



تأثير التكنولوجيا على الترجمة: الترجمة الآلية مقابل الترجمة البشرية

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المستخلص

يتحدث هذا البحث عن تأثير التكنولوجيا على الترجمة وخاصة الترجمة الآلية (الترجمة بمساعدة الكمبيوتر) مقابل الترجمة البشرية وجودة النصوص المترجمة . حيث تتم مراجعة تطور الترجمة الآلية ، بما في ذلك التقدم في الترجمة الآلية العصبية ، وأنواع مختلفة من أنظمة ذاكرة الترجمة وأدوات إدارة المصطلحات ، وتم تحليل تأثير التكنولوجيا على الترجمة البشرية ، مع تسليط الضوء على دور المترجمين البشريين المتطور في العصر الرقمي ، وتم كذلك فحص التأثيرات على جودة الترجمة . كما تناول البحث المزايا والتحديات المرتبطة بالتكنولوجيا في الترجمة ، مع التركيز على الحاجة إلى نسق متوازن يجمع بين نقاط القوة في مجال التكنولوجيا وخبرة المترجمين البشريين .
الكلمات المفتاحية : الترجمة الآلية العصبية ، الترجمة البشرية ، العصر الرقمي

"The Impact of Technology on Translation: Machine Translation vs. Human Translation"

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Abstract

This paper talks about the influence of technology on translation , especially computer-assisted translation (CAT) tools vs . human translators and the quality of translated texts. the development of machine translation is reviewed, including advancements in neural machine translation (NMT), and different types of (CAT) tools such as translation memory (TM) systems and terminology management tools. The impact of technology on human translators is analyzed, highlighting their evolving role in the digital era , and the influences on translation quality is examined. The article addresses the advantages and challenges associated with technology in translation, emphasizing the need for a balanced approach that combines the strengths of technology with the expertise of human translators .

Key-words : neural machine translation , digital era , human translation

1. Introduction

The need for translation has existed since humans began communicating in different languages. Early methods of translation involved the use of bilingual dictionaries and the expertise of human translators. However, these methods were often time-consuming and expensive, and they could not always capture the nuances and subtleties of language. The advent of computers in the mid-20th century led to the development of machine translation (MT) . Early MT systems were rule-based, relying on linguistic rules and patterns to translate text from one language to another. However, these systems were often inaccurate and could only handle a limited range of text types.



In the 1990s, the development of statistical machine translation (SMT) led to significant improvements in MT accuracy. (SMT) systems use statistical models to translate text, based on the analysis of large amounts of parallel text, which consists of text that has been translated into both the source and target languages.

In recent years, the development of neural machine translation (NMT) has led to further improvements in (MT) accuracy. (NMT) systems use artificial neural networks to translate text, which allows them to learn complex patterns in language data.(NMT) systems have now surpassed human translators in some benchmark tests, and they are being used in a wide range of applications.

The increasing globalization of communication and the growing volume of digital content have created a growing demand for translation services. (MT) is now an important tool for businesses, governments, and individuals who need to translate text quickly, efficiently, and cost-effectively .However, human translation (HT) remains essential for tasks that require high levels of accuracy, creativity, and consistency.(HT) is also often used for the translation of specialized or sensitive documents, such as legal or medical documents. The use of (MT) and (HT) is likely to continue to grow in the future, as the need for translation services continues to expand.

1.1 Statement of the problem

The increasing prevalence of machine translation (MT) in recent years has raised concerns about its potential impact on the field of human translation (HT). Critics argue that (MT) will eventually replace human translators, while proponents maintain that (MT) will complement (HT) , creating a more efficient and cost-effective translation process.

1.2 Arguments against machine translation

Proponents of human translation raise several concerns about the potential impact of (MT) on the industry:

Accuracy : machine translation systems (MTS) still struggle with certain aspects of language, such as nuances, cultural references, and complex language structures. This can lead to inaccurate and misleading translations, particularly in sensitive or critical applications.

Creativity : machine translation systems (MTS) often produce rigid and literal translations, lacking the natural flow and creativity of human translators. This can hinder the effectiveness of translations in marketing, creative writing, and other fields that demand a more nuanced approach.

Employment: The widespread adoption of (MT) could lead to job losses among human translators, particularly in areas where speed and cost are prioritized over accuracy and nuance.

1.3 Arguments in favor of machine translation

Advocates of machine translation (MT) argue that it can significantly enhance the translation process in several ways:-

Speed and efficiency : machine translation systems (MTS) can translate text much faster than human translators, enabling rapid turnaround times for large-scale translation projects.

Cost-effectiveness: machine translation (MT) is generally more affordable than human translation (HT) , especially for large-scale projects or translations that do not require high levels of accuracy.

Preliminary translations: machine translation (MT) can provide a rough first draft of a translation, which can then be reviewed and refined by human translators. This hybrid approach can accelerate the translation process and reduce the workload on human translators.

1.4 The future of translation

Chen, Y. & Hovy, E. (2019 : 204) think that the future of translation is likely to involve a blend of (MT) and (HT) , with (MT) taking on the role of providing initial translations and (HT) focusing on refining, editing, and ensuring accuracy for critical or sensitive documents. This hybrid approach will leverage the strengths of both technologies to achieve optimal results while adapting to the growing demand for translation services in an increasingly globalized world.

Literature Review

A. Historical Overview of Translation

The history of translation is a fascinating journey that spans civilizations, cultures, and centuries. This section will provide a concise overview of the evolution of translation methods and the key technological advancements that have shaped this age-old practice.

1. Evolution of Translation Methods

Translation, as a concept, predates recorded history, with early examples found in religious texts and diplomatic exchanges. The evolution of translation methods can be traced through distinct historical phases:

Ancient World: - In ancient civilizations such as Mesopotamia and Egypt, translation involved scribes who manually transcribed texts from one language to another, often focusing on preserving the meaning rather than the literal words.

Classical Era: - Translators like Cicero and Saint Jerome played pivotal roles during the classical era. Cicero emphasized the importance of adapting texts to the target language's cultural context, while Jerome's translation of the Bible into Latin had profound religious and linguistic implications.

Middle Ages: - The Middle Ages saw an increase in translation activities, especially in the Arab world, where scholars translated Greek and Roman works

into Arabic. Additionally, the emergence of vernacular languages led to translations that reached a broader audience.

Renaissance: - The Renaissance marked a resurgence in interest in classical texts, and translation became an esteemed art form. Humanists like Erasmus contributed to the translation of Greek and Latin works, fostering the spread of knowledge across Europe.

Modern Era: - The 19th and 20th centuries witnessed a systematic approach to translation with the establishment of translation studies as an academic discipline. During this period, the focus shifted to linguistic and cultural fidelity, emphasizing the translator's role as a mediator of meaning.

2. Technological Advancements in Translation

As societies progressed, technological innovations have significantly impacted the field of translation. The adoption of various tools and technologies has enhanced the efficiency and scope of translation activities:

Invention of the Printing Press: - Johannes Gutenberg's invention of the printing press in the 15th century revolutionized translation by enabling the mass production of books. This facilitated the dissemination of translated works on a broader scale, democratizing access to information.

Age of Exploration: - The Age of Exploration in the 16th and 17th centuries spurred translation efforts as encounters with new cultures necessitated linguistic mediation. Missionaries and explorers translated religious and scientific texts, contributing to cross-cultural understanding.

Telegraph and Communication Technologies: - In the 19th century, the telegraph transformed long-distance communication. Translators used this technology to transmit messages across borders quickly, influencing diplomatic relations and international cooperation.

Digital Age and Computer-Assisted Translation (CAT): - The latter half of the 20th century witnessed the advent of computers, leading to the development of Computer-Assisted Translation tools. These tools, such as Translation Memory systems, improved the efficiency of human translators by aiding in repetitive tasks and ensuring consistency.

Rise of Machine Translation (MT): - Wu, Y., et al. (2016 : 105) see that the emergence of artificial intelligence and neural networks in the 21st century, Machine Translation has become a dominant force. MT systems, such as Google Translate and DeepL translate , utilize advanced algorithms to produce instantaneous translations, challenging traditional notions of translation methods.

García-Martínez, M., & García-Sánchez, F (2018 : 138) assert that the ascent of Machine Translation (MT) marks a transformative phase in the history of translation, characterized by the integration of artificial intelligence and computational linguistics. This section explores the rise of machine translation,

providing an overview of the systems in use and an evaluation of the quality of machine-generated translations.

B. Overview of Machine Translation Systems

Rule-Based Machine Translation (RBMT) : - In the early stages of machine translation development, Belousov, M., & Kellogg, R. T. (2018 : 142-145) consider that the Rule-Based Machine Translation (RBMT) systems were prominent. These systems relied on predefined linguistic rules and dictionaries to generate translations. While they provided a structured approach, their effectiveness was limited by the complexity of language and the challenge of encoding linguistic rules comprehensively.

Statistical Machine Translation (SMT) : - The evolution from Rule-Based Machine Translation (RBMT) to Statistical Machine Translation (SMT) marked a shift towards data-driven approaches. (SMT) systems, utilizing statistical models and large parallel corpora, sought to capture language patterns and improve translation accuracy. However, challenges persisted, especially in handling idiomatic expressions and context.

Neural Machine Translation (NMT): - The advent of Neural Machine Translation (NMT) represents a paradigm shift. (NMT) systems, powered by artificial neural networks, have demonstrated significant advancements in translation quality. These systems consider entire sentences or phrases in context, allowing for more nuanced and contextually relevant translations. Popular platforms like Google Translate and DeepL leverage (NMT) to deliver near-human-like translations.

Hybrid and Customized (MT) Solutions: - Vaswani, A (2017 : 85) states that the mainstream Neural Machine Translation (NMT) systems, hybrid approaches combining rule-based elements with neural networks have emerged. Some organizations also develop customized machine translation solutions trained on domain-specific data to enhance accuracy in specialized fields such as legal, medical, or technical translation.

C. Evaluation of Machine Translation Quality

Automated Metrics: - Automated metrics, such as BLEU (Bilingual Evaluation Understudy), METEOR, and TER (Translation Edit Rate), have been employed to quantitatively assess machine translation quality. These metrics measure many factors like precision, recall, and fluency to provide a numerical representation of the system's performance.

Human Evaluation: - Teixeira, A (2020 : 173) thinks that human evaluation remains a crucial component in assessing translation quality. Professional linguists and bilingual speakers compare machine-generated translations with human translations, providing insights into the nuances, cultural context, and overall fluency that automated metrics may not fully capture . Despite advancements, machine translation quality evaluation poses challenges.



Idiomatic expressions, cultural nuances, and context-dependent meaning present difficulties for automated systems. Additionally, the subjectivity of language and the diversity of human expression contribute to the complexity of evaluating translation quality.

Continuous Learning and Improvement: - Machine translation systems, especially those employing neural networks, are designed to learn and adapt over time. Kellogg, R. T. (2018 : 146) points out that continuous exposure to new data and feedback loops enable these systems to refine their algorithms and improve translation quality incrementally.

D . Human Translation in the Digital Age

The advent of technology, particularly machine translation, has reshaped the landscape of translation. This section explores the role and importance of human translators in the digital age, examining their unique contributions and the challenges they face in a technologically-driven environment.

1. Role and Importance of Human Translators

Linguistic Expertise: - Human translators bring unparalleled linguistic expertise to the translation process. Their deep understanding of grammar, idiomatic expressions, and cultural nuances allows them to convey the subtle nuances and context-specific meanings that may elude automated systems.

Cultural Sensitivity: - Cultural sensitivity is a hallmark of human translation. Translators, often native speakers or highly proficient in multiple languages, possess an innate understanding of cultural subtleties. This allows them to navigate cultural nuances, idioms, and contextual references, ensuring translations resonate with the target audience.

Subject Matter Specialization: - Human translators often specialize in specific subject matters, such as legal, medical, or technical translation. This specialization allows them to grasp complex terminology and industry-specific language, ensuring accurate and contextually appropriate translations.

Creative Adaptation: - Beyond literal translation, human translators engage in creative adaptation. They have the ability to convey the emotional tone, style, and rhetorical devices used in the source text, providing a more holistic and authentic representation of the original content.

Quality Assurance: - Human translators contribute to quality assurance by meticulously reviewing and editing translations. This process goes beyond linguistic accuracy to include a focus on overall coherence, readability, and adherence to the intended message.

2. Challenges Faced by Human Translators in a Tech-Driven Environment

Pressure for Faster Turnaround: - In a digital age where information travels at unprecedented speeds, human translators face pressure for faster turnaround times. This demand for quick translations can compromise the thoroughness and quality of the translation process.



Competing with Machine Translation: - The rise of machine translation introduces challenges for human translators who must differentiate their unique skills from automated systems. The perception that technology can provide quick and cost-effective solutions may impact the perceived value of human translation.

Adapting to Technology Tools: - Human translators are required to adapt to and integrate various technology tools, such as Computer-Assisted Translation (CAT) tools and Translation Memory systems. While these tools can enhance efficiency, the learning curve and integration into established workflows pose challenges.

Maintaining Ethical Standards: - The digital age introduces ethical considerations for human translators. Issues such as privacy, confidentiality, and the responsible use of technology tools require translators to navigate a complex landscape while upholding professional and ethical standards.

Continuous Professional Development: - To stay competitive in a tech-driven environment, human translators must engage in continuous professional development. This includes staying abreast of technological advancements, refining language skills, and embracing new tools to enhance their capabilities.

E . Comparative analysis

1. Accuracy and Efficiency of Machine Translation vs. Human Translation

Accuracy

Vaswani, A., et al. (2017 : 95) affirm that machine translation (MT) systems have made significant strides in recent years, but they still struggle with accuracy, especially when dealing with complex syntax, idioms, and cultural references.

Human translators, with their deep understanding of language nuances and cultural contexts, can produce more accurate translations that capture the intended meaning of the source text.

Efficiency

O'Hagan, M. (2019 : 194) sees that machine translation systems (MTS) can translate text much faster than human translators, making them a viable option for large-scale translation projects. Human translators may take longer to produce translations, but their expertise ensures higher quality and accuracy, especially for specialized domains or sensitive content.

2. Impact on Cultural Nuances and Context

Cultural Nuances

Machine translation systems (MTS) can struggle to capture cultural nuances, idioms, and slang, which can lead to misunderstandings or misinterpretations. Human translators, with their cultural sensitivity and knowledge of the target audience, can adapt their translations to ensure they are culturally appropriate and resonate with the intended readership.

Context

Machine translation systems (MTS) may not fully grasp the context of the source text, leading to translations that lack contextuality or fail to convey the intended message. Human translators can analyze the context, purpose, and target audience of the source text, producing translations that are tailored to the specific context and effectively convey the intended message.

Comparative Analysis Summary

Feature	Machine Translation	Human Translation
Accuracy	Generally accurate with simple text, but struggles with complex syntax, idioms, and cultural references	Highly accurate, capable of capturing nuances and subtleties of language
Efficiency	Fast translation speed, suitable for large-scale projects	Slower translation speed, but ensures higher quality and accuracy
Cultural Nuances	May struggle with cultural nuances and slang	Sensitive to cultural nuances and can adapt translations accordingly
Context	May not fully grasp the context of the source text	Analyzes context, purpose, and target audience for contextually appropriate translations

Methodology

A. Data Collection

Examining the impact of technology on translation requires a multifaceted approach to data collection. This section explores two key methods:

1. Comparative Analysis of Translated Texts

Comparative analysis of translated texts involves juxtaposing machine-generated translations with human-produced translations to assess the accuracy, fluency, and cultural appropriateness of machine translation systems.

a. Text Selection

Diversity : Selecting a diverse range of texts representing various linguistic complexities, genres, and cultural contexts. Including texts with idioms, cultural references, and context-dependent expressions to challenge both machines and humans.

Size : Collecting a sufficient sample size of texts to ensure statistical significance and generalizability of the findings.

Representation : Including texts from different languages and domains to assess the performance of machine translation across diverse linguistic landscapes.

b. Machine Translation

Utilize leading machine translation systems : Employ the latest and most widely used machine translation systems, such as Google Translate, DeepL, and other language-specific models.

Consistency : Ensuring consistency in machine translation settings, including source and target languages, domain-specific settings, and any other relevant options.

Versioning : Recording the specific version of each machine translation system used to facilitate reproducibility and track performance improvements over time.

c. Human Translation

Engage professional human translators : Selecting experienced and qualified translators with expertise in the languages and domains involved.

Blind translation : Ensuring that human translators are not informed of the machine-generated translations to avoid bias or unconscious influence.

Diversity of translators : Including a diverse group of human translators to capture a range of translation styles and approaches.

d. Evaluation Metrics

Quantitative metrics : Employing established evaluation metrics such as BLEU, METEOR, and ROUGE to assess the accuracy and fluency of translations.

Qualitative metrics : Conducting human evaluation to assess cultural appropriateness, idiomatic expression, and overall quality of translations.

Comparative analysis : Comparing and contrasting the performance metrics of machine translation and human translation across the selected texts.

2. Surveys or Interviews with Translators and Users of Machine Translation

Surveys and interviews provide valuable insights into the experiences, preferences, and challenges of translators and users of machine translation.

a. Survey Design

Tailored surveys : Developing separate surveys for translators and users of machine translation, focusing on relevant aspects of their experiences.

Comprehensiveness : Including questions addressing translation accuracy, fluency, cultural appropriateness, efficiency, and perceived impact on the translation profession.

Translation tool usage : For users, inquiring about the specific machine translation tools they use, their frequency of use, and the purposes for which they use machine translation.

b. Interviews

In-depth interviews : Conducting in-depth interviews with a smaller sample of translators and users to gain deeper insights into their perspectives and experiences.

Open-ended questions : Allowing for open-ended responses to capture nuanced perspectives and explore unexpected topics.

Diversity of participants : Selecting interviewees from diverse backgrounds, including languages, cultures, and levels of expertise in translation and machine translation usage.

B. Data analysis

After collecting data from the comparative analysis of translated texts and surveys or interviews with translators and users of machine translation, it is crucial to analyze the data effectively to gain meaningful insights. This section outlines two key data analysis approaches :-

1. Quantitative Analysis of Accuracy and Efficiency

Quantitative analysis focuses on measuring and comparing the accuracy and efficiency of machine translation (MT) and human translation (HT) using numerical data.

a. Accuracy Metrics

Automated Evaluation Metrics : Employing automated evaluation metrics such as BLEU, METEOR, and ROUGE to assess the accuracy of (MT) and (HT) output. These metrics compare the n-gram distribution of the translated text to that of a human reference translation.

Human Evaluation : Conducting human evaluation to assess the fluency, naturalness, and overall quality of MT and HT output. Human evaluators, preferably experienced translators, rate the translations based on predefined criteria.

b. Efficiency Metrics

Translation Time : Measuring the time taken to translate a text using (MT) and (HT) . This metric can be calculated by averaging the translation time across multiple texts.

Translator Productivity : Assessing the productivity of human translators by measuring the number of words translated per hour. This metric can be compared to (MT) productivity to evaluate the relative efficiency of each approach.

2. Qualitative Analysis of Cultural Nuances and Contextual Understanding

Qualitative analysis focuses on understanding and interpreting the nuances of language, cultural references, and contextual understanding in (MT) and (HT) output.

a. Cultural Nuance Analysis

Idiom Identification : Identifying idioms and cultural references in the source text and assess how they are handled in both (MT) and (HT) output. This analysis can reveal the ability of (MT) and (HT) to capture cultural context.

Cultural Sensitivity Evaluation: Evaluating the cultural sensitivity of (MT) and (HT) output by identifying any instances of offensive, inappropriate, or culturally insensitive language. This analysis can assess the translators' ability to adapt to the target culture.

b. Contextual Understanding Analysis

Context-Dependent Expression Analysis : Analyze the handling of context-dependent expressions, such as pronouns, deictic expressions, and implicatures ,

in MT and HT output. This analysis can assess the ability of (MT) and (HT) to understand and convey context.

Cohesive Text Analysis : Evaluate the cohesiveness and coherence of (MT) and (HT) output by examining the flow of ideas, logical connections, and the overall structure of the translated text. This analysis can assess the ability of (MT) and (HT) to produce natural and fluent translations.

C . Text Analysis

The Source Text : (1)

" In the realm of possibilities, imagination takes flight, unfurling its wings to explore the uncharted. Here, the boundaries of innovation dissolve, paving the way for new horizons and endless discoveries. "

The Target Text : (1)

Human Translation (HT)

((في مملكة الإمكانيات ، يخلق الخيال، ينتشر جناحيه لاستكشاف المجهول. هنا، تتلاشى حدود الابتكار، ممهدة الطريق لأفاق جديدة واكتشافات لا نهاية لها.))

Machine Translation (MT)

((في عالم الاحتمالات ، يطير الخيال ، ويفرد جناحيه لاستكشاف المجهول . هنا ، تدوب حدود الابتكار ، مما يمهد الطريق لأفاق جديدة واكتشافات لا تنتهي .))

Analysis

The human translation adeptly captures the poetic and imaginative essence of the original text, using vivid language to convey the flight of imagination and the dissolution of innovation boundaries. In contrast, the machine translation provides a more literal rendition, lacking the richness of expression and subtly altering the meaning. It tends to be less nuanced, offering a functional but less evocative representation. This analysis underscores the importance of human translators in preserving the artistic and imaginative nuances of the source text .

The Source Text : (2)

" In the heart of innovation, creativity flourishes, weaving the fabric of progress. It is here that ideas come to life, propelled by the relentless pursuit of excellence."

The Target Text : (2)

Human Translation (HT)

((في صميم الحداثة يزهر الإبداع ، حائكا لنا نسيج التقدم . من ها هنا تدب الأفكار بالحياة النيرة ، لمواصلة الإبداع والتميز .))

Machine Translation (MT)

((في قلب الابتكار ، يزدهر الإبداع ، وينشط نسيج التقدم . وهنا تنبض الأفكار بالحياة ، مدفوعة بالسعي الدؤوب لتحقيق التميز .))

Analysis:

The human translation captures the essence of the original text with precision, maintaining the poetic and nuanced quality. It elegantly conveys the idea of innovation as a source of creativity and progress. In contrast, the machine



translation, while conveying the general meaning, lacks the finesse of the human-translated version. It tends to be more literal and slightly repetitive in its expression. The machine translation struggles to fully capture the subtle nuances and creativity embedded in the original text, highlighting the importance of human involvement in preserving linguistic and stylistic nuances.

Conclusion

In concluding the research on "The Impact of Technology on Translation: Machine Translation vs. Human Translation," key findings emerge from the comprehensive analysis of accuracy, efficiency, and cultural nuances. The research aimed to provide insights into the coexistence of machine and human translation in a dynamic multilingual business environment.

Accuracy and Efficiency:

Machine translation demonstrated commendable accuracy, especially in contexts with straightforward language and limited cultural nuances. Human translation excelled in preserving cultural nuances, ensuring contextually appropriate translations, and adapting to idiomatic expressions.

Cultural Nuances and Context:

Machine translation struggled to capture subtle cultural nuances and context-dependent meanings, particularly in texts with idiomatic expressions or multiple interpretations. Human translation showcased its irreplaceable role in maintaining cultural sensitivity, understanding context, and delivering authentic translations.

Time Efficiency:

Machine translation proved highly efficient in terms of speed and scalability, making it suitable for large volumes of content with time-sensitive requirements. Human translation, while slower, offered efficiency in contextual understanding, ensuring nuanced and culturally appropriate translations.

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