and Spanish, they may produce lower-quality translations for less common languages. Human translators with expertise in specific languages ensure consistent quality across all language pairs. Rachel Wolff (2024).

Machine translated text:

Original text:

“She broke the ice by telling a funny story at the beginning of the meeting.”

Machine Translated text:

لقد كسرت الجليد من خلال إخبار قصة مضحكة في بداية الاجتماع.

Literal translation of idioms The phrase “broke the ice” is an idiom meaning “to ease tension or start a friendly atmosphere.” The machine translated it literally to “كسرت الجليد” (she broke the ice physically), which sounds strange or meaningless in Arabic. Machines often fail to detect idiomatic expressions and translate them word-for-word.

The verb “إخبار قصة” (telling a story) is grammatically correct but unnatural in this context. Native Arabic prefers “سرد قصة” or “حكى قصة”. MT systems choose direct dictionary equivalents instead of contextually natural verbs.

Overuse of “لقد” (has) The machine added “لقد” before the verb, a literal reflection of the English past tense, even though it’s unnecessary and stylistically heavy in Arabic narrative. MT tries to preserve tense markers too literally.

Lack of stylistic flow The sentence is stiff and mechanical; it conveys meaning but lacks rhythm and natural cohesion. MT focuses on structural correctness rather than stylistic smoothness.

Register mismatch Arabic readers would expect a softer, more idiomatic phrase for “at the beginning of the meeting,” e.g., “في مستهل الاجتماع” rather than the literal “في بداية الاجتماع.” MT doesn’t adjust register or formality to fit context (formal vs informal tone).

Better Human Translation:

أزالت التوتر بسرد قصة مضحكة في بداية الاجتماع

Human Translation:

Human translators bring several unique advantages to the table, making them indispensable even in the age of AI and machine translation. Some of these advantages include:

Contextual Understanding and Cultural Sensitivity: Human translators possess a deep understanding of cultural contexts, which allows them to adapt translations for the intended audience while preserving cultural nuances. This is particularly important for marketing content, literary works, or any material that seeks to engage an audience on a deeper level.

Expertise in Specialized Fields: Professional human translators often specialize in specific industries such as legal, medical, technical, or financial fields. Their expertise in the terminology and conventions of these industries ensures that translations are accurate and meet industry-specific standards. This level of precision is crucial for documents where accuracy is paramount, such as contracts, patent applications, and medical reports.

Ability to Convey Tone and Emotion: While machine translation can produce grammatically accurate translations, it often falls short in capturing the original content’s tone, style, or emotional intent. Human translators can interpret the emotional undertones of the source text and adapt the translation accordingly, ensuring that the message resonates with the audience.

Quality Assurance and Error Detection: Human translators provide an essential layer of quality assurance, as they can identify and correct errors, ambiguities, or inconsistencies in the source text that automated tools might overlook. Their expertise ensures that the final translation is not only accurate but also stylistically appropriate.

Antoine Falempin and Dinda Ranadireksda (2024) outlined that “the role of human translators remains particularly indispensable in the critical domains where human lives are at tasks such as legal and proceedings and healthcare diagnoses”.

Human interpreters possess the nuanced understanding and cultural sensitivity necessary to navigate complex communication scenarios, ensuring that the intended meaning and tone are accurately converted.

2. Statement:

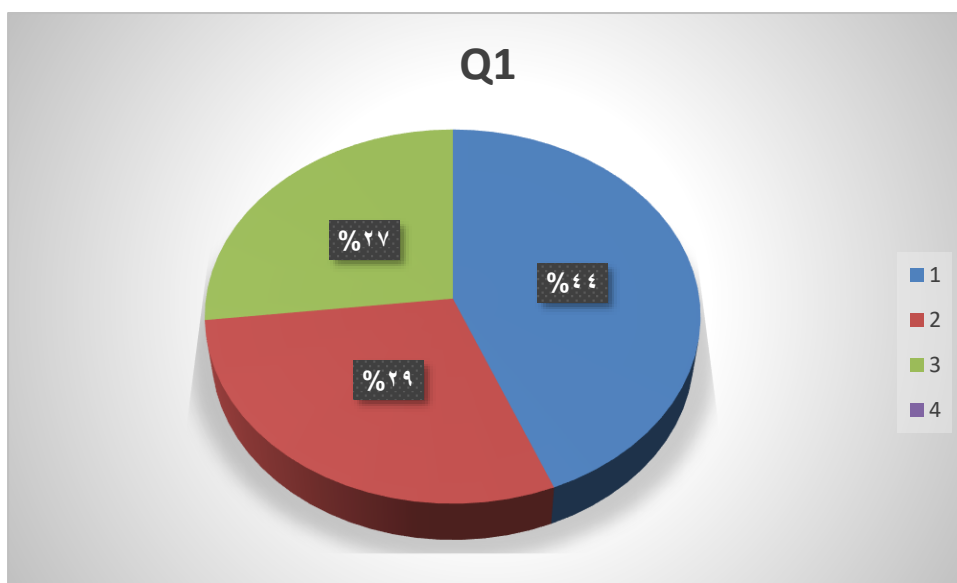
The rapid advancement of artificial intelligence (AI) in translation technologies is transforming the landscape of the translation industry, raising fundamental questions about the future role of human translators. As AI-powered translation tools become increasingly sophisticated, they are being leveraged to improve efficiency, accuracy, and scalability in translation workflows. However, the limitations of machine translation in capturing nuance, context, and cultural sensitivity underscore the continued importance of human translators. This paper explores the impact of AI on human translation, examining the opportunities, challenges, and implications of this technological shift. By investigating the evolving relationship between human translators and AI-powered translation tools, the study aims at providing insights into the future of human translation in the age of AI, including the skills and competencies required for human translators to remain relevant and the potential for human-AI collaboration to enhance translation quality and productivity.

3. Methods:

This paper aims to provide a comprehensive understanding of the future of human translators in the age of AI. It aims to provide a rich and nuanced understanding of the future of human translation in the age of AI.

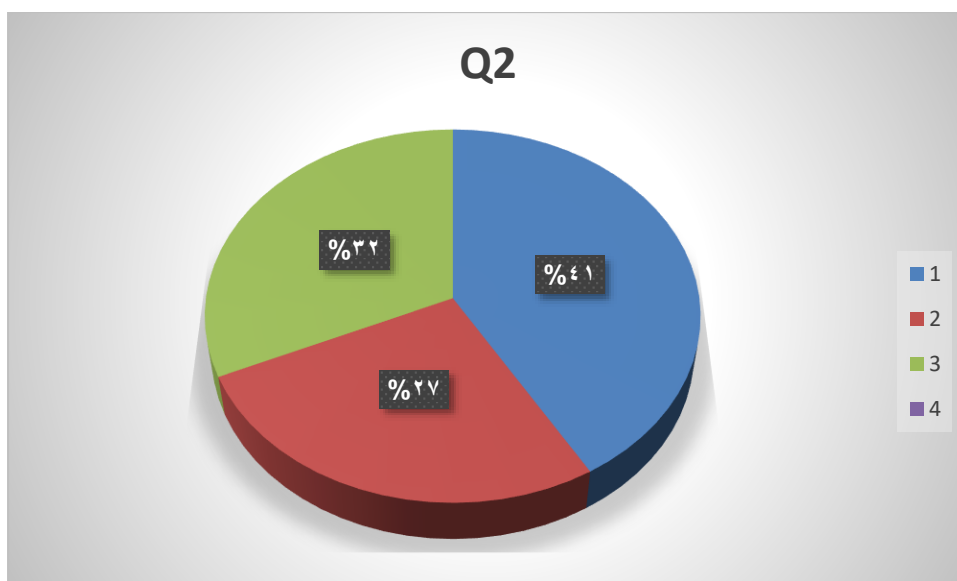
The paper employed quantitative approach to gather comprehensive insights into the future of human translators in the age of AI. Online surveys was administered to a sample of human translators to gather data on their perceptions, experiences, and expectations regarding the impact of AI on human translation. Survey data was analyzed using Statistical Package for Social Sciences to identify trends and patterns in the data.

4. Results and discussion:



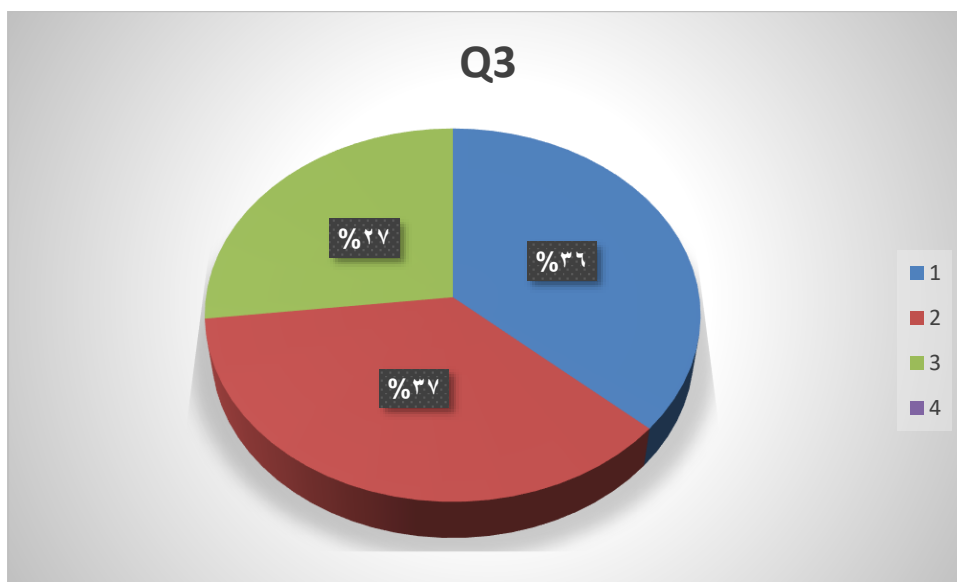
1. How do you envision human translators and AI-powered translation tools working together?

The chart shows that 44% of participants see that human translators focusing on complex or creative tasks, while 29% think that AL- powered tools handing repetitive or straightforward tasks, only 27% except other factors.



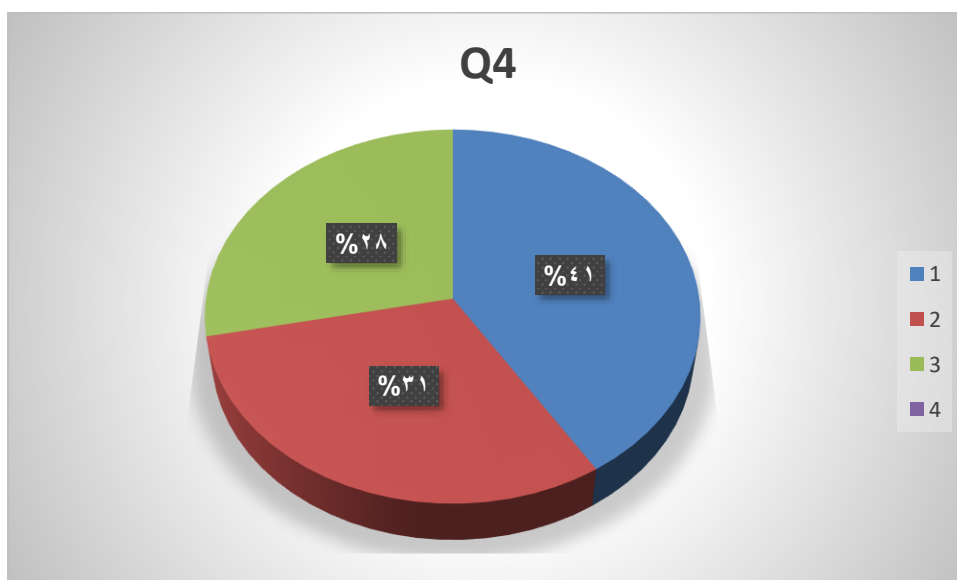
2. What do you think the translation industry will look like in 5- 10 years?

The bar chart shows that 41% of participants expect that the nature of human translators work will be changed in next ten years, whereas 32% see that the demand for human translators will be decreased, only 27% of participants think that that the demand for human translators will be increased.



What is the most appropriate tool for AI translation?

Above chart shows that 37% of participants agree that google translate is the most appropriate tool for AI translation, while 36% of them believe that chat GPT is most useful tool and 27% see the DeepL is most appropriate tool.



How do you think human translators can adapt to the changing landscape of industry?

Above bar-chart shows that 41% of participants agree that human translators can adapt to the changing landscape of industry by developing new skills whereas 31% of them see focusing on high value tasks can help on adapting to the changing landscape of industry, and 28% of participants there are other ways to adapt

5. Conclusions:

The paper has explored the impact of artificial intelligence on the translation profession, examining both the benefits and limitations of machine translation and the role of human translators in this new landscape.

While AI has made significant strides in improving translation accuracy and efficiency, human translators remained essential for high-stakes, nuanced, and culturally sensitive content. The unique strengths of human translators ensure that they will continue to play a vital role in the translation industry.

As AI technology continues to evolve, it's likely that human translators will need to adapt and develop new skills to work effectively alongside machines.

Ultimately, the future of human translator in the age of artificial intelligence will depend on translators' ability to leverage the strengths of both human and machine translation. By embracing the opportunities and challenges presented by AI, human translators can continue to provide high-quality, nuanced translations that meet the needs of diverse clients and audiences.

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