A Systematic Literature Review on the Application of Artificial Intelligence in Translation: Challenges, Innovations, and Impact Across Diverse Fields

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ABSTRACT

With the ongoing expansion of digital technology and global communication, the need for rapid and accurate language translation has become increasingly important. Artificial intelligence has led to significant progress in translation, especially through innovations such as Neural Machine Translation (NMT) and Large Language Models (LLMs). Despite ongoing advancements, these translation systems often fall short in areas such as gender fairness, maintaining accuracy from the source language, and recognizing cultural subtleties. This paper systematically analyzes 29 selected research works to highlight the challenges, novel contributions, and potential implications of AI-assisted translation. The approach used was a systematic review. Results show that Artificial intelligence has improved translation efficiency and identified new opportunities in global trade, research, healthcare, and cross-cultural communication. Yet it needs to tackle several issues, such as algorithmic bias, challenges and nuances in cultural retention, and ethical challenges in the human translation industry. The results of this analysis underscore the need for more comprehensive, precise, and ethical AI models, as well as the importance of AI-human collaboration to achieve the highest-quality translations. This study helps to understand the development of AI-based translation and develop methods for its long-term usage.

1. INTRODUCTION

With globalization and rapid digitalization, demand for immediate, accurate language translation has increased. The adoption of artificial intelligence (AI) in translation has ushered in fundamental changes to the regularities of interlingual engagement (Hutchins, 2019; Koehn, 2020; Jurafsky and Martin, 2021). Since the advent of some new technologies such as Neural Machine Translation (NMT), Large Language Models (LLMs), and deep learning-based systems (Sutskever et al., 2014; LeCun et al., 2015; Goodfellow et al., 2016; Vaswani et al., 2017), the quality of automatic translation has improved dramatically. Recent NMT systems use transformer-based models, and some theoretical studies indicate that these models have been better able to capture syntactic and semantic relatedness than previous models (Cho et al., 2014; Bahdanau et al., 2015; Brown et al., 2020).

Due to this dramatic increase in information exchange, many fields such as education, business, law, and diplomacy are now reaping the benefits of the enhanced capabilities AI-driven translation offers (Gile, 2009; Hale, 2016; Pöchhacker, 2016; House, 2018). The development of Google Translate, DeepL, and transformer-based models has achieved considerable success in comprehending complex sentence-level structures (Knight, 2017; Way, 2018; Melby & Warner, 2019). But while doing so provides clear benefits, it doesn't come without significant challenges. Translation errors caused by AI's deficiencies in understanding, idiomatic expressions, pragmatic context, and cultural nuances impact cross-language communication (Snell-Hornby, 2006; Venuti, 2012; Munday, 2016; Baker, 2018). This feeds into the view of some experts that the role of social and cultural context is one of the most significant challenges in automated translation research that AI systems cannot learn (Nord, 2005; Pym, 2010; Toury, 2012). Moreover, the appearance of algorithmic bias in AI translation systems is a core topic in ethical and justice-oriented linguistics research (Floridi, 2013; Bostrom & Yudkowsky, 2014; Mittelstadt et al., 2016; Dignum, 2019).

Aside from technical and linguistic considerations, using artificial intelligence in translation has social and economic ramifications. One of the most contentious issues is its influence on the human translation profession (Cronin, 2013; Chesterman, 2016; Drugan, 2017; Bowker, 2020). While AI can improve efficiency and speed up the translation process, there are concerns that over-reliance on this technology will diminish the role of professional translators and undermine the creative aspects of human translation (Bielsa & Bassnett, 2009; Schäffner, 2012; Gambier & Van Doorslaer, 2021). Others contend that humans still possess an advantage over AI in terms of contextual meanings and cultural characteristics (Tymoczko, 2007; Hatim & Munday, 2019; Baker & Saldanha, 2020). Therefore, the most important point to study is how AI can collaborate with and/or support human translators to produce optimal translation results rather than replacing them completely (Risku, 2010; Kiraly, 2015; Pym & Torres-Simón, 2017).

Much research has been conducted on the utility of AI in translation, but significant gaps remain in the literature. First, the majority of existing research focuses on improving the accuracy of AI translation systems while neglecting a serious, in-depth analysis of the social, ethical, and economic implications of translating those texts (Stahl, 2006; Moor, 2006; van den Hoven & Vermaas, 2007; Ess, 2013). Second, Dwork et al. (2012), Binns (2018), and Barocas et al. (2019) note that most research on algorithmic bias in translation has not provided systematic strategies for mitigating linguistic and cultural bias in AI. Third, by Hutchins (2001), O'Brien (2012), Carl et al. (2016), and Massardo et al. (2020), which focus more on research and exploration on the impact of human translators in the AI era, and collaborative models between human translators and AI to ensure translation quality and efficiency. Next, Kenny (2017), Garcia (2019), Sánchez-Gijón et al. (2020), and Díaz-Millón et al. (2021) examine the consequences, challenges, and solutions of using artificial intelligence for text translation. In addition, the social and ethical implications of AI-based translation, as well as how the remaining limitations can be addressed, will be reviewed, and the aim/purpose of the study will be stated (Bowker & Fisher, 2010; van der Ploeg, 2012; Feigenbaum, 2015). Therefore, this scholar hopes that

this study will significantly advance knowledge of the evolution of AI Translation and of how AI and its developments can be best used both ethically and sustainably (Melby, 1995; Chesterman & Wagner, 2014; Olohan, 2020).

Specific research questions were formulated to facilitate the systematic review. In a nutshell, the main study topics were 1) the use of artificial intelligence (AI) in translation and the latest breakthroughs. 2) What are the main issues around the use of AI for translation bias, accuracy, and cultural sensitivity? 3) How does the use of AI in translation impact international commerce, education, medicine, and intercultural communication?

2. RESEARCH METHODOLOGY

2.1. Research Design

A systematic review was used in this study to explore the evolution of technology, methodology, and ethical issues in AI-based language translation. This approach is used because it allows the researchers to identify, evaluate, and integrate evidence from relevant studies in a controlled manner (Kitchenham and Charters 2007). This strategy also assures that the study process is visible and reproducible by other researchers (Moher et al., 2009).

2.2. Formulation of Research Questions

a. How is AI used in translation, and what recent breakthroughs have there been?
b. What are the major threats to the use of AI in translation, like bias, quality, and culture?
c. How has AI impacted fields such as international commerce, health, education, and intercultural communication in translation?

2.3. Literature Search

A literature search used relevant keywords such as "AI language translation" and "machine translation". The search was carried out on the Google Scholar database. The literature search followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards (Moher et al., 2009). Inclusion and exclusion criteria were established to ensure that the selected papers were relevant to the study issue.

Inclusion criteria include:

a. Publications within the past 7 years (2018–2024).
b. Studies of AI-based language translation: technology, methodology, and ethics.
c. Literature published in English.

Exclusion criteria include:

a. Unrelated research studies (e.g., AI in other domains).
b. Research that was not peer-reviewed or published in respectable scientific publications.

2.4. Literature Selection and Evaluation

The selection procedure has two stages:

a. Selection based on citation and abstract: Studies that satisfied the exclusion criteria were eliminated according to their citation/abstract.
b. Advanced Selection: Studies that passed the first selection were further reviewed to verify relevance and quality.

Through these two processes, the 100 articles collected from Google Scholar were reduced to 34. A total of 29 articles remained after the advanced selection that complied with the quality standards set for this study.

2.5. Data Extraction

Data were extracted from the selected studies using a pre-designed template. Variables extracted include:

a. General details (author, year of publication, title, and source).
b. AI technologies and methodologies for translation.
c. Evaluation of system efficacy, accuracy, and limitations.
d. The research highlighted ethical and societal consequences.

2.6. Data Analysis and Synthesis

The gathered data was examined both subjectively and quantitatively. A qualitative analysis was used to identify major themes, trends, and patterns in the literature. The quantitative part of the analysis yielded descriptive statistics on publication years, study types, and research areas. Data were categorized according to the study's questions to synthesize the findings.

2.7. Presentation of Results

The study findings are presented in a structured narrative format, supported by tables of findings. The presentation of findings includes:

a. Describe technology advancements and translation approaches using artificial intelligence.
b. Identify the problems and the system's impossibility.
c. Talk about the ethical and social implications.

2.8. Research Ethics

The present study adhered to the academic ethics practised in the normal course of study by avoiding plagiarism, correctly citing sources, and ensuring transparency in the conduct of this research. During the study, no conflicts of interest were found (Higgins and Green, 2011).

3. FINDINGS

3.1. Finding of Data

Table 1. Finding of data

No	Author Name	Title	Year	Research Method	Research Findings	Research Implications
1	J Morley, L Floridi, L Kinsey, A Elhalal	From what to how: an initial review of publicly available AI ethics tools, methods, and research to	2020	This research uses a literature review method and categorizatio n of publicly available AI	Awareness of potential ethical challenges in AI is growing rapidly, but the AI community's	The findings of this research may inform the development of more effective AI ethics tools

		translate principles into practices		ethics tools and methods.	capacity to implement ethical principles is limited.	and approaches, and help the AI community put ethical ideals into practice.
2	MR Costa-jussà, J Cross, O Çelebi, M Elbayad, dkk.	No language left behind: Scaling human-centered machine translation	2022	This research uses a scalable approach to develop human-centered machine translation.	Machine translation may be enhanced to include under-resourced languages, ensuring no language is left behind.	These results promote the development of more inclusive machine translation, which has the potential to remove language barriers throughout the globe.
3	MOR Prates, PH Avelar, LC Lamb	Assessing gender bias in machine translation: a case study with Google Translate	2020	This research uses a case study with Google Translate to assess gender bias in machine translation.	Google Translate tends to produce gender-biased translations, mainly when translating from gender-neutral languages to gendered languages.	These findings highlight the need to develop AI systems that are more inclusive and free from gender bias.
4	J Clusmann, FR Kolbinger, HS Muti, ZI Carrero, et al.	The future landscape of large language models in medicine	2023	This research uses literature analysis and case studies to explore the potential of large language models	LLMs have enormous potential to translate medical terminology into plain English, potentially	These results imply that LLMs have the potential to transform medical communicati on and recordkeepin

				(LLMs) in the medical field.	enhancing patient communicatio n and medical recordkeeping.	g, making medical information more accessible to patients.
5	F Stahlberg	Neural machine translation: A review	2020	This research uses an encoder-decoder architecture to model neural machine translation.	The encoder-decoder architecture yields translations that perform best across a wide range of language pairs.	These findings provide insight into the future development direction of neural machine translation.
6	E Brynjolfsson, X Hui, M Liu	Does machine translation affect international trade? Evidence from a large digital platform	2019	This research uses data analysis from large digital platforms to measure the impact of machine translation on international trade.	Machine translation significantly reduces language barriers and improves cross-border transactions.	These findings suggest that AI can help reduce language barriers in international trade, boosting global economic growth.
7	S Ranathunga, ESA Lee, M Prifti Skenduli, dkk.	Neural machine translation for low-resource languages: A survey	2023	This research uses a literature survey to explore the challenges and solutions in neural machine translation for under-resourced languages.	This research identifies key challenges in neural machine translation for under-resourced languages and offers potential solutions.	These findings can help develop more effective machine translation methods for under-resourced languages.

8	SK Ko, CJ Kim, H Jung, C Cho	Neural sign language translation based on human keypoint estimation	2019	This research uses the KETI dataset to develop an AI-based sign language recognition and translation system.	The developed system shows promising results in addressing the communication gap for the deaf community.	This finding demonstrates the potential of AI to improve communication accessibility for people with disabilities.
9	D Guo, W Zhou, H Li, M Wang	Hierarchical LSTM for sign language translation	2018	This research uses a hybrid HMM-LSTM model to improve the accuracy of sign language translation.	The hybrid model showed significant improvement in sign language translation accuracy.	The findings can be used to develop more effective communication tools for the deaf community.
10	S Rustamova	Translation Problems And Solutions	2023	This research uses problem-and-solution analysis in translation between Uzbek and English.	This research identifies common problems in translation between Uzbek and English and offers solutions to improve translation quality.	The findings can help improve translation quality between Uzbek and English, especially in complex cultural and linguistic contexts.
11	U Ehsan, B Harrison, L Chan, MO Riedl	Rationalization: A neural machine translation approach to generating natural language explanations	2018	This research uses a neural machine translation approach to generate natural language explanations of AI decisions.	The developed system can generate explanations that users can understand when making AI decisions.	These findings can increase transparency and user trust in AI systems.

12	J Muñoz-Basols, C Neville, BA Lafford, C Godev	Potentialities of applied translation for language learning in the era of artificial intelligence	2023	This research uses literature analysis to explore the potential translation application in language learning in the AI era.	Penerapan terjemahan dapat meningkatkan keterampilan berpikir kritis yang diperlukan untuk berinteraksi dengan alat bahasa berbasis AI.	The findings encourage integrating translation into the language-learning curriculum to prepare students for the AI era.
13	J Roberge, M Senneville, K Morin	How to translate artificial intelligence? Myths and justifications in public discourse	2020	This research uses public discourse analysis to uncover the myths and justifications surrounding AI.	This research reveals how public discourse shapes people's understanding of AI technology.	These findings can help improve public understanding of AI and reduce misconceptions.
14	M Hasyim, F Saleh, R Yusuf, dkk.	Artificial Intelligence: Machine Translation Accuracy in Translating French-Indonesian Culinary Texts	2021	This research uses machine translation accuracy evaluation in translating French-Indonesian culinary texts.	Machine translation still struggles to achieve high accuracy in translating culinary texts.	These findings highlight the need to improve machine translation systems for specialized texts, such as culinary texts.
15	Z Zong	Research on the relationship between machine translation and human translation	2018	This research examines the relationship between machine translation and human translation.	Machine and human translation can complement each other to improve translation quality.	The findings encourage collaboration between AI and humans in the translation process.
16	I Dunđer, S Seljan, M	Automatic machine	2020	This research uses	This research identifies key	These findings can

	Pavlovski	translation of poetry and a low-resource language pair		challenge analysis in automatic poetry translation for under-resourced language pairs.	challenges in poetry translation and offers innovative solutions.	help improve the accuracy of poetry translation, especially for under-resourced languages.
17	NA Alowedi, AAMH Al-Ahdal	Artificial Intelligence-based Arabic-to-English machine versus human translation of poetry: An analytical study of outcomes	2023	This study uses a comparative analysis between AI and human translation in Arabic-English poetry translation.	AI translation offers speed advantages but lacks cultural sensitivity and literary nuance.	These findings indicate the need to improve AI systems for handling complex literary translations.
18	Z Lihua	The Relationship between Machine Translation and Human Translation under the Influence of Artificial Intelligence	2022	This research analyses the relationship between machine and human translation under the influence of AI.	AI can improve translation efficiency and accuracy, but human collaboration is still necessary.	These findings encourage the integration of AI in the translation process to improve quality and efficiency.
19	A Guerberof, D Asimakoulas	Creative skills development: training translators to write in the era of AI	2024	This research uses a needs analysis of creative skill development for translators in the AI era.	Creative skills are necessary for translators to adapt to the AI-driven translation landscape.	The findings encourage the development of creative skills training for translators to ensure high-quality, culturally sensitive translations.

20	Z Abdelali, H Bennoudi	AI vs. Human Translators: Navigating the Complex World of Religious Texts and Cultural Sensitivity	2023	This research analyzes the challenges of translating religious texts using AI.	AI has limitations in handling complex cultural and ideological nuances in religious texts.	These findings highlight the need to develop more culturally sensitive AI systems for translating religious texts.
21	O Banimelhem, W Amayreh	Is ChatGPT a Good English-to-Arabic Machine Translation Tool?	2023	This study evaluated the effectiveness of ChatGPT as an English-Arabic translation tool.	ChatGPT shows potential as a translation tool but has limitations in accuracy and cultural sensitivity.	These findings indicate the need to improve AI models for complex language translation, such as Arabic.
22	H Feng, S Xie, W Wei, H Lv, Z Lv	Deep Learning in Computational Linguistics for Chinese Language Translation	2023	This research uses deep learning techniques to improve Chinese translation.	Deep learning has great potential to improve the accuracy of Chinese translation.	The findings can help develop a more effective translation system for Chinese.
23	C Xiao	Comparison of Differences Between Artificial Intelligence Translation and Artificial Translation	2021	This research uses a comparative analysis between AI-based translation and human translation.	AI-based translation offers speed but still falls short in terms of accuracy and cultural sensitivity.	These findings encourage the integration of AI in the translation process to improve efficiency and quality.
24	W LingZhi	Research on the application of artificial	2021	This research analyzes the challenges	AI has great potential to improve	The findings can help develop more

		intelligence in machine translation		and solutions in applying AI to machine translation.	translation accuracy, but faces challenges in handling complex linguistic structures.	sophisticated and accurate translation systems.
25	C Wang	AI-Based Heterogeneous Large-Scale English Translation Strategy	2022	This research uses AI-based strategies to improve large-scale English translation.	The proposed strategy can improve the efficiency and accuracy of large-scale translation.	The findings can help develop a more efficient translation system for English.
26	R. Valentim, I. Drago, M. Mellia, et al.	Lost in Translation: AI-based Generator of Cross-Language Sound-squatting	2023	This research utilizes a multi-language-based AI system to generate cross-language sound-squatting domains.	The developed system can generate sound-squatting domains that pose potential security risks.	These findings highlight the need for security risk mitigation measures in cross-language AI systems.
27	VD Avina, M Amiruzzaman, S Amiruzzaman, LB Ngo, et al.	An AI-Based Framework for Translating American Sign Language to English and Vice Versa	2023	This study uses deep learning models and keypoint estimates to translate between American Sign Language (ASL) and English.	The technology developed can produce accurate, real-time translations.	These discoveries may help the deaf and hard-of-hearing communities communicate more effectively.
28	Y Liu	Application of artificial	2022	This research uses function	AI-based translation	This research demonstrates

		intelligence technology in computer-aided translation software		testing of AI-based translation software.	software can perform translation tasks swiftly and accurately.	the potential of artificial intelligence in developing computer-based translation technologies.
29	CAB León	Challenges of Artificial Intelligence and Automated Translation in the Field of Foreign Languages	2023	This study employs problem analysis and tactics to develop AI-powered translation systems in foreign languages.	AI-based translation systems are still limited in handling intricate language and cultural subtleties.	The results support the creation of more culturally sensitive and accurate translation systems.

3.2. How is artificial intelligence (AI) applied in translation, and what are the latest innovations that have been developed?

Artificial intelligence applications in the translation field have demonstrated significant advances, embodied in techniques such as neural machine translation (NMT), legal language modelling (LLMs), and sign language translation. Artificial Intelligence (AI) has applied various models and techniques to translation, among the most significant are Neural Machine Translation (NMT) and Large Language Models. Stahlberg (2020) describes the NMT model, which employs an encoder-decoder architecture to accurately translate text between languages. Meanwhile, LLMs like GPT and ChatGPT have revolutionized translation by producing more natural, contextually relevant language (Banimelhem & Amayreh, 2023).

Other recent breakthroughs include: a) Low-Resource Language Translation: Costa-jussà et al. (2022) found a way for minority languages not to be left behind in machine translation. b) Sign Language Translation: Ko et al. (2019) and Avina et al. (2023) created AI models that can translate sign language into text and vice versa, making communication easier for persons with impairments. c) Medical Translation: Clusmann et al. (2023) have shown that LLMs may translate complicated medical terminology into English that patients can understand. d) Poetry and Literature Translation: Alowedi and Al-Ahdal (2023) investigated using AI to translate poetry. However, expressing emotional and cultural subtleties remains a difficulty.

3.3. What are the main challenges faced in applying AI for translation, including bias, accuracy, and cultural sensitivity?

The main challenges include gender bias, accuracy in low-resource languages, and cultural sensitivity. The main challenges in applying AI for translation include a) Gender Bias: Prates et al. (2020) found that translation systems like Google Translate tend to produce gender-biased translations, especially in gender-structured languages. For example, gender-neutral phrases in English are often translated into other languages with gender-specific assumptions. b) Accuracy in Low-Source Languages: Ranathunga et al. (2023) highlighted that minority or low-source languages often lack sufficient training data, resulting in less accurate translations. c) Cultural Sensitivity: Abdelali and Bennoudi (2023) emphasized that AI often fails to capture cultural and contextual nuances in translation, especially in sensitive texts such as religious or literary texts. d) Limitations in Contextual Translation: Although models like ChatGPT show progress, Banimelhem and Amayreh (2023) found that AI still struggles to capture cultural and idiomatic context in Arabic translation. e) Ethics and Privacy: Roberge et al. (2020) identified that using AI in translation raises ethical questions, such as data privacy and the machines' potential replacement of human jobs.

3.4. How will the application of AI in translation impact areas such as international trade, medicine, education, and cross-cultural communication?

AI influences various industries, including international commerce, health, education, and cross-cultural communication, yet there are still obstacles to be solved. The use of AI in translation has dramatically influenced many fields: a) International commerce: Brynjolfsson et al. (2019) discovered that machine translation has lowered language barriers in international commerce, making cross-border transactions easier and increasing global company efficiency. b) Medical Field: Clusmann et al. (2023) have shown that AI can convert complex medical terminology into more understandable English, increasing communication between physicians and patients and facilitating international medical information sharing. c) Education: Muñoz-Basols et al. (2023) investigated the potential of AI-based translation in language learning, claiming it may increase students' critical thinking abilities and comprehension of foreign literature. d) Cross-Cultural Communication: Artificial intelligence has allowed more inclusive communication, such as sign language translation (Ko et al., 2019) and culturally sensitive text translation (Abdelali & Bennoudi, 2023). However, cultural sensitivity and accuracy must be addressed to ensure AI translation can be used effectively across cultures.

4. DISCUSSION

Artificial intelligence (AI) in translation has resulted in substantial advancements in various areas, including daily texts and specialist translations such as medical, literary, and sign language. The 29 studies showed that AI, in the form of neural machine translation (NMT) and large language models (LLMs), "has improved accuracy and efficiency in translation". But those obstacles have proven stubbornly difficult, especially in gender bias, low-resource language translation, and cultural sensitivity. For one thing, gender bias persists: Prates et al. (2020) noted that Google Translate still tends to use gendered

pronouns only in gendered languages, while Ranathunga et al. (2023) highlighted the challenge of translating minority languages with limited training data.

Innovations in AI-based translation have also created new prospects, particularly in medicine and cross-cultural communication. Clusmann et al. (2023) showed that LLMs may translate complicated medical terminology into plain English, improving communication between physicians and patients. On the other hand, AI-based sign language translation systems, such as those developed by Ko et al. (2019) and Avina et al. (2023), have paved the way for more inclusive communication for people with impairments. However, technological issues such as accuracy in identifying sign language motions and processing speed must be addressed.

AI's influence on translation may also be seen in international commerce. Brynjolfsson et al. (2019) found that machine translation has lowered linguistic barriers in global commerce, leading to more cross-border transactions. However, research by Rustamova (2023) warns that translations across languages with highly distinct linguistic systems, such as Uzbek and English, still have accuracy concerns. According to Alowedi and Al-Ahdal (2023), despite significant development in AI, human translation is still required for settings that need high accuracy, such as the translation of poetry or religious literature.

On the other hand, introducing AI models like ChatGPT has breathed new life into colloquial translation. Banimelhem and Amayreh (2023) assessed the efficiency of ChatGPT in English-Arabic translation and discovered that the model has significant promise. However, there is still room for improvement in accuracy and cultural context. However, using AI in translation creates ethical concerns, as Roberge et al. (2020) noted. They observe that public conversation about AI is often riddled with misconceptions and excuses, which might obscure awareness of AI's limits and hazards.

Overall, the results of these 29 studies demonstrate that AI has transformed translation by enhancing efficiency and creating new possibilities. However, prejudice, accuracy, and cultural sensitivity must be addressed. Furthermore, cooperation between AI and humans remains crucial, particularly in situations that require a thorough understanding of language and cultural subtleties. Future research should focus on developing more inclusive, accurate, and ethical AI models and on investigating the social effects of translation automation on the human translation industry.

5. CONCLUSION

Artificial intelligence (AI) in translation has resulted in substantial advancements in various areas, including daily texts and specialist translations such as medical, literary, and sign language. Innovations like Neural Machine Translation (NMT) and Large Language Models (LLMs) have improved translation accuracy and efficiency, enabling faster, more efficient cross-language communication. Despite all of this, significant challenges remain, especially when it comes to sexism, low-resource language translation, parallel corpora, and cultural nuances.

AI has also made strides in translation systems (for example, sign language, medical records, and poetry). However, technical challenges impede the detection and

interpretation of sign language movements. Moreover, machines do not exist in cultural or emotional contexts, especially with sensitive content such as religion or literature. Google Translate and related translation technologies tend to produce gender-biased translations, especially in gender-structured languages. For smaller or low-resource languages with few parallel data, it is impossible to achieve accurate translations.

AI's influence on translation can be seen across industries, including international commerce, education, medicine, and intercultural communication. Machine translation has removed the language barrier in international trade, facilitating more cross-border sales and making global businesses more effective. Named SMART (Semantic Medical Transformer), it empowers AI to improve doctor-patient conversations and global patient education by translating complex medical terms into plain language. AI in education would enable students to understand alien concepts and also enhance their analytical skills. AI has also allowed more inclusive communication by translating sign language and culturally relevant texts.

However, using AI in translation raises ethical concerns, such as data privacy and the potential replacement of human labor by robots. Collaboration between AI and humans remains crucial, particularly in situations that require a thorough understanding of language and cultural subtleties. Future research should focus on developing more inclusive, accurate, and ethical AI models and on investigating the social effects of translation automation on the human translation industry. Overall, the results from the 29 publications examined suggest that AI has transformed translation by enhancing efficiency and creating new possibilities; however, issues such as bias, accuracy, and cultural sensitivity remain to be addressed.

As a result of this finding, there are also technological, social, ethical, and existential ramifications. Technologically, this research highlights the necessity of better, or at least more equal, training of AI models for low-resourced languages and translations that require fine-grained cultural understanding. The study suggests that AI is a life changer for human translators in the sense that AI has affected the livelihood of translators internationally. The main worry now is that computers can completely take over translation from humans. A key concern is now the fear that computers may replace humans altogether in translation. In ethical terms, using AI for translation raises questions about privacy and data protection. It is especially true when sensitive information, such as healthcare documents or religious publications, needs to be translated. In practice, AI has shown great promise in improving translation efficiency across fields such as business, international trade, medicine, and education. Lastly, this finding opens up avenues for future research in human-AI cooperation. It indicates that such collaboration should be explored to find the best model for cooperation between AI and humans to achieve high-quality translation. Furthermore, the constraints of translating minority or low-resource languages require novel solutions, underscoring the need for ongoing research to develop methodologies and models that improve translation accuracy in these languages. Overall, the findings of this study highlight the importance of creating more inclusive, accurate, and ethical AI technologies, as well as encouraging closer cooperation between AI and humans to address current challenges.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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