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ChatGPT vs. Google Translate: Comparative Analysis of Translation Quality[1]

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Abstract

The rise of large language models and their use in machine translation has prompted the need to examine the quality of their translations and compare them with other systems. This study aimed to assess the quality of literary translation from Persian to English using ChatGPT and Google Translate. A Persian short story was chosen, and both tools were used to generate translations. The translations were evaluated using Sofyan and Tarigan's (2019) functional holistic model, resulting in scores of 56% and 40% respectively. Additionally, a critical error analysis was conducted to identify areas where the tools struggled with effective translation, highlighting their strengths and weaknesses. These scores indicate that both machine translation systems have limitations in terms of accuracy, equivalence, and text function, particularly in literary translation. Moreover, the findings of this study emphasize the importance of human translators in achieving high-quality translations that effectively convey cultural nuances and idiomatic expressions in Persian to English literary translations, despite the convenience offered by machine translation systems for quick translations.

Keywords: ChatGPT, comparative analysis, Google Translate, LLMs, machine translation, NMT, translation quality assessment

1. Introduction

Google Translate is an automated machine-translation service provided by Google Inc. Initially, it functioned as a Statistical Machine Translation (SMT) system

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that directly translated written source languages to other languages or with English as an intermediary (Boitet et al., 2009). However, in November 2016, Google introduced the Google Neural Machine Translation system (GNMT), which employs Neural Machine Translation (NMT) instead of SMT (Turovsky, 2016). NMT is based on a recurrent neural network that operates under the Encode-Decode framework. It encodes the source sentence into context vectors and then generates its translation token-by-token by selecting from the target vocabulary (Liu et al., 2016).

Although NMT has made significant strides lately, Cheng (2019) notes that NMT systems only rely on parallel corpora for parameter estimation. Since parallel corpora are typically limited in quantity, quality, and coverage, particularly for low-resource languages, exploiting monolingual corpora to enhance NMT is appealing. Wu et al. (2016) highlight that NMT systems are computationally expensive in both training and translation inference. Moreover, most NMT systems struggle with rare words, impeding their practical deployment and services where accuracy and speed are critical. However, Wu et al. (2016) demonstrate that compared to the previous phrase-based production system, Google's Neural Machine Translation, GNMT, system reduces translation errors by around 60% on several popular language pairs.

On the other hand, Large Language Models (LLMs) are self-supervised nonparametric models trained on vast amounts of text data, with hundreds of millions to billions of parameters. OpenAI's GPT models are a prime example (Xie et al., 2023). According to Xie et al. (2023), ChatGPT-3.5 is a highly effective translator, despite the complexity of translation as a task. Direct literal translation between human languages often falls short, as proper translation necessitates leveraging contextual information and prior knowledge. However, they also note that LLMs can struggle with simple counting and spatial inference during translation. Despite these challenges, they conclude that LLMs can be incredibly powerful

translators due to their linguistic competence, but further research is necessary to apply them successfully to general goal translation.

As Dong (2022) points out, unlike traditional machine translation systems, ChatGPT has the ability to incorporate additional information, such as human interactions, through input prompts (Dong et al., 2022). Peng (2023) suggests that we can further improve its performance by including domain-specific guidance. To achieve this, we propose Domain-Specific Prompts (DSP), which identify the domain information of translated sentences in prompts to facilitate ChatGPT's generalization.

Adawiyah et al. (2023) conducted a study to compare the quality of post-editing translations using Google NMT and Yandex NMT, with the goal of determining which tool produced the most natural translation of a short story. The researchers used Larson's theory as a reference to analyze the naturalness of the translation of "Jack and The Beanstalk" from English to Indonesian, and found that GNMT produced better translations that were easier to use compared to YNMT.

Bonyadi (2020) examined the linguistic modifications made to Persian-to-English translations using Google Translate. The study analyzed ten unpublished Persian literary article abstracts translated by the machine and then post-edited to make them academically acceptable. The modifications included changes in tense, literal translation, redundancy, collocations, deletion of the main verb, word choice, and proper nouns. The study provides insight into the types of linguistic errors that can occur in machine translations and the necessary post-editing required for academic writing.

Moneus (2023) conducted a study comparing human and artificial intelligence in Arabic-English legal translation. Legal texts were given to both human translators and AI systems, and the differences between the two approaches were analyzed. The study found that human translation was slightly better than AI in

terms of maintaining legal effect and knowledge of legal background. However, the potential for AI to improve with advancements in technology and data input was noted.

In a study conducted by Khoshafah (2023), the accuracy of ChatGPT 3.5 in translating English to Arabic was evaluated by comparing its outputs to professional translations across various genres, including historical, literary, media, legal, and scientific texts. The findings revealed that ChatGPT can be used as a translator for simple content, but struggles with complex texts that require human intervention. While ChatGPT generally provides accurate translations, its limitations make it unsuitable for certain types of texts, such as legal documents, medical reports, scientific studies, and literary works. Therefore, users should exercise caution when using ChatGPT for such texts and rely on human intervention to ensure accuracy.

2. Purpose of the Study

The purpose of this study is to conduct a comparative analysis of translation quality between two different translation methods: ChatGPT, Google Translate. The aim is to evaluate the accuracy, fluency, and overall quality of translations produced by these methods in order to determine their effectiveness and identify any potential limitations.

Firstly, this study seeks to assess the translation quality of ChatGPT. As an advanced language model developed by OpenAI, ChatGPT has shown promising results in various natural language processing tasks. However, its performance in translation tasks has not been extensively explored. By comparing its translations with those generated by Google Translate and human translators, we can gain insights into the strengths and weaknesses of ChatGPT as a translation tool. Secondly, the study aims to evaluate the translation quality provided by Google Translate. As one of the most widely used machine translation systems available online, Google Translate has become a popular choice for quick translations.

However, its accuracy and fluency have been subject to criticism due to occasional errors or awkward phrasing. By comparing its translations with those produced by ChatGPT and human translators, we can determine how well it performs in comparison to other methods.

This study will contribute towards advancing our understanding of machine translation systems' capabilities compared to human translators. Additionally, it will help identify areas where improvements can be made in machine translation technology. The findings from this research will be beneficial for various stakeholders such as language service providers, researchers, and developers of machine translation systems. Researchers can use the results to further enhance machine translation systems and address their limitations. Developers of machine translation systems can utilize the findings to improve the accuracy, fluency, and overall quality of their tools.

3. Research Questions

1. To what extent do Chat GPT and Google Translate differ in terms of overall translation quality when translating Persian literary works into English?

2. What are the strengths and weaknesses of Chat GPT and Google Translate in translating Persian literature to English?

4. Method

According to Holmes' (1988), map of translation studies, this study falls under the category of "Translation Aids" which is part of Applied Translation Studies. Translation aids refer to any tools or resources that can assist a translator in the process of translating a text from one language to another. These aids can include dictionaries, glossaries, translation memory software, machine translation tools, and other computer-assisted translation (CAT) tools. Moreover, this study involves elements of product-oriented research because it focuses on the impact of translation aids on the quality of the final translated product through translation

quality assessment. Therefore, this study can be categorized as both process-oriented and product-oriented research according to Holmes' (1988) map of translation studies.

The renowned Persian short story "Kabab-e-Ghaz" or "Roasted Goose" by Mohammad Ali Jamalzadeh was chosen for evaluation. The story was subjected to translation by Google Translate and ChatGPT-3.5. The translations were then evaluated based on the functional holistic model developed by Sofyan and Tarigan (2019) to determine their quality. The model comprises five factors, each with a different weight in determining the total quality score. Accuracy holds the highest weight of 30%, followed by equivalence at 25%, translation skills at 20%, text function at 15%, and grammar and style at 10%.

5. Results

Table 1 presents the answer to the initial research question, providing an overview of the quality of literary translations produced by Google Translate and ChatGPT. The Functional Holistic Model (Sofyan & Tarigan, 2019) was used to evaluate the translations, and the results are as follows.

Table 1. *Quality of Translations by Google Translate and ChatGPT*

Translation Software	Google Translate	ChatGPT-3.5
Accuracy	13	17
Meaning Equivalence	10	13
Translation Skill	5	8
Text Function	7	9
Grammar and TT style	5	9
Total Score	40%	56%

Table 1 demonstrates that Google Translate received an overall score of 40%, while ChatGPT achieved 56%. Notably, there were evident omissions, additions, and mistranslations that impacted the accuracy and equivalence scores.

Both machine translators encountered difficulties in identifying and/or resolving translation issues, as evidenced by significant translation errors and a considerable number of minor errors. Furthermore, the TTs revealed inconsistencies in meeting the text function of the ST and they did not fully correspond to the text function based on the TL perspective.

Finally, it was observed that Google Translate was more prone to producing awkward grammatical structures, whereas ChatGPT generated relatively more fluent translations. ChatGPT tended to omit parts it did not fully comprehend to produce smoother translations, and there were instances where it moderated the author's ideas instead of adhering to the target text's style, which negatively affected its TT style score.

6. Discussion

In the translation produced by Google Translate, many word-for-word equivalents were used without taking context into account. For instance, "هم قطارها" was translated as "train mates," but the author simply meant "friends." In contrast, ChatGPT successfully translated the same phrase as "colleagues," which is also a correct translation in the context. In the sentence "زد و ترفیع رتبه به اسم من درآمد," the first word "زد" was not translated by either machine translator. The omission strategy was used, which involves leaving out certain elements in the target language that are present in the source language to simplify the text and make it more natural and fluent in the target language. (Vinay Darbelnet, 1995). However, the omitted word in this context means "unexpectedly" which might have been translated by a human translator. The same omission strategy was used by ChatGPT. Here are some sample sentences from the study. Firstly, the Persian text is provided, followed by Google Translate version. Next, the ChatGPT translation is presented. Finally, any errors are addressed in the discussion of each sample.

گفت یک بر نره‌خر گردن‌کلفت را که نمی‌شود وعده گرفت. تنها همان رتبه‌های بالا را وعده بگیر و مابقی را نقداً خط **بکش** و بگذار سماق بمکند

He said that he made a promise that he can't be burdened by a donkey. Only promise the high ranks and pay the rest in cash and **let it die**.

She said that we should only invite the high-ranking officials and promise the others something else or give them money instead.

The phrase "یک بُر نره خر گردن کلفت" carries a negative connotation and is humorously used to describe mature and tough men in this particular context. The researcher found the clumsy translation of this phrase amusing. While a literal translation like "a bunch of male donkeys and thick-necks" would have been easier to comprehend, it wouldn't have been satisfactory. Additionally, the negative sentence "you cannot promise" was translated as "he made a promise," which is an affirmative statement. ChatGPT chose to omit this part entirely.

Persian heteronyms pose a particular challenge for machine translators. In the above translation example, the verb "بکش" meaning "to draw" was mistakenly rendered as its heteronym meaning "to kill" by Google Translate. While a human Persian translator can easily deduce the intended meaning based on context, the machine was easily misled. ChatGPT failed to translate this part in its own unique way. Additionally, the Persian idiom "بگذار سماق بمکند" was clumsily translated as "pay the rest in cash" or "give them money instead" which are totally irrelevant. It was omitted in a sense. The reason for this mistake is the use of "نقداً" in the source text, which is simply for emphasis and has nothing to do with money or cash.

گفتم ای‌بابا، خدا را خوش نمی‌آید

I said, Baba, God doesn't like it.

I said that it wouldn't be right to do so.

"Ey Baba" is an expression of annoyance in Persian, but it was mistakenly translated as a proper noun in English. ChatGPT provided a fluent translation by omitting culture-specific elements.

این بدبخت‌ها سال آزگار یک‌بار برایشان چنین پایی می‌افتد و شکم‌ها را مدتی است صابون زده‌اند که کباب‌غاز بخورند و ساعت‌شماری می‌کنند

These poor people have such a **problem** once every year, and they have soaped their bellies for some time to eat roast goose and count the hours.

These unfortunate people only have this **opportunity** once a year to enjoy such a feast and have been waiting for it for a long time.

The people mentioned in the story don't face a specific problem once a year. What was meant is that they occasionally have the opportunity to be invited to a friend's house for a delightful meal. Unfortunately, Google Translate misunderstood the meaning. Additionally, the Persian idiom in the original text, which literally translates to "they have soaped their bellies," actually refers to the guests' enthusiastic anticipation for the upcoming party. Surprisingly, ChatGPT produced a significantly better translation.

اگر از زیرش در بروم چشمم را در خواهند آورد و حالا که خودمانیم، حق هم دارند

If I go out from under it, they will take out my eye, and now that we are ourselves, they have the right.

[ChatGPT: Omitted this part altogether]

The phrase "If I go out from under it" means breaking a promise. Similarly, "they will take out my eye" signifies anger or frustration. Lastly, "now that we are ourselves" means speaking honestly. However, the translation provided is overly literal and hampers comprehension.

چطور است از منزل یکی از دوستان و آشنایان یک‌دست دیگر ظرف و لوازم عاریه بگیریم

How can we borrow dishes and accessories from the house of one of our friends and acquaintances?

If we were to take the utensils from one of our friends or acquaintances, it wouldn't be fair.

The underlined sections above were intended to convey the same meaning and function as "how about," which is used for making suggestions. However, Google's translation is much better because it doesn't include the unnecessary addition of "it wouldn't be fair."

مگر نمی‌دانی که شکون ندارد و بچه‌ی اول می‌میرد؟

Don't you know that there is no change and the first child dies?

It would be considered bad luck and our first child might die.

The Persian expression "شگون ندارد" is oddly translated as "there is no change" by Google Translate. This phrase is commonly used by superstitious individuals to discourage certain actions believed to bring bad luck or misfortune. ChatGPT correctly understood this meaning; however, its inclusion of the verb "might" suggests an attempt to moderate rather than remain faithful to the source text.

در تختخواب گرم و نرم و تازه‌ای که از جمله‌ی اسباب جهاز خانم است لم داده و به تفریح تمام مشغول خواندن حکایت‌های بی‌نظیر صادق هدایت بودم

I was lying in a warm, soft and fresh bed, which is one of the furniture of a woman, and I was having fun reading the unique stories of Sadegh Hedayat.

I had just settled into a warm and fresh bed, which was among the belongings of Mrs. Hadayat, and was busy enjoying reading the unique stories of Sadegh Hedayat.

The sentence above does not pertain to the furniture of a random woman or a woman named Mrs. Hadayat; rather, it refers to the narrator's own wife. Google Translate misunderstood this due to its lack of linguistic understanding regarding how the word "woman" can also be used in Persian to denote one's own wife. Consequently, it incorrectly associated the mentioned author's name with the word "woman".

لات و لوت و آسمان جل و بی‌دست و پا و پخمه و گاگول و تا بخواهی بدریخت و بدقواره

Lot and lot and the sky, jal and beid, pa, pakhme and gagol, and as much as you want, shiny and ugly.

Unruly, and had no manners.

The only correctly translated adjective in the above sentence is "ugly." Google Translate failed to translate the extensive list of adjectives and mostly transliterated them into English. However, ChatGPT did not attempt to translate unfamiliar words; instead, it provided a shorter translation that was less confusing.

به زنم گفتم تو را به خدا بگو فلانی هنوز از خواب بیدار نشده و شر این غول بی‌شاخ و دم را از سر ما بکن و بگذار برود لای دست بابای علیه‌الرحمه‌اش.

I told my wife to tell God that so-and-so hasn't woken up yet and get rid of this hornless giant and let him go to the hands of his father, may God have mercy on him. He said it doesn't matter to me!

I told my wife to tell him that so-and-so has not yet woken up from sleep and to get rid of this hornless and tailless monster from our heads. She said to me it doesn't matter!

Contrary to what was translated, there was no need to inform God about anything. In other words, "telling God that so-and-so hasn't woken up" is an incorrect translation of "begging my wife to tell him that I was asleep." Throughout the translation process, Google Translate frequently misgendered the wife; however, ChatGPT did not encounter this issue.

مال بد بیخ ریش صاحبش. ماشاءالله هفت قرآن به میان پسرعموی دسته‌دیزی خودت است. هرگلی هست به سر خودت بزن

Bad property of its owner. Masha Allah, seven Qurans are among your cousins. Hit yourself with any flower.

It's his owner's bad hair. Ma sha Allah, you have seven Qurans in your hands. Do whatever you want.

The above text demonstrates the difficulty machine translators face when translating Persian idiomatic expressions into English. Literal translation failed miserably in conveying the intended meaning. Nonetheless, ChatGPT performed slightly better by accurately translating the final expression in the provided example.

پیش خودم گفتم چنین روز مبارکی صلهٔ ارحام نکنی کی خواهی کرد؟

I said to myself, on such a blessed day, don't say goodbye, when will you do it?

I said to myself, on such a blessed day, who wouldn't want to maintain family ties?

The underlined sentence above was meant to convey "if you don't visit your relatives now." ChatGPT successfully produced an accurate and fluent translation for this segment.

راستی‌راستی تصور کردم دو رأس هندوانه از جایی کش رفته و در آن‌جا مخفی کرده است

I honestly thought he had pulled two watermelon heads from somewhere and hid them there.

I imagined two watermelon heads had gone somewhere and hidden there.

ChatGPT did not translate the adverb "honestly." The underlined Persian idiom, "کش رفتن," which means "to steal," was translated literally by Google Translate and omitted by ChatGPT.

مشغول تماشا و ورانداز این مخلوق کمیاب و شیء عجیب بودم که **عیالم** هراسان وارد شده گفت خاک به سرم مرد حسابی، اگر ما امروز این غاز را برای مهمان‌های امروز بیاوریم، برای مهمان‌های فردا از کجا غاز خواهی آورد؟

I was watching this rare creature and a strange object when my **parents** came in and said to me, "If we bring this goose today for today's guests, where will you get goose for tomorrow's guests?"

I was busy watching this rare creature when my **wife** entered in fear and said, "God damn it, a real man has arrived. If we bring this goose for today's guests, where will you get a goose for tomorrow's guests?

The word "عیال" was translated as "parents." However, in Persian, it most commonly means "wife." Throughout the text, it was mistranslated as "family" for the most part. The second underlined phrase was also omitted in the English translation by Google Translate, while ChatGPT translated that idiom with an appropriate informal equivalent, "God damn it."

تمام حسن کباب غاز به این است که دست‌نخورده و سر به مهر روی میز بیاید

The whole beauty of goose kebab is that it comes to the table intact and intact.

The whole point of a goose kebab is for it to be untouched and placed with honor on the table.

The underlined adjective was unnecessarily repeated. It could have been used once if equivalents for two synonymous Persian words in English couldn't be found. However, ChatGPT managed to avoid this problem through unfaithfulness.

به خود گفتم این مصطفی گرچه زیاد کودن و بی‌نهایت چلمن است، ولی پیدا کردن یک غاز در شهر بزرگی مثل تهران، کشف آمریکا و شکستن گردن رستم که نیست

I said to myself that this Mustafa, although he is a lot of hard work and infinite Chalman, but finding a goose in a big city like Tehran, discovering America and breaking Rostam's neck is not.

I told Mustafa, "Dear Mustafa, what's the matter? Let me fix your head. I want to show you that today, we have found a good and fresh goose at any cost, like we have discovered America and broken Rostam's neck.

It is unclear why the adjective "کودن," which means stupid, was translated as "hard work." The word "چلمن" was only transliterated. The sentence word order in the translation by Google Translate is not natural. On the other hand, ChatGPT's translation missed the point entirely, and even its omission strategy didn't help produce an easy-to-understand translation this time.

می‌خواهم نشان بدهی که چند مرده حلاجی و از زیر سنگ هم شده امروز یک عدد غاز خوب و تازه به هر قیمتی شده برای ما پیدا کنی

I want you to show me how many dead people you have dug up from under a rock.
[ChatGPT: Omitted the idiom]

Persian script does not always include diacritic marks to indicate vowel sounds, making it difficult to differentiate between words with similar spellings but different meanings. The heteronym problem arose again in the translation of the word "مرد," which means "man" or "death" depending on how you pronounce it rather than how you write it. That being said, the above underlined Persian idiomatic expression would have been mistranslated anyway since even ChatGPT couldn't find an equivalent and omitted it altogether.

با حال استیصال پرسیدم پس چه خاکی به سرم بریزم؟

I asked with desperation, so what should I pour on my head?
With a heavy heart, I asked, "Then what should I serve?"

The underlined questions are not good translations because they are misleading or inaccurate. It could have been translated as "what should I do?" instead.

کلید مشکل‌گشای عرق، قفل تپق را هم از کلامش برداشته و زبانش چون ذوالفقار از نیام برآمده و شق‌القمر می‌کند

The key to solve the problem of Irq has also removed the lock of clapping from his words, and his tongue is like Zulfiqar, and he is shouting.

The key to unlocking the problem of the syrup had also removed the lock from his mouth, and his tongue was like the Zulfiqar sword rising from the scabbard and splitting the moon.

It was particularly difficult for Google Translate to understand metaphors and religious allusions, such as the phrase 'Shaqq al-Qamar' which means 'splitting of the moon' and refers to a miracle believed to have been performed by the Islamic prophet Muhammad, where he split the moon in two. Nowadays, it is used to refer to any arduous task done by anyone. Another example is 'Dhu al-Faqar,' which is a legendary sword given to Ali ibn Abi Talib, the cousin and son-in-law of the Islamic prophet Muhammad, and is considered a symbol of courage and strength in some Islamic cultures. The author's intention was to convey that the otherwise reserved Mustafa became talkative due to consuming alcoholic drinks. However, both ChatGPT and Google Translate mistranslated the specific type of alcoholic drink, but overall ChatGPT provided a better translation.

گفتم تو رفقای مرا نمی‌شناسی، بچه قنداقی که نیستند بگویم ممه را لولو برد و آن‌ها هم مثل بچهٔ آدم باور کنند

I said, "You don't know my friends, they are not children. I will tell **you** that Lulu took Meme and they will believe me like a child."

I said, "You don't know my friends. They'll think I'm lying. What if I tell them my aunt's son took it and ran away with it?"

Google Translate failed to comprehend the object of the conversation. In the underlined sentence above, the bolded pronoun, "you," should have been translated as "them." One of the most commonly mistranslated Persian proverbs is "آن ممه را لولو برد" ("*'Ân mameh ra lulu bord*"). In this proverb, "*mameh*" refers to breast and "*lulu*" represents an imaginary creature that children fear. Former President of the Islamic Republic, Mr. Ahmadinezhad, used this proverb in a political context when referring to the United States, which posed a challenge for many translators as well. It appears that even after numerous years, Google Translate still struggles to provide an accurate translation for it. The proverb signifies that what one is attempting to achieve is no longer feasible. Its origin lies in what mothers used to say to their children when they were weaned off breastfeeding. In the aforementioned text, it simply meant "I can't deceive my friends." However, ChatGPT made a different error by assuming that "*mame*" was a misspelling of

"*amme*," which means aunt in Persian. Consequently, it produced an incomprehensible translation.

7. Conclusion

In summary, the research findings highlight the significant contributions of machine translation systems like ChatGPT and Google Translate to the field of machine translation. However, when it comes to literary translation from Persian to English, they encounter challenges in conveying cultural nuances and idiomatic expressions. While ChatGPT is more likely to produce grammatically correct translations, it tends to omit cultural nuances at the expense of fluency. Conversely, Google Translate is less likely to omit source text elements, even if it means producing transliterations or clumsy translations.

The functional holistic model developed by Sofyan and Tarigan (2019) was used to assess the performance of ChatGPT and Google Translate, resulting in scores of 40% and 56%, respectively. These scores demonstrate the potential for machine translation systems to improve and develop further. Furthermore, ChatGPT's score was comparable to some human translators' scores obtained by online translation agencies in another quality assessment research based on the same model (Aghai, 2023). This indicates that ChatGPT performs better than less skilled human translators, although there is still room for improvement in order to reach the level of highly qualified human translators.

Overall, these apps have the potential to be used as a facilitator for producing high-quality hybrid translations. While machine translation systems cannot fully replace human translators, they can be used in conjunction with human translators to produce high-quality hybrid translations. The future looks promising for machine translation systems as they continue to improve and develop, and with further training, they may become more effective tools for literary translation.

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