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The relationship between machine translation and human translation in the era of artificial intelligence machine translation

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Abstract. In recent years, neural network machine translation has vastly enhanced translation efficiency and ushered in the era of artificial intelligence for machine translation. In the era of artificial intelligence, technological progress has forced us to reconsider the link between machine translation and human translation. Through a literature analysis, the paper investigates the history and current situation of the development of AI translation, the technical anxiety that AI brings to human translation, and the equilibrium between machine translation and human translation.

Keywords: Machine translation, human translation, artificial intelligence.

1. Introduction

Translation has been crucial to cultural interaction and civilization development throughout history. With the widespread application of deep learning in recent years, machine translation technology has also attempted to combine with artificial intelligence, and neural network machine translation has arisen as a new model. The advent of artificial intelligence has ushered in a new era of machine translation technology and artificial intelligence translation. The technological advancement seems to portend a bright future for machine translation, but the space squeezed by technology must be yielded to tradition, and the development of technology requires people to adapt. Furthermore, the complex human-machine relationship in the translation industry merits consideration. In such a context, the relationship between machine translation and human translation, technology, and humans is brought to the fore.

Using a literature review methodology, this paper examines the history and current situation of the development of AI translation, the technical anxiety that AI brings to human translation, and the balance between machine and human translation. Besides, the paper provides some relevant recommendations to the fields of human and machine translation to facilitate the interaction between human and machine translation.

2. The development of machine translation: a new era of artificial intelligence translation

2.1. The initial development of machine translation

Looking back at the linear history of machine translation, its development can be simply divided into two stages: the first stage, from the 1940s to the 1990s, is represented by the early machine translation

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based on semantic rules; the second stage, after the 1990s, is characterized by the widespread use of statistical data in machine translation. And if we take 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.

When machine translation was initially conceived, the concept and approach of searching for linguistic "language rules" was prevalent. It was proposed as early as the 17th century that translation between different languages may be accomplished via "machine dictionaries"[1]. Such attempts to implement machine translation in a manner analogous to "dictionary searching" are all examples of machine translation based on language rules. In early research on machine translation, linguists collaborated with engineers and designers to develop a set of "common language" or "intermediate language" principles based on the laws of natural language expression, particularly by summarizing the norms among mainstream languages. The final translation is conducted by an electronic device. From the initial word-by-word translation, machine translation progressed to a focus on the syntactic structure relationship between the source language and the destination language, and ultimately to the achievement of semantic mutual translation. During this process of evolution, the development of machine translation steadily penetrates deeper into the language and encompasses more complicated linguistic linkages, and the investigation of machine technology and linguistic knowledge advances in tandem.

Deep natural language elements such as syntax, lexis, and semantics have been exhaustively examined; nonetheless, common norms among languages are difficult to comprehend, which leads directly to issues such as "great difficulty in program creation and high labor costs"[2]. As computer processing speed rose, statistical computing rapidly supplanted the method of comprehending semantic rules.

2.2. The emergence of statistical machine translation system

In 2003, Franz Josef Och, a researcher at the Institute for Information Science in the School of Engineering at the University of Southern California, used statistical models to improve traditional machine translation methods, and the statistical machine translation system he developed received the highest score in a test conducted by the National Institute of Standards and Technology of the United States Department of Commerce. Rather of focusing solely on linguistic patterns, statistical translation methods aim to construct mathematical models and train machines to enhance translation accuracy by importing massive databases of multilingual texts. Using tens of billions of complex mathematical calculations, the computer optimizes the statistical likelihood of obtaining the correspondence between languages and the translation output. The statistical method not only dramatically improves translation efficiency, but also avoids a thorough investigation of natural language.

2.3. Neural network machine translation

Nevertheless, what is the underlying principle of neural network machine translation, and where has the breakthrough occurred? What is the advancement? If the application of statistics liberates the machine from human-written language norms, it is unnecessary to "teach" the computer how to translate. If individuals do not have to "teach" the computer how to translate, but rather let it find it out, then the technology of artificial neural networks will increase the autonomy of machine translation. The technology of artificial neural networks enhances the autonomy of machine translation. Biological neural networks are mathematically modeled by artificial neural networks. The most significant characteristic of an 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, it simulates the neuronal structure of the brain, enabling machines to learn autonomously. Neural Network Machine Translation is a model framework of encoder and decoder. The primary characteristic of neural network machine translation is that it models the neural structure of the brain by connecting many artificial neurons, hence enabling the machine's independent learning. This is an end-to-end translation technology, which means the intermediary phase of machine translation is weakened, and "human linguistic knowledge has been replaced by large-scale linguistic data, and the role of linguistic rules is no longer so clear."

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The application of artificial intelligence enables translation robots to directly face whole phrases like humans, hence this methodology is far superior to statistical methods for generating intelligent machine translation. The outcomes of Google's neural network machine translation studies in 2016 revealed that the error rate of the neural network model reduced by an average of 60 percent compared to previous phrase-based translation systems, and that its quality surpassed all published findings to date [3]. The neural network translation technology with such excellent performance has quickly "replaced statistical machine machine translation as the core technology of commercial online machine translation of Google, Microsoft, Baidu, etc" [4]. due to its short development period, low labor cost, and high efficiency. Currently, Google's online translation system supports the universal translation of more than 100 languages, while Microsoft, Baidu, Tencent and other Internet companies also compete in the direction of neural network active research and development, translation efficiency has been significantly enhanced, and machine translation has entered the era of artificial intelligence.

3. The Man-machine competition: artificial intelligence and technology anxiety

3.1. Current status of translation

Today, translation without the assistance of machines is inconceivable, and the original business of translators has formed a new image of human-machine coexistence in response to the development of globalized translation needs and the interaction between human and machine translators. However, development and hidden concerns coexist, and the dramatic new development of machine translation has prompted greater speculation about the future of human translation, with some experts predicting that post-translation editing will replace the majority of current translation work [5]. The link between machine translation and human translation aided by artificial intelligence is unclear.

Will translation by machine, which is so much more efficient and widely used, one day replace human labor? From the standpoint of the human-computer symbiosis in translation, the ancient profession of translation has taken on a new appearance due to the effect of advanced technology, and the machine translation environment has had a significant impact on translation practice. The translation industry has steadily created human-computer interaction modalities, such as machine-assisted translation and post-translation editing, in addition to traditional human translation. Today, most translation needs can be met by machines for the initial draft, and some materials can even be translated independently by machines. Due to the increase in translation demand and information effectiveness needs, machine translation can now independently translate content with short delivery time and relatively low translation quality criteria, such as weather forecasts and website translations. On the market, machine-assisted translation and post-translation editing, which are variants of "machine-assisted human translation" and "human-assisted machine translation," are also prevalent. As a result, "computer-assisted translation, machine translation, and translation management systems with translation technology at their core are integrated to form an integrated translation environment for translators." The convenience and efficiency of technology have both met and increased demand, thereby shaping the human-computer interaction pool environment of the present day.

3.2. The limitations of machine translation

The expansion of technology is not unrestricted; machine translation still has limitations, while human translation retains subjectivity. The human translator's subjectivity is intact. The existing neural network machine translation technology falls under the heading of "poor artificial intelligence." What is the definition of weak artificial intelligence? In this discipline, the argument over the effectiveness of artificial intelligence is a significant problem. According to "strong AI," "a string of binary numbers controlled by a digital computer can represent anything" and "a string of binary numbers run by a digital computer can represent anything." The "strong AI" perspective holds that "everything can be represented by a string of binary numbers run by a digital computer"[6] and that AI is capable of independently thinking and acting. Those who believe in "weak AI" argue that "the mind is semantic, that the mind is not merely a formal structure, it has content"[7], and that the nature of the human mind cannot be captured by form

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or mathematics and hence cannot be programmed. The human mind cannot be contained by forms and processes and cannot be programmed due to its fundamental nature. Moreover, current AI translations "rely on millions of ready-to-use translated texts as the basis for reference analysis," and the majority of these texts come from standardized institutions and use mainstream languages, so translations tend to be standardized expressions with limited applicability and an inability to meet the requirements of multiple creative expressions.

In particular, the creative demands of translation itself are a basic restriction of machine translation. Although the real labor of the translator is interlanguage translation, the original goal of the translator, the creative translation method, and the flow of the translated text in circulation reading are immensely complicated processes. The original aim of the translator, the creative method of translation, and the flow of the translation during circulation reading are all incredibly complex processes. Numerous translation theories, such as "translation production," "alienation," and "naturalization," etc., emphasize that translation as "intermediary" is actually the activity of the translator. " In reality, the translation is a recreation of the translator. According to Benjamin, "the translator's mission is to utilize his own language to liberate the language trapped within the original work by his own re-creation" [8]. This "release" and "binding" not only refers to the expression challenges produced by cultural variations in the translation process, but also emphasizes that understanding the "pure language" and rephrasing it is the key to translation.

Additionally, creativity suggests that translation is a "impossible" task. This is due to the fact that there is no completely precise and flawless answer for the translation of two languages into each other, which is the exact opposite of machine translation, which seeks precision. Machines that rely on existing corpus databases with predetermined translation aims cannot recreate. We do not expect to obtain a perfect and precise equivalent text through translation, but rather to achieve a profound cultural engagement through the process. This is the fundamental distinction between machine translation and human translation, and the basis for the human-machine hierarchy.

4. Rethinking the construction: the balance between human and machine translation

Coexistence and symbiosis between humans and machines will characterize the near future in an era where artificial intelligence is enhancing machine translation. Under such circumstances, the question of how to strike a balance between human and machine translation becomes crucial.

4.1. Rethinking the nature of technology

With the advancement of technology, the rhetoric of technical rationality has progressively come to predominate in contemporary culture, and the preeminence of technology has grown increasingly mainstream. This holds true for translation research as well. The "technical shift" in translation studies has established a consensus, but what is more notable is that translation technology studies have given more attention to human and social issues, producing a "turn about people" [9]. A serious examination on technology and society lies behind this change. We do not minimize the progress of machine translation or reject its positive significance, but we also do not permit technology to spread indefinitely to the detriment of human subjects' meaning. To achieve a balance between machine translation and human translation, we must consider the nature of technology in a modern manner.

Heidegger chose the term "The Pursuit of Technology" to inquire philosophically about the essence of contemporary technology. Although Heidegger was generally critical of modern technology, he considered that the essence of technology had certain redeeming qualities. He views technology as a man-made instrument and its essence as a form of "demystification" [10].

The same holds true for machine translation, the essence of whose "declassification" is to better comprehend language and convey culture. However, machine translation has progressed from depending on semantic rules to statistical data to artificial intelligence. Technical researchers' research and development concepts have progressed from a basic understanding of natural language rules to data computing and statistics based on empirical instances to artificial intelligence. from the initial understanding of natural language grammar to data processing and statistics based on practical examples to

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the neural network-like technologies of today. The technology has become increasingly removed from the substance of language. The performance of machine translation exemplifies this issue as well. Processing "informational" text by machines is far more efficient than processing "expressive" text. Machine translation is far more efficient than other "expression-based" and "operation-based" texts. Jin Sun analyzes the research on machine translation efficiency conducted by German translator Katharine Reis in the paper "Research on Machine Translation Based on Text Type Theory" [10]. This study alludes to German translator Katharine Reiss' three-dimensional theory of text types: informational, expressive, and operational. The text type theory established by Katharine Reiss in "Research on Text Type Theory" [10] refers to three text types: informational, expressive, and operative. Particularly, instructive texts refer to texts on natural science, commerce and economics, and scientific and technological subjects. The reason is that the study of language technology in machine translation has lagged behind computer technology. There is a substantial technological barrier and underdevelopment of creative elements like as metaphor, ambiguity, contagiousness, cultural connotation, and others.

4.2. The shortcomings brought by machine translation

The language is pre-programmed as a corpus, an encoder and decoder, and a string of parallel data in modern machine translation. The issue of language is no longer relevant, and the question of how to obtain accuracy in language interpreter through technology has taken precedence. As translation becomes conventional, the translator's agency is subjected to the ever-expanding needs for translation, and his or her sense of self is continually eroded. Faced with advancing translation technologies, the social identity and self-identification of translators shrink rapidly. The mode of machine-assisted translation, such as post-translation editing, tends to "de-technologize" the labor of translators.

The purpose of translation is not to eradicate obstacles between languages; translation is a dynamic activity that should not exist as a template, but rather adapt to the changing situations of the times and take on new hues based on the subject's creative energy. Standardization should not be the future of translation, and machines should become "unblinding" rather than "blinding" instruments.

The subjective creativity of humans should be placed in context. According to Heidegger, man is not "imprisoned in a boring compulsion" by technology [10]. The only way to obtain a free relationship between man and technology in the age of technology is to continuously inquire, "Where are we being led? The only way for humans to have a free relationship with technology is to continuously inquire, "Where are we being led? All of this is contingent upon human subjectivity. In order to achieve a balance between machine translation and human translation, it is essential to rectify the translator's subjective position and increase the translator's subjective awareness in translation work.

4.3. Countermeasures

Faced with the dilemma of de-technicalization and marginalization of the subject, translators must first comprehend the instrumental significance of machine translation. When people are perplexed, they will naturally turn to tools, much as the earliest humans did when they utilized flint to generate life. And, as Heidegger stated, a sequence of tools such as flint eventually enabled the "unblocking" of human civilisation. Similarly, machine translation is a declassification tool. Since its inception, machine translation has been designed to mimic human translation. Both have the same practical responsibility. With the aid of big data, mathematical reasoning, and information technology, machine translation is able to acquire a deeper comprehension of linguistic implications. Using big data, mathematical logic, and information technology, machine translation has realized the reciprocal translation of informative texts with plain meanings, which not only answers the translation needs of globalization but also creates a new world. Globalized translation necessitates and generates a greater number of communication contacts, which is This is the relevance of machine translation in a good light. Therefore, translators should view it as a viable method. It is neither dangerous nor authoritative, so there is no need for concern. They should also be aware of the inclination toward standardization of machine translation and employ human subjects to provide creative translations. Human subjects must appreciate the significance of technology with creativity.

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Second, topic awareness necessitates that translators actively adapt to the linguistic environment of technology integration and produce subject value within it. Machine translation would never be able to replace human translation, according to academic Wang Zuoliang, since "the translator must be a cultural person in the truest sense" [11]. The significance of the translator's subjectivity is precisely represented in his or her cultural sensitivity and creative energy, and the human capacity to adapt to the real world and even give meaning to reality is the essence of human vitality. Therefore, translators must not only adapt to the reality of the technical language environment, but also be able to "find meaning with the help of machines," to go beyond technology to deeply comprehend the complexity of language and culture, and to give full play to the creative value of the translator's subject in order to realize the coexistence and symbiosis of human and machine.

5. Conclusion

Using a literature review methodology, this study covers the history of machine translation, the technical fears linked with machine translation, and the balance and future of human and machine translation.

In the era of artificial intelligence, technological progress has forced us to reconsider the link between machine translation and human translation. On the one hand, machine translation and human translation present a tense game relationship, and the translation environment with full participation of technology shapes the industry landscape, but in the end, there are still limitations in the development of machine translation, and human translation still grasps the subjectivity; on the other hand, the future of machine translation and human translation anticipates a more balanced, free relationship, and the translation industry landscape will continue to evolve. To achieve a healthy relationship between humans and technology, translators should use technology to discover the truth while retaining their own subjectivity and sense of value.

References

[1] Schütz, Jörg. “W. John Hutchins (Ed.), Early Years in Machine Translation: Memoirs and Biographies of Pioneers, Vol. 97 Amsterdam Studies in the Theory and History of Linguistic Science.” Machine Translation, vol. 18, no. 1, Springer Science and Business Media LLC, 2003, pp. 77–79. https://doi.org/10.1023/b:coat.0000021732.15869.57.

[2] Gao Minghu. A Review of Neural Machine Translation [J]. Journal of Yunnan University for Nationalities Journal (Natural Science Edition), 2018 (1): 72-76.

[3] Wu Y ,Schuster M ,Chen Z ,et al.Google’s Neural Machine Translation System; Bridging the Gap between Human and Machine Translation [J]. arXiv preprint arXiv: 1609,08144,20166

[4] Liu Yang. Frontiers of neural machine translation [J]. Computer Research and Development, 2017 (6): 1145 -1149

[5] Kenny, Dorothy. “The Translator and the Machine, by Dorothy Kenny.” Chartered Institute of Linguists, 15 Dec. 2016, www.ciol.org.uk/translator-and-machine-dorothy-kenny.

[6] Boden, Margaret. The Philosophy of Artificial Life (Oxford Readings in Philosophy). 1st ed., Oxford UP, 1996.

[7] Searle, John. Minds, Brains and Science (1984 Reith Lectures). 1st ed., Harvard UP, 1984.

[8] Walter Benjamin. The Task of the Translator. Lawrence Venuti ed. The Translation Studies Reader [M]. London and new York: Routledge.2000:22.

[9] Li Hanji, Chen Haiqing. Current Situation, Problems and Prospects of Translation Technology Research [J]. Journal of University of Science and Technology Beijing (Social Science Edition), 2019 (4): 112-118

[10] Heidegger, Martin. Vorträge Und Aufsätze. Klett-Cotta, 1967.

[11] Wang Zuoliang. Cultural Comparison in Translation [J]. Chinese Translation, 1984 (1): 4.