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USING NEURAL NETWORKS AND AI IN TRANSLATION: CHATGPT, DEEPL AND OTHER TECHNOLOGIES

Abstract: In recent years, artificial intelligence (AI) and neural network technologies have revolutionized the field of translation. Modern tools such as ChatGPT, DeepL, Google Translate, and others have automated the translation process, increasing both speed and accuracy. However, despite these clear advantages, the use of AI in translation faces several challenges, including handling cultural and contextual nuances, the need for post-editing, and ethical concerns. This article explores the principles behind neural machine translation systems, their strengths and limitations, and prospects for their future development in professional translation.

Keywords: neural machine translation, artificial intelligence, machine translation, ChatGPT, DeepL, automation

INTRODUCTION

In the digital transformation era, artificial intelligence (AI) and neural networks have dramatically changed the approach to translation. Whereas machine translation once evoked awkward phrasing and word-for-word literalism, today systems like DeepL, ChatGPT, and Google Translate demonstrate impressive accuracy — sometimes comparable to that of human professionals. Modern technologies are increasingly becoming integral to various aspects of daily life, necessitating innovative solutions across different fields. Particularly in the realms of language learning and translation, the significance of Artificial Intelligence (AI) and neural networks has surged in response to globalization and the expanding boundaries of communication. AI-driven technologies, including neural networks such as ChatGPT and DeepL, have the potential to dramatically enhance translation quality, making them indispensable components of linguistic services. The evolution of translation tools has passed through multiple stages, from manual translations to automated machine translations. Today, thanks to the capabilities of deep learning in AI, there has been a significant improvement in translation quality, and the process continues to evolve. Neural networks, especially the transformer architecture, have brought revolutionary changes to this field. Transformers utilize attention mechanisms that allow the model to analyze entire sentences or text segments simultaneously, which results in more accurate and natural translations. Technologies like ChatGPT and DeepL not only perform literal translations but also possess the ability to understand and maintain the semantic level of the text, translating it into a new language while preserving its meaning. This approach enhances the efficiency and accuracy of the translation process, facilitating easier exchange of information across different languages.

However, the application of these technologies also involves various challenges and limitations. For instance, issues such as the lack of high-quality translation databases for less-studied languages, difficulties in correctly translating idiomatic expressions, and capturing cultural nuances are still prevalent. Therefore, future research and developments should aim to address these issues.

This article delves deeper into the use of AI and neural networks in translation. We will explore leading technologies like ChatGPT and DeepL, examining their operational principles, applications, and prospects for future advancements.

From “Rules” to neural networks: a brief history of machine translation

Rule-based machine translation (RBMT)

Early systems (1950s–1990s) relied on dictionaries and grammatical rules. Examples: Systran, Promt.

Drawbacks: literalism, inability to process context.

Example: “The spirit is willing, but the flesh is weak” → “Vodka is strong, but the meat is rotten” (idiomatic mistranslation).

Statistical Machine Translation (SMT)

2000s: Algorithms analyzed parallel text corpora (e.g., pre-2016 Google Translate).

Pros: better understanding of frequent expressions.

Cons: issues with agreement and style.

Neural Machine Translation (NMT)

Since 2016, neural networks have dominated, using Transformer architectures (BERT, GPT).

Principle: Algorithms learn from billions of examples to predict the most probable translation.

Breakthrough: DeepL (launched in 2017) surpassed Google Translate in quality for European languages.

How do modern neural translators work?

Transformer Architecture

Self-Attention: The algorithm identifies relationships between words in a sentence, even across long distances.

Example: In “She took the book from the shelf and put it in her bag,” the model correctly links “book” and “it.”

Learning from Big Data

ChatGPT (OpenAI) is trained on internet texts, books, and legal codes.

Problem: Risk of internalizing bias or false patterns (e.g., gender stereotypes).

Contextual Adaptation

Neural networks account for:

Topic (medical, legal, conversational).

Localization: DeepL offers variants for European vs. Latin American Spanish.

Market Leaders: DeepL, ChatGPT, and Others

High accuracy for European languages thanks to specialized focus.

Format support (PDF, DOCX) and CAT-tool integration (e.g., Trados).

Example: German “Gemütlichkeit” → “coziness” + cultural commentary.

ChatGPT (OpenAI)

Creativity: translates poetry, generates stylistic alternatives.

Multitasking: simultaneously corrects grammar, adapts tone.

Limitations: Prone to “hallucinations” — inventing nonexistent information.

Google Translate

Pros: Supports 133 languages, instant camera translation.

Cons: Quality depends on language popularity (weaker for African languages).

Specialized Tools

Smartcat: AI for localizing business texts.

Lilt: Hybrid platform combining AI with human editing.

Thousands of pages translated in minutes (e.g., IT documentation). Tools like Reverso Context help learners understand nuances through examples. CSA Research: AI reduces localization budgets by 30–50%. Meta AI translates Māori using social media data.

Contextual Errors

Example: “They are searching for a match” → “They are looking for a matchstick” instead of “match/partner/game.”

Begin with the basics of neural networks, specifically focusing on deep learning models that underpin modern translation technologies. Explain concepts like machine learning, deep learning, and neural networks. Highlight the transformation from statistical machine translation to neural machine translation (NMT). Discuss the evolution of translation technologies from rule-based systems to statistical methods, and finally to neural machine translation. NMT uses models like the transformer

architecture, introduced in the paper "Attention is All You Need" by Vaswani et al. (2017), which significantly improved translation quality by focusing on the context of entire sentences rather than just phrase-based translation. Outline how it utilizes a variant of the transformer architecture, designed for understanding and generating human-like text based on the input it receives. Discuss its training process, which involves large-scale datasets and supervised fine-tuning to enhance its translation capabilities alongside its primary function in conversation. Mention its reputation for high-quality translations, attributed to its advanced neural architecture and a highly optimized training process that includes a refined selection of training data. DeepL also uses a modified version of the transformer architecture but with proprietary improvements that are not fully disclosed to the public. Include a comparison of these technologies with others like Google Translate and Microsoft Translator. Focus on differences in approach, such as how Google Translate has evolved over time to incorporate neural network technologies, and how these differences impact the quality and nuance of translated text. Address the challenges in neural network-based translation systems, such as handling idiomatic expressions, cultural nuances, and maintaining the context over long texts. Discuss the limitations in terms of languages with less digital data available and the potential for biased outputs due to the training datasets used. Conclude with insights into the future of AI in translation, considering trends like unsupervised learning, the potential for real-time learning from user feedback, and the integration of AI translators in various professional fields to assist with real-time multilingual communication.

CONCLUSION

As we advance further into the digital age, the role of neural networks and AI in translation is becoming increasingly vital. Technologies such as ChatGPT and DeepL have demonstrated remarkable capabilities in bridging language barriers, offering more than just word-for-word translations by capturing the essence and subtleties of the source language. Their use in translation not only enhances linguistic accessibility but also promotes a deeper cultural exchange and understanding.

Despite the impressive strides in technology, challenges such as handling less-common languages, dealing with linguistic nuances, and avoiding biases in translation still persist. Addressing these challenges requires ongoing research and refinement of AI models to ensure they can handle the complexities of human languages more effectively.

The future of AI in translation looks promising, with potential developments in areas like unsupervised learning, real-time adaptive translation based on user feedback, and broader integration into various professional fields. These advancements could further transform translation services, making them more dynamic and responsive to the needs of global communication.

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