Use of NLP Techniques in Translation by ChatGPT: Case Study

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Abstract

In this research, it is aimed to compare the translations from English to Turkish made by ChatGPT, one of the most advanced artificial intelligences, with the translations made by humans. In this context, an academic 1 page English text was chosen. The text was translated by both ChatGPT and a translator who is an academic in the field of translation and has 10 years of experience. Afterwards, two different translations were examined comparatively by 5 different translators who are experts in their fields. Semi-structured in-depth interviews were conducted with these translators.The aim of this study is to reveal the role of artificial intelligence tools in translation, which are increasing day by day and suggesting that there will be no need for language learning in the future. On the other hand, many translators argue that artificial intelligence and human translations can be understood. Therefore, if artificial intelligence is successful, there will be no profession called translator in the future. This research seems to be very useful in terms of shedding light on the future. The method of this research is semi-structured in-depth interview.

1 Credits

This document is an original research. Feyza Dalaylı conducted and concluded this research alone. No support was received from any person for the continuation of the research. Therefore, as ChatGPT emerged and continued to develop, the researcher realized that it was important to consider the subject in terms of translation. Because the basis of the increase in dialogue in the world is the understanding of individuals belonging to different languages. With ChatGPT, there are many innovations that humanity has achieved thanks to artificial intelligence and technology, which is being talked about more and more day by day. This phenomenon, which was much more difficult in the past, today, thanks to artificial intelligence, individuals can translate any document into any language they want within minutes. The important thing here is not only the translation, but the quality of the translation. To date, many tools continue to translate on the internet. However, ChatGPT's difference is its use of NLP. Thus, the translation is perceived as more natural and as if it was made by human hands. In this context, it was deemed appropriate to conduct a case study in order to better understand the research based on it. For the case study, an NLP-related text in Turkish was translated into English by both ChatGPT and a translator with 10 years of translation experience. Within the scope of the case study, these two translations, together with the original text, were shown to 5 academician translators who are experts in their fields. First of all, they were asked which of the translations was done by artificial intelligence. Thus, the differences between artificial intelligence and human translations were tried to be determined. Semi-structured interviews were conducted with the interviewees. During the literature search, both ChatGPT and NLP studies were scanned. However, when it comes to translation, it has been noticed that the number of studies that discuss ChatGPT and NLP together is low. The reason for this is that ChatGPT started to be used in a relatively recent period.

2 Introduction

In recent years, the rapid advancements in Natural Language Processing (NLP) have sparked transformative changes across various domains, including translation. The integration of NLP techniques into translation processes has garnered significant attention due to its potential to revolutionize the way we bridge linguistic gaps. This article delves into a case study that explores the utilization of NLP techniques in translation, focusing on a comparative evaluation of translations generated by ChatGPT, an AI-powered language model developed by OpenAI, and those crafted by expert human translators. The study investigates the efficacy and intricacies of these translations through the lens of five

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distinguished academician translators. Through a semi-structured interview methodology, we aim to uncover insights into the strengths, limitations, and nuances associated with NLP-assisted translations.

As NLP technologies continue to evolve, their application in translation has the potential to streamline the process, enhance efficiency, and expand access to multilingual content. However, the challenges posed by idiomatic expressions, cultural nuances, and context preservation remain focal points of concern. This study seeks to contribute to the ongoing discourse surrounding the intersection of NLP and translation by offering a nuanced analysis of translations generated by ChatGPT in comparison to those crafted by human experts. By delving into the perceptions and observations of experienced academic translators, it is intended to shed light on the evolving landscape of translation practices in the era of artificial intelligence driven language models.

The subsequent sections of this article will delve into the methodology employed, the details of the case study, and the insightful findings derived from the semi-structured interviews with the academician translators. Through this exploration, it is intended to provide a comprehensive understanding of the current state, implications and possible future directions of NLP-assisted translation. The integration of NLP techniques into translation processes holds the promise of transforming the translation landscape, yet it also poses important questions about the role of human expertise and the preservation of linguistic and cultural subtleties. This study builds upon this premise by examining the practical implications of NLP-assisted translation through the eyes of those deeply entrenched in the field.

3 NLP and AI

Natural Language Processing (NLP) refers to a field of study within the domain of artificial intelligence (AI) and computational linguistics that focuses on the interaction between computers and human language. NLP seeks to develop computational models and algorithms capable of understanding, analyzing, and generating natural language text and speech (Brown et al., 1990). Natural Language Processing (NLP) is a subfield of Artificial Intelligence (AI) that focuses on enabling computers to understand, interpret, and generate human language. The relationship between NLP and AI is symbiotic, as NLP plays a crucial role in advancing the capabilities of AI systems, while AI techniques contribute to the development of more sophisticated NLP models. At its core, NLP aims to bridge the gap between human language and machine understanding by employing various techniques from linguistics, computer science, and statistics. It involves the application of linguistic and computational theories to process, interpret, and extract meaningful information from unstructured textual data (Bahdanau, Cho and Bengio, 2015).

Researchers and practitioners in NLP employ diverse methodologies, including rule-based approaches, statistical models, machine learning techniques (such as neural networks), and more recently, deep learning architectures. These methodologies enable the development of robust algorithms that can learn from large-scale language data to improve the accuracy and effectiveness of language processing systems (Nilsson, 2010).

NLP has numerous real world applications across various domains, including information retrieval, virtual assistants, chatbots, social media analysis, sentiment monitoring, automated translation services, and healthcare, among others. As the field continues to advance, NLP strives to overcome challenges such as understanding the nuances of human language, handling ambiguity, context sensitivity, and incorporating knowledge from diverse sources to enable machines to effectively communicate and interact with humans in a more natural and intuitive manner.

Over time, NLP has taken place in almost every field of life and continues to take place. Because natural language processing is very successful in conveying many things about human beings. Being able to interact with human-computer, in other words artificial intelligence, with natural language is a significant step. In this way, people's work becomes significantly easier, as artificial intelligence can do what people need to do. On the other hand, when human interaction with artificial intelligence is done with natural language processing, human characteristics can almost be attributed to artificial intelligence. Artificial intelligence performs a large number of operations thanks to natural language processing. Translation is only one of these processes. During

translation, when artificial intelligence is based on natural language processing, it has many important separation, combining and distinguishing features.

NLP involves various techniques and methodologies that draw from linguistics, computer science, and machine learning. Various studies have dealt with this issue in great detail. Considering these studies and their results, some important points regarding the relationship between NLP and AI are listed: (Andreev, 1967; Bahdanau, Cho, Bengio, 2015; Berger, Della Pietra, Della Pietra, 1996; Cho, Van Merriënboer, Bahdanau, Bengio, 2014; Collobert, Weston, 2008; Davis, Marcus, 2015;

Foundation of AI: Language is a fundamental aspect of human communication and intelligence. Developing AI systems capable of effectively understanding and generating human language is a significant step toward creating more human-like and capable AI agents.

Language Understanding: NLP techniques help AI systems understand the nuances of human language, including context, semantics, sentiment, and intent. This understanding is crucial for tasks such as chatbots, virtual assistants, sentiment analysis, and information retrieval.

Language Generation: AI systems equipped with NLP capabilities can generate coherent and contextually relevant human-like language. This is used in applications like text generation, content summarization, and language translation.

Machine Translation: AI-powered NLP models have revolutionized machine translation, enabling real-time translation of text between languages. This has far-reaching implications for global communication and collaboration.

Sentiment Analysis: NLP allows AI systems to analyze and interpret the sentiment behind text data, enabling businesses to understand customer opinions, reviews, and feedback on a large scale.

Voice Assistants: Voice-based AI assistants like Siri, Google Assistant, and Alexa heavily rely on NLP to understand spoken language, convert it to text, and execute tasks or provide information based on user queries.

Text Classification: NLP techniques are used for categorizing and classifying text data, which has applications in spam detection, content categorization, and more.

Dialog Systems: AI-driven dialog systems leverage NLP to engage in natural-sounding conversations with users. This is used in customer support, virtual companions, and interactive systems.

Challenges: The relationship between NLP and AI also involves addressing challenges such as ambiguity, context, sarcasm, and cultural variations in language interpretation.

Bu bilgilerden de anlaşıldığı üzere yapay zeka ve NLP teknikleri bir arada kullanıldığında önemli faydalar sağlamaktadır. Bütün bunlar

4 NLP, Translation and AI

Natural Language Processing (NLP) and translation are interconnected fields that share a symbiotic relationship, as NLP techniques and methodologies greatly contribute to the advancement and effectiveness of machine translation systems. NLP, a subfield of artificial intelligence (AI), focuses on the interaction between computers and human language. It encompasses a wide range of tasks, including text analysis, syntactic and semantic parsing, sentiment analysis, information extraction, and machine translation (Bahdanau, Cho and Bengio, 2014).

NMT models employ deep learning architectures, such as recurrent neural networks (RNNs) and more specifically, long short term memory (LSTM) networks, to learn the mapping between source and target language sentences. These models are trained on large scale parallel corpora, consisting of aligned sentence pairs in different languages. The training process involves optimizing model parameters to minimize the discrepancy between predicted translations and human-generated translations (Wu et al., 2016)

NLP techniques are crucial at various stages of machine translation. Preprocessing techniques, such as tokenization, sentence segmentation, and morphological analysis, help break down input text into meaningful linguistic units, making it easier for translation models to process and understand the content. Syntactic and semantic parsing techniques aid in capturing the structural and semantic relationships within sentences, improving the overall coherence and accuracy of translations. Furthermore, NLP-based methods are employed for handling specific translation challenges, such as handling idiomatic expressions, resolving lexical ambiguities, and

addressing syntactic divergences between languages. For instance, statistical alignment models, based on NLP algorithms, enable the identification of correspondences between words or phrases in source and target languages, facilitating the generation of more accurate translations. Several studies have demonstrated the effectiveness of NLP techniques in enhancing machine translation quality. For example, Bahdanau et al. (2015) introduced the attention mechanism, an NLP technique that enables NMT models to focus on relevant parts of the source sentence during translation. This attention mechanism significantly improved the translation quality of neural machine translation models.

5 ChatGPT, NLP and Translation

ChatGPT is a language model developed by OpenAI that utilizes the principles of Natural Language Processing (NLP) for various tasks, including translations. NLP is a field of artificial intelligence that focuses on the interaction between computers and human language. It encompasses a range of techniques and algorithms for processing, analyzing, and understanding natural language. When it comes to translation, NLP techniques can be applied to facilitate the conversion of text from one language to another. ChatGPT employs a sequence-to-sequence model, a type of neural network architecture commonly used in machine translation tasks. This model takes an input sequence in one language and generates a corresponding output sequence in the target language (OpenAI, 2023).

The training process for ChatGPT involves exposing the model to large amounts of multilingual data, allowing it to learn patterns, syntax, and semantic relationships across different languages. This exposure enables the model to develop a general understanding of language structures and meanings, making it capable of performing translation tasks. To enhance translation quality, ChatGPT leverages the Transformer architecture, which has been highly successful in NLP tasks. Transformers utilize attention mechanisms, enabling the model to focus on different parts of the input sequence during the translation process. This attention mechanism allows the model to capture long-range dependencies and improve the overall coherence and accuracy of translations. Additionally, techniques such as subword tokenization, which divides words into smaller units, are commonly employed in NLP translation systems like ChatGPT. Subword tokenization helps handle out-of-vocabulary words and improves the model's ability to handle rare or unknown words (GPT-4 Technical Report, 2023).

As can be seen, there have been significant developments in artificial intelligence translations thanks to NLP. However, it is not possible to say that it has fully reached the quality of translation made by people. The only goal in artificial intelligence translations is to reach translations made by humans. In general, there are some fundamental differences between human and ChatGPT translations.

Human-made translations and translations generated by ChatGPT (or similar language models) have several key differences (Kelly and Zetzsche, 2014; Koehn, 2010; Sutskever, Vinyals and Le, 2014; Costa-jussà and Fonollosa, 2016)

Translation Quality: Human translators are capable of producing high-quality translations with a deep understanding of both the source and target languages. They can accurately capture the nuances, cultural references, idioms, and context of the original text. On the other hand, ChatGPT translations can sometimes be less accurate or may not fully grasp the intended meaning due to the limitations of the training data and the model's inability to comprehend context in the same way a human can. While ChatGPT can provide reasonable translations, they may lack the finesse and precision of a human translator.

Natural Language Processing: Human translators are skilled at processing and understanding natural language, taking into account the broader context, cultural implications, and the intended audience. They can adapt their translations to suit the target audience, tone, and purpose of the text. ChatGPT, although trained on a vast amount of text data, lacks the same level of natural language understanding. It often relies on pattern matching and statistical analysis to generate translations, which can result in less nuanced or contextually appropriate outputs.

Subject Matter Expertise: Human translators often specialize in specific domains or subject areas, allowing them to have deep knowledge and understanding of technical or specialized terminology. They can accurately translate complex or industry-specific texts, ensuring the meaning is preserved. ChatGPT, while having

access to a wide range of general knowledge, may struggle with domain-specific vocabulary or terminology, leading to inaccuracies or incorrect translations in specialized texts.

Cultural Sensitivity: Human translators are well-versed in the cultural nuances of both the source and target languages. They can navigate potential pitfalls, adapt the translation to the cultural context, and avoid unintended offensive or inappropriate language choices. ChatGPT lacks this level of cultural sensitivity and may produce translations that are culturally tone-deaf or insensitive, as it lacks the ability to understand the subtleties and implications of language choices.

Revision and Editing: Human translators go through an iterative process of revision and editing to refine their translations, ensuring accuracy, clarity, and quality. They can self-correct errors and refine their translations based on feedback or additional research. ChatGPT, while capable of generating translations, does not have the same ability to self-correct or improve based on feedback. It generates translations in a single pass, without the iterative refinement process that humans can employ.

In summary, while ChatGPT can be a useful tool for generating translations, human-made translations generally outperform machine-generated translations in terms of quality, accuracy, contextuality, cultural sensitivity, and domain-specific expertise.

In conclusion, NLP and machine translation are closely intertwined, with NLP providing essential tools, methodologies, and techniques that contribute to the development and improvement of machine translation systems. The integration of NLP methods has led to significant advancements in translation accuracy, fluency, and the ability to handle various linguistic complexities. As NLP continues to evolve, its impact on the field of machine translation is expected to grow, enabling the creation of more sophisticated and context-aware translation systems.

6 Method

The in-depth interview method is a qualitative research technique used to gather detailed and comprehensive data from participants by engaging them in a structured conversation. This method allows researchers to explore complex phenomena, understand individuals' perspectives, and obtain rich insights into their experiences. In-depth interview method was also used in this study. In this context, a text was chosen first. This text has been translated by both ChatGPT and a lecturer who is a professor in the field of foreign language and translation science. Then, these two translation sources were ambiguously shown to 5 expert academician translators and in-depth interviews were conducted on translations.

7 Findings

The findings of the study are quite remarkable. First of all, 3 of 5 academician translators thought that a translator translated the text translated with ChatGPT and stated that the translation was of high quality. On the other hand, the remaining 2 interviewees insisted that both translations were of good quality, even if they were aware of the translation made with ChatGPT. All interviewees stated that the reason why ChatGPT, which translates via artificial intelligence, is so good is that it uses NLP techniques correctly and appropriately. An interviewer who noticed the translation made only with ChatGPT, stated that a few sentences were robotic and cold, and thus he thought that the translation was not translated by humans. As it can be understood from here, although ChatGPT has made significant progress in translation, it has not been able to prevent some of its expressions from being cold and far from human sincerity. This shows that it still needs to make progress on NLP. In addition to all these, it is an important detail that only 1 of 5 academician translators who have been working in the sector and academic field for more than 10 years noticed this detail.

The interviewees also evaluated the future of the relationship between ChatGPT and NLP. Accordingly, there is a possibility that the translators' jobs will become much easier in the future, and there may even be times when translators are no longer needed. The interviewees underlined that certain criteria should be taken into account when it comes to translation. Accordingly, a translation should include a wide variety of components such as grammar rules, correct and appropriate use of expressions, naturalness, fluidity, and the general structure of the translated language. In response to these statements, the interviewees were asked to evaluate the differences between ChatGPT's current status and artificial intelligence translations in the past. It was confirmed by all

interviewees that the development in NLP practices was the basis of these developments.

The interviewees were asked to express the differences between the two translations. The main purpose here is to identify the main differences between artificial intelligence and human translations. Interestingly, 3 interviewees who thought that artificial intelligence translation was human translation first suggested that the translation was natural and sufficient in terms of terminology. From this point of view, the level of development of ChatGPT in terms of human spontaneity and adequate terminology can be seen.

On the other hand, while it is an important finding that the translations made with ChatGPT are not noticed in general, the interviewees also put forward the quality and smoothness of the translation as a reason. As it can be understood from here, ChatGPT has managed to increase the quality of translation in this sense, as it receives NLP support. Although the interviewees are translators, they support the development of artificial intelligence in the future and replacing people when necessary in translation.

Finally, the interviewees were asked to evaluate the use of NLP in artificial intelligence supported tools within the scope of translation. Except for 1 interviewee, all interviewees stated that these tools will play a positive role in the development of intercultural communication by bringing humanity to an important point in translation and foreign language development in the future. However, one interviewee stated that the development of these tools harmed humanity rather than contributed. According to him, foreign language learning will decrease among people in the future as these tools make people lazy. Thanks to instant translation, people will only communicate with the help of tools without learning anything new. This will cause humanity to move away from naturalness day by day and become robotic. Although one interviewee expressed her fears about the future with these statements, the development of ChatGPT in translation is generally appreciated by the interviewees.

8 Conclusion

Undoubtedly, the most important area where natural language processing is visible to the translator is machine translation. When the development of translation from the time it first emerged to the present, it cannot be ignored that a very important point has been reached today. In particular, the development of artificial intelligence tools such as ChatGPT is considered a turning point in translation. ChatGPT is capable of rendering quality translations that are almost indistinguishable from human translations today. Although it still needs improvement, ChatGPT has made significant improvements in translation. The basis of these developments and improvements is the correct and appropriate use of NLP techniques. Considering that artificial intelligence tools such as ChatGPT will increase in the future, the deficiencies that exist today will be eliminated with the NLP systems that will develop. Although there were hopeless and frightening opinions about the future among the interviewees, in general, this case study shows that NLP-supported artificial intelligence applications are beneficial for humanity. The translation done by ChatGPT was perceived by most of the interviewees as being done by a human translator. This clearly demonstrates progress. Thanks to artificial intelligence NLP, it has made a remarkable improvement in translation based on the way people think and express. As long as ChatGPT continues to receive support from NLP, it will be much more successful in the future.

According to the general results of the research, NLP enabled the positive development of artificial intelligence supported translation tools. Thus, artificial intelligence, which can replace human beings in the field of translation and alleviate the workload, will become even more important in the near future. This is supported by most of the translators. The perception of translations made by artificial intelligence such as ChatGPT as if they are made by humans is associated with translation quality, naturalness, subject-verb harmony and general harmony in sentences.

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