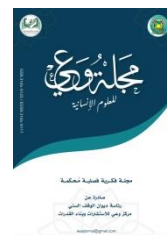




مجلة وعي للعلوم الإنسانية

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تقييم جودة الترجمة التقنية: باستخدام ترجمة جوجل وتشات جي بي تي دراسة حالة

Quality Assessing of Technical Translation: Using Google

Translation and ChatGPT as a Case Study

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الكلمات

المفتاحية

الترجمة التقنية،

الترجمة الآلية،

اللغة التقنية،

الذكاء

الاصطناعي

المخلص

لقد زاد تطور التكنولوجيا من ضرورة الترجمة التقنية. ترشد الترجمة التقنية المستخدمين الى الاستخدام السليم والمساعدة على تجنب المخاطر وتسهيل عملية التنصيب بصورة سريعة. تستخدم هذه الدراسة تطبيقي تشات جي بي تي وترجمة جوجل لترجمة النصوص التقنية. تجرى عملية تقييم الترجمة باستخدام نهج النموذج المدمج. وتؤكد النتائج ان النصوص المولدة من تطبيق ترجمة جوجل ذات جودة اقل من النصوص المولدة من تطبيق تشات جي بي تي. ويمكن ان يعزى هذا الى القصور في تركيب الجمل وأدوات الربط في تطبيق ترجمة جوجل. بالإضافة الى اتمام تحديد الوحدات النحوية. لذلك، غالباً ما تقتصر النصوص المولدة من تطبيق ترجمة جوجل على الترجمة الحرفية. تفرض طبيعة النصوص التقنية تحديات في التمييز بين معنى المصطلحات المتخصصة والمباشرة. يدعو هذا البحث الى استخدام نصوص تقنية سياقية مدمجة في خوارزميات متطورة لتحسين جودة الترجمة. على الرغم من ذلك مهما زاد تطور الآلات الترجمة تبقى متابعة المترجمين امر واقع. ان دور المترجم لا يقتصر على الترجمة. هو يعمل كناقذ ومدقق لغوي ومقوم للنص المنتج. وبشكل عام، مع ظهور نماذج الترجمة الآلية أصبحت مهمة المترجم مهمة تكميلية. حيث ان المترجم يستغل الوقت والجهود في حين تستغل نماذج الترجمة الآلية المراجعة

KEY WORD

Technical translation, machine translation, technical language, artificial intelligence

Abstract

The development of technology has increased the necessity for technical translation. Technical translation guides users to proper use, helps avoid hazards, and facilitates rapid installation. This study uses Google Translate and AI-based ChatGPT to translate technical texts. The assessment of translation is conducted using a mixed-model approach. The findings emphasize that Google Translate-generated texts are of inferior quality to AI ChatGPT-generated texts. This can be attributed to the deficiency of sentence structure and connectors in Google Translate. In addition to the lack of identifying units of syntax. Hence, Google Translate-generated texts are often limited to word-for-word translation. The nature of the technical text poses a challenge in discriminating between the direct meaning and the specialized meaning of terminology. The research advocates the use of contextual technical texts that have built-in advanced algorithms to enhance translation quality. Despite that, even if the development of translation machines has increased, the oversight of translators remains a fact situation. The role of a translator is not restricted to translation. He serves as a reviewer, proofreader, and assessor of the product. Overall, with the emergence of machine translation models, the task of a translator has become complementary. The translator makes use of time and effort, whereas the machine translation models make use of revision.

1. Introduction

Technical language is a specialized register characterized by unique and complex terms that are understood by in-group members. Decontextualization of these technical terms leads to technical problems, societal challenges, and misleading information. The urgent need for effective technical use in light of recent progress paves the way for the emergence of technical translation. The intellectual and abstract character of technical concepts invokes a precise understanding of their fundamentals. Subtle details are potentially overlooked in translation due to the condensed, complex grammatical structures of technical language. The corpus for investigation involves samples extracted from a car manual. AI-generated texts and Google Translate-generated texts are submitted to translation standards to assess the accuracy and quality of translation. The purpose of this research is to improve readability and fluency as well as enhance the translation quality of technical texts.

2. Overview of Technical Translation

According to Herman (1993:11), translation and technical materials converge in several qualities. The technical materials are concise, obvious, and accurate, and the translation reflects the same characteristics. Concise is a key feature of technical writing. It focuses on expressing all ideas concisely and precisely. It aims to make the text fluent and readable to the target audience. Whereas clarity emphasizes content over form. It works to convey the original meaning through the target structure, taking into account grammatical and lexical variation. Correctness involves accurately reproducing technical vocabulary in the target language and producing correct texts even when errors are presented in the original, which necessitates a deep understanding of the subject matter.

Hervey et al (2005:125) note that technical translation involves three main problems arising from specialized and technical vocabulary. Initially, some vocabulary is not commonly used and is unrecognized by a non-specialized translator. For instance, without a translator's technical expertise for scientific vocabulary, they cannot infer the exact meaning of the technical vocabulary, nor can they provide its correct rendering in the target text. The following is vocabulary familiar to the translator in its everyday use; however, it is used differently in the field of technology in the SL. Therefore, the translator fails to find the technical meaning. The final one is the most unsafe type, in which the translator fails to recognize technical vocabulary and translates it in its ordinary meaning.

Byrne (2006:3) identifies that technical translation is related to technology or technological texts. It is crucial to differentiate between specialized and technical translation. The presence of specialized vocabulary does not necessarily make a text technical. For instance, religious texts have a special vocabulary, form, and structure, but they are not considered religious texts. On

the contrary, technical vocabulary is the most crucial language feature of technical text. It stamps the text with a technical trait.

Burke and Richter (2012:5) observe that technical translation adheres to clear messaging, omitting subtle nuances such as tone, suggestion, deep thought, or layered references. Put another way, it aims to lay out complex topics - say, global talks, science work, money matters - without hidden meaning.

Ismayilli and Bahruz (2024:84-85) point to technical translation focusing on writings packed with specialized words, requiring a grasp of both original and target fields. They show that technical translation deals with documents using specialized terms, needing deep knowledge in the subject for both the original and translated versions. When working across fields like healthcare, legal matters, or engineering, clarity becomes key. Translators must make difficult ideas easier without losing their core meaning. Even so, precision stays central - consistency in how technical phrases appear keeps confusion low. Think scientific studies, instruction manuals, medical records being put into another language carefully. Now machines talk our language, thanks to smarter tools behind the scenes. Because accuracy matters, words get moved across borders without losing meaning. Mistakes fade when manuals speak clearly to workers who rely on them daily. Precision kicks in wherever gear runs only if directions are perfectly clear. One wrong term can ripple through a factory floor - clarity stops that. When systems must behave exactly right, translations hold the line. People stay protected because documents say what they mean, every time.

3. Machine Translation

Poibeau (2017:12) says machines still struggle to translate language perfectly. News articles see real change through automated tools. Yet poetry needs people who deeply understand words, rhythm, and feeling. Technical documents bring another layer of complexity. Special terms must first be entered into the software before the correct output appears. One thing stands

clear - humans remain essential even when machines help. Drafts come from systems but rely on editors to refine them. Accuracy keeps coming up in conversations about digital translation. Some aim to match what skilled translators deliver by hand. Progress exists, though perfection stays out of reach. Still, people find it tough to put into practice because results hinge on how tricky and unique the original text happens to be. At first, machines translated one word at a time, yet modern versions now rely on smarter methods when dealing with tangled sentence structures.

James (2023:20) splits machine translation into four types. Starting with rule-based systems, these rely on hand-crafted patterns to break down how words connect in a sentence before rebuilding meaning elsewhere. Because experts design the guidelines, tiny shifts in phrasing often get handled well. One strength? Accuracy improves when grammar details matter most. Translation shaped this way leans heavily on deep knowledge of both languages involved. Yet rules inside RBMT fall short when facing phrases never seen before. Looking closer, SMT studies patterns using number-based models to guess matching sentences. Speed favors SMT over older rule-heavy methods since it moves faster with less manual setup. Still, guesses by SMT sometimes miss the mark - especially with tricky structures needing background clues. Further along comes NMT, built on network designs that mirror how brains handle signals. New algorithms help judge correct translations. Attention methods plus word embeddings play a role here. Patterns become clearer when data flows into NMT. This flow brings sharper recognition of fresh terms. Idioms appear more naturally because of it. Yet problems remain even with progress. Technical limits slow things down sometimes. High demands on hardware can block smooth operation. Perfectly matched texts are necessary for good results. Without them training stumbles. HMT mixes older rules with newer models. Either neural or statistical systems join the mix. Grammar gets fixed first through structured rules. Accuracy climbs after that step happens. Translation

gains strength from both sides working together. What sets HMT apart is how it handles layered sentences shaped by surrounding meaning. Still, running this kind of machine translation needs heavy computing power - keeping it working and updating it takes far greater effort compared to simpler systems.

Lyu et al. (2024:1339) point out that machine translation matters a lot in tech, shifting meaning from one language to another. Through time, systems moved from number-driven approaches toward brain-inspired networks, lifting performance noticeably. Idioms trip up machines often, uncommon words cause hiccups too, and the flow between sentences sometimes breaks apart. Big shifts arrived when models like GPT-3 and GPT-4 entered the scene, changing how translations get handled across tasks. These smart models do more than translate - they answer questions, reshape wording without losing intent. Even so, depending on AI brings issues, especially around private data staying secure. New strategies keep being necessary because old fixes no longer meet current demands.

4. Artificial Intelligence

Haque (2020:37) differentiates between human and artificial intelligence, asserting that humans share the same intellectual mechanism. Nevertheless, they may reveal clear differences in intelligence due to physical and mental factors, which may affect primary and secondary memory. AI networks operate more efficiently than human intelligence and can store large amounts of data, but their intelligence relies on the data they are given. Although scholars of cognitive science have not identified human skills, AI's skills may surpass those of a normal or even a mature child. Humans' cognitive mechanisms might differ from those of AI. If a human's performance is superior to that of a machine, or if a machine requires complex computations to rival a human's performance, it indicates the intelligence of the program's developer.

Ghosh and Thirugnanam (2021:23) demonstrate that artificial Intelligence (AI) is a field of computer technology that allows computers to mimic human

conduct and enhance performance in science and technology. AI is designed to imitate human intelligence, address complex tasks, and make machines capable of performing tasks that require human intelligence. It also strives to create systems that can autonomously learn. AI involves various elements, such as machine learning and deep learning, that utilize sophisticated algorithms and complex neural network layers sequentially to address problems.

According to Hoch (2024:2), under the sphere of artificial intelligence, ChatGPT pledges a major transformation in translation. ChatGPT can efficiently interpret, analyze, and generate texts by using its remarkable linguistic abilities. The mechanisms of ChatGPT are entirely distinct from conventional translation software. It relies on the concepts of text and context to produce translations similar to the original. AI's cutting-edge capabilities make it an important part of a translator's job, helping them to accelerate the translation process and provide high-quality versions. To sum up, translators can perform multiple tasks using ChatGPT, such as addressing large amounts of data, overcoming linguistic obstacles, and keeping accuracy.

5. Methodology

One way to look at this research is through a mix of two models - one handles language patterns, the other deals with how things get translated. Different experts like Gile and others, Justeson with Katz, plus Chung alongside Nation have shaped the ideas behind the language part. Instead of sticking to just one idea, the translation side pulls from methods like borrowing, equivalence, explication, and literal translation. Sentences first appeared in the 2024 Corolla manual before moving into digital tools. Both Google Translate and ChatGPT processed these phrases separately. What stands out is how this work blends angles to judge what gets lost or kept during.

5.1 Technical Language

Justeson and Katz (1995:13-17) denote that the structure of noun phrases in technical language is distinct from that of general language. Most expressions used in fields such as engineering, medicine, and physics consist of noun phrases; they are noticeably used in such technical texts. Generally speaking, technical noun phrases usually involve nouns and adjectives, with limited usage of the preposition “of”. Basic vocabulary of technical language is usually composed of a word or a combination of words and modifiers. More precisely, long vocabulary is unfamiliar, whereas pure technical vocabulary typically is composed of two-word phrases, providing harmony between brevity and elaboration. Linking words, adverbs, and determiners often perform communicative functions instead of adding precise meaning. Therefore, they are not often used in technical language. Although prepositions are also unfamiliar, they can be used to connect sentence elements. The more brevity in technical vocabulary, the more superfluous elements are removed, leading to more precise and concise vocabulary. The identification of technical vocabulary requires specifying its structure and lexical repetition with a focus on phrases that end with a noun and sometimes a preposition and an adjective. On the whole, technical vocabulary is distinguished by concise nominal-adjective phrases which demonstrate its specialized character.

Chung and Nation (2004:252) assert that technical vocabulary is terms or phrases tightly bound to a specific area of expertise and form a part of specialized content knowledge. These vocabularies exist in specific fields and can be identified by different strategies, including assessing their relation to a subject, looking them up in technical dictionaries created by experts, using a judgment-centered system, and examining their repetition in specialized versus non-specialized texts. Moreover, the writers often associate contextual cues with new technical vocabulary, helping readers comprehend their meanings.

Gile et al. (2004:58) point out - fixed expressions matter a lot in technical talk because things must stay clear and consistent. Unlike stories or poems that chase fresh wording, science writing leans on familiar chunks of language. These repeat patterns show up again and again since the work circles around nearly identical steps, ideas, and outcomes. Redundancy shapes how it sounds, not by accident but because the subject stays narrow. Under these parameters, the daily language uses sentence-length chunks that combine fixed expressions and discourse markers, while formulaic phrases exist, but they are less common. Within the framework of sociolinguistics, technical language should create an equilibrium between standardization and compliance with the expected criteria. A single rigid rule often leads to writing stuffed with confusing terms. Too little guidance might result in flat, out-of-place wording missing its setting. Working without attention to pattern or situation risks miscommunication. Phrases pulled from templates need care each time they are placed into reports or manuals. Matching rhythm and relevance matters more than repeating fixed forms. When reused expressions fit both logic and moment, clarity stands a better chance.

Campbell and Freedman (2015:4-5) point out how technical writings fit within science-related material, aiming to clarify ideas for people reading them. Because they serve many roles, these pieces show up everywhere - think manuals, flyers, small printed guides. Safety notes for equipment appear alongside alerts, directions on operation, plus details about where the content lives, digital or paper. Sometimes the topic might be running an experiment, arranging a desktop system, putting together a mechanical figure. When it comes to fixing machines, words must mean exactly what they say. Think about car repairs - tiny mistakes in directions can lead to big problems later on. Instructions need to sit right in front of the person doing the work. If details get mixed up or left out, things go wrong fast. Clarity isn't optional here - it shows up like a tool you can't skip.

5.2 Translation Framework

5.2.1. Equivalence

Nida (1964:12) states that translation splits into two main types: dynamic equivalence and formal equivalence. While one leans toward meaning, the other sticks close to how things are said. Words, phrases, whole sentences - these pieces stay tied to the original when using formal equivalence. Ideas themselves follow the source pretty tightly. Take gloss translations - they try hard to mirror every bit of the original in the new language. Accuracy becomes the top goal here. At the bottom of each page, footnotes appear so readers can grasp cultural distinctions. Academic formats often stick to this way when keeping the source's layout matters most. Yet dynamic equivalence cares less about structure, more about impact - how the translated version affects its audience as the original did. Meaning gets center stage here, along with ease and familiarity within the new culture. Instead of pulling people toward the source, it grounds them where they are. The goal shows up quietly: let meaning live naturally in another setting.

5.2.2. Borrowing

Vinay and Darbelnet (1995:31-32) point out that borrowing involves incorporating a word from the source language into the target language with minor modification, primarily to adjust for pronunciation rules. This method is one of the easiest translation methods. It is usually employed in two main directions: to introduce a new technical term without an equivalent in the target text, or to retain a term from the source text for stylistic reasons, consequently adding a particular flavor to the target text.

Molina and Albir (2002:520) classify borrowing into two kinds: pure borrowing that occurs when a word or a phrase is adopted into the target text without any adjustment, such as employing the English word (internet) directly → انترنت in Arabic. Naturalized borrowing that includes adapting the

loaned word to match the spelling and phonological rules of the target text, such as computer → كومبيوتر .

5.2.3. Explication

Blum-Kulka (1986:19) introduces the explication hypothesis, which holds that the translation process produces a target-language text that is more explicit than the source-language text. This increased explicitness is often reflected in greater cohesive explicitness within the target text.

Vinay and Darbelnet (1995:342) define explication as “a stylistic translation technique which consists of making explicit in the target language what remains implicit in the source language because it is apparent from either the context or the situation”.

Klaudy (1998/2011:104) identifies explication as “the technique of making explicit in the target text the information that is implicit in the source text”.

5.2.4. Literal translation

Moussa and Hammoud (2024:14) say that literal translation is the process of rendering words precisely as they seem in the source text into the target text without considering grammar, context, or vocabulary differences. This method sticks close to each individual word when moving from one language to another, often causing unclear meanings once translated. Even though straightforward, such direct swapping fails to carry over the original message properly. It is an automatic approach (focus on the form) rather than a communicative one (focus on the meaning). The literal translation has been subjected to several criticisms, but it remains the safest method for beginners.

Sample (1)

| Input text |
|--|
| Starting engine 1. Driving 1. With the brake pedal depressed, shift the shift lever to D. 2. Release the parking brake. 3. Gradually release the brake pedal and gently depress the accelerator pedal to accelerate the vehicle <p style="text-align: right;">(Toyota Motor Corporation, 2024:143)</p> |
| Output Google translation |
| <p style="text-align: right;">محرك البداية</p> <p style="text-align: right;">1. القيادة</p> <p style="text-align: right;">1. اثناء الضغط على دواسة الفرامل، قم بتحويل ذراع ناقل الحركة الى وضع D</p> <p style="text-align: right;">2. حرر فرامل الانتظار</p> <p style="text-align: right;">3. حرر دواسة الفرامل تدريجيا واضغط برفق على دواسة الوقود لتسريع السيارة</p> |
| Output ChatGPT |
| <p style="text-align: right;">تشغيل المحرك</p> <p style="text-align: right;">1. القيادة</p> <p style="text-align: right;">1. مع الضغط على دواسة الفرامل قم بتحويل ذراع النقل الى D</p> <p style="text-align: right;">2. قم بتحريك فرامل الانتظار.</p> <p style="text-align: right;">3. اطلق دواسة المكابح تدريجيا واضغط برفق على دواسة الوقود لتسريع السيارة</p> |

The text is excluded from the Toyota Corolla user manual. Google and ChatGPT translate the above text. The first phrase indicates the process that initiates engine operation. Google Translate produces an incorrect translation (محرك البداية), whereas ChatGPT captures the appropriate meaning of the same expression (تشغيل المحرك). In the second sentence, Google Translate uses the word (اثناء), ChatGPT uses the more convenient word (مع) to refer to the act of pressing the brake pedal. The process of moving the shift lever should occur sequentially and continuously. The expression *brake pedal* (دواسة الفرامل) is an acceptable translation, but the term "فرملة" is derived from Turkish, borrowed from "frenleme," which in turn comes from the French "frein" (Alankaa). Furthermore, the more appropriate translation is (دواسة المكابح). The proper

translation for *parking brake* is (فرامل الانتظار)، (مكبج الوقوف)، not (أطلق). ChatGPT uses dynamic translation, while Google Translate uses formal equivalence.

| Proposed translation |
|---|
| <p>تشغيل المحرك ١. القيادة ١. مع الضغط على دواسة المكابح قم بتحويل ذراع النقل الى وضع D ٢. حرر مكبج الوقوف ٣. حرر دواسة المكابح تدريجيا واضغط برفق على دواسة الوقود لتسريع العجلة</p> |

Sample (2)

| Input text |
|--|
| <p>When using the mechanical key and operating the power windows or moon roof (if equipped). Operate the power window or moon roof after checking to ensure no passenger has any body part caught in it. Also, do not allow children to operate the mechanical key. Children and other passengers can get caught in the power window or moonroof. (Toyota Motor Corporation, 2024:427)</p> |
| Output Google translation |
| <p>عند استخدام الميكانيكية المفتاح وتشغيل الطاقة النوافذ أو سقف القمر (إذا مسلح) قم بتشغيل النافذة الكهربائية أو سقف القمر بعد التحقق من صنعه متأكد من عدم وجود امكانيه لذلك اي راكب لديه اي منهما اجزاء الجسم عالقه في النافذه او سقف القمر. كما لا تسمح للاطفال تشغيل المفتاح الميكانيكي. انها ممكن للاطفال وغيرهم الركاب للوقوع في نافذه كهربائيه او سقف قمري.</p> |
| Output ChatGPT |
| <p>عند استخدام المفتاح الميكانيكي وتشغيل النوافذ الكهربائية أو السقف الزجاجي (إذا كان مزوداً به) قم بتشغيل النافذة الكهربائية أو السقف الزجاجي بعد التأكد من عدم وجود احتمال لاحتجاز أي جزء من جسم الركاب في النافذة أو السقف الزجاجي. أيضاً، لا تسمح للأطفال باستخدام المفتاح الميكانيكي. فمن الممكن أن يتعرض الأطفال والركاب الآخرون للاحتجاز في النافذة الكهربائية أو السقف الزجاجي.</p> |

Google translation above contains many errors, including grammatical and lexical errors. Furthermore, it is irregular and incoherent. Google Translate renders the expression "mechanical key" into (الميكانيكية المفتاح), whereas the appropriate translation is (المفتاح الميكانيكي). Google does not distinguish that the word mechanical is an adjective used to describe a noun, namely a *key*. The second error is the expression "power windows," which is translated into (الطاقة) (النوافذ), while the proper translation is (النوافذ الكهربائية). The word *power* has many meanings, but the most appropriate one here is (الكهربائية). Ready-made phrases are commonly used in technical texts. Therefore, such applications must include precise translations of these phrases. For instance, the expression *moon roof* is translated into (سقف القمر) by Google or (السقف الزجاجي) by ChatGPT. The literal translation of both renderings is flawed; the accurate translation is (فتحة السقف). Likewise, the phrase *if equipped* is translated by Google (إذا مسلح), while ChatGPT produces the proper translation (إذا كان مزودا به). In the second sentence, Google uses the contextual translation for the expression "power windows". (النوافذ الكهربائية). Accordingly, it can provide the appropriate translation for an expression, but it should consider the context. Google Translate translates the phrase after checking to make sure as (بعد التحقق من صنعه) (متأكد), but the relevant translation is (بعد التحقق للتأكد من). Google Translate translates the following phrase as "any passenger having any of their body parts caught incorrectly," while ChatGPT produces a contextual translation (لاحتجاز أي جزء من جسم الركاب). The translation of the last sentence lacks accuracy and natural flow. There is no coherence in the notion of translated text, especially in Google Translate. In a nutshell, Google Translate uses literal translation, while ChatGPT is more accurate in dynamic equivalence.

Proposed translation

عند استخدام المفتاح الميكانيكي وتشغيل النوافذ الكهربائية وفتحة السقف (إذا كان مزودا به).
شغل النافذة الكهربائية او فتحة السقف بعد الفحص، للتأكد من عدم امكانية وجود اي جزء من
اجزاء جسم المسافرين عالق في النافذة او فتحة السقف. ولا تسمح أيضا للأطفال بتشغيل المفتاح
الميكانيكي. فمن المحتمل ان يعلق الاطفال او المسافرين الاخرين في النافذة الكهربائية او فتحة
السقف.

Sample (3)

| Input text |
|--|
| Fuel pump shut-off system. To minimize the risk of fuel leakage when the engine stalls or an airbag inflates during a collision, the fuel pump shut-off system stops fuel supply to the engine. (Toyota Motor Corporation, 2024:398) |
| Output Google translation |
| مضخة الوقود مغلقة نظام لتقليل مخاطر الوقود تسرب عندما المحرك الاكشاك او عندما وساده هوائيه ينتفخ عند الاصطدام، ونظام ايقاف مضخة الوقود ايقاف امداد الوقود لها المحرك. |
| Output ChatGPT |
| نظام إيقاف تشغيل مضخة الوقود لتقليل خطر تسرب الوقود عند تعطل المحرك أو عند انتفاخ وسادة الهواء عند التصادم، يقوم نظام إيقاف تشغيل مضخة الوقود بوقف إمداد الوقود إلى المحرك |

The word order in Google Translate is incorrect. The words (مغلقة)and (نظام)are placed at the end of the sentence, making the meaning awkward. The sentence has to be paraphrased for clarity. Reviewing Google translation, we can note that the verb (تسرب) should come before the subject (الوقود). Moreover, the word "stalls" is translated as a noun (اكشاك), but it is a verb here, not a noun. According to the Cambridge Dictionary, a stall is "if an engine stalls, or if you stall it, it stops working suddenly and without you intending it to happen." Therefore, the correct translation of the word "stalls" is (تعطل). In the following sentence, the verb (ينتفخ) should come before the subject (وساده هوائية), noting

that the proper translation should be (انتفاخ الوسادة الهوائية). ChatGPT provides the more commonly used word for the word *collision* (تصادم) compared to Google Translate, which provides a more accurate translation (اصطدام). In the last sentence, the word (stops) has to be translated as (يوقف) not (ايقاف) and come before the subject (يوقف نظام ايقاف مضخة الوقود).

| Proposed translation |
|---|
| <p>نظام ايقاف مضخة الوقود لتقليل مخاطر تسرب الوقود عند توقف المحرك او عند انتفاخ الوسادة الهوائية عند الاصطدام، يوقف نظام ايقاف مضخة الوقود امداد الوقود الى المحرك</p> |

Sample (4)

| Input text |
|--|
| <p>To prevent the windshield from fogging up Do not use the windshield defogger switch during cool air operation in extremely humid weather. The difference between the outside air temperature and the windshield temperature can cause the outer surface of the windshield to fog up, blocking your vision. (Toyota Motor Corporation, 2024:297)</p> |
| Output Google translation |
| <p>لمنع الزجاج الامامي من التعفير لا تستخدم مزيل ضباب الزجاج الامامي قم بالتبديل اثناء تشغيل الهواء البارد في الطقس الرطب للغاية. الفرق بين درجات الحرارة من الهواء الخارجي ويمكن ان يسبب ذلك الزجاج الامامي السطح الخارجي للزجاج الامامي للضباب، وحجب الرؤية الخاص بك.</p> |
| Output ChatGPT |
| <p>لتجنب تعكير الزجاج الامامي لا تستخدم مفتاح مجفف الزجاج الامامي أثناء تشغيل الهواء البارد في الطقس الرطب جدًا. الفرق بين درجة حرارة الهواء الخارجي ودرجة حرارة الزجاج الامامي يمكن أن يتسبب في تعكير السطح الخارجي للزجاج، مما يعوق رؤيتك.</p> |

The translation in the two applications needs to be revised. Google and ChatGPT inaccurately render an expression *fogging up* into (تعكير) and (التعفير). The appropriate translation for an expression *fogging up* is (تكاثف ضباب). In

addition, the noun *switch* in the above text is translated into a verb (قم بالتبديل), but its translation is (مفتاح). Furthermore, the exact translation for *defogger* is (مزيل الضباب), not (مجفف). The translation of Google contains some stylistic and formulation errors. The last translated sentence lacks coherence among its elements, making it ambiguous. The absence of conjunctions and pronouns disrupts coherent ideas. In Arabic, the main verb comes first in a verbal sentence. Google cannot divide the sentence into word classes. The subject, in this sentence, is "*The difference between the temperature of the outside air and that of the windshield,*" and the main verb is "*cause*". Therefore, we should use the verb (الاختلاف بين درجة حرارة (يمكن ان يؤدي) in the beginning then followed by (الهواء الخارجي ودرجة حرارة الزجاج الامامي). Generally, ChatGPT's translation is clear, but it involves some errors. For instance, in the last sentence, the expression *fog up* is translated into (تكاثف الضباب), but it has to be (تغير). In this instance, Google follows a literal approach, whereas ChatGPT goes for formal equivalence.

| Proposed translation |
|--|
| <p>لمنع تكاثف الضباب على الزجاج الامامي لا تستخدم مفتاح مزيل ضباب الزجاج الأمامي عند تشغيل الهواء البارد في الطقس الرطب جدا. يمكن ان يؤدي الاختلاف بين درجة حرارة الهواء الخارجي ودرجة حرارة الزجاج الامامي الى تكاثف الضباب على السطح الخارجي للزجاج الامامي ، مما يسبب حجب رؤيتك.</p> |

Sample (5)

| Input text |
|---|
| <p>If the engine has to be turned off while driving. Power assist for the brakes and steering wheel will be lost, making the brake pedal harder to depress and the steering wheel heavier to turn. Decelerate as much as possible before turning off the engine (Toyota Motor Corporation, 2024:391)</p> |
| Output Google translation |
| <p>إذا كان لابد من إيقاف تشغيل المحرك قبله اثناء القيادة. دعم الطاقة للفرامل وسيتم فقدان عجله القيادة مما يجعل دواسه الفرامل اصعب الاكتئاب وعجله القيادة اثقل للدوران. التباطؤ كما قدر الامكان قبل ان تتحول خارج المحرك.</p> |

Output ChatGPT

إذا كان يجب إيقاف تشغيل المحرك أثناء القيادة. سيتم فقدان المساعدة الكهربائية للمكابح وعجلة القيادة، مما يجعل دواسة الفرامل أصعب في الضغط عليها وعجلة القيادة أثقل في الدوران. قلل السرعة قدر الإمكان قبل إيقاف تشغيل المحرك.

The translation of the phrasal verb *turned off* as (قبالة) deviates from the original meaning. This mistranslation impacts the full meaning of the sentence. The verb consists of two parts: the main verb and the preposition that collectively communicate the sense of (إيقاف). The difference between Google and ChatGPT's translation is obvious. This is because ChatGPT has a feature that makes its neural networks similar to those of humans. Additionally, it uses contextual text to deliver high-quality translations. These advantages enable ChatGPT to process the text and solve problems. Google Translate strictly follows literal translation in this text, ignoring the original's structure, grammar, and vocabulary. In the source text, *power assist for the brake and the steering wheel* are two separate systems that minimize the required effort to depress the brake pedal and to guide the vehicle. ChatGPT produces nearly the appropriate translation. Simultaneously, Google presents an unclear sequence when indicating to the two systems and incorrectly renders the expression connected to the steering wheel. The correct translation should be (سيتم فقدان التحكم بنظام الكبح) ، (الاكتئاب) ، والتوجيه المؤزرين كهربائياً. The verb *depress* is translated as a noun leading to a misunderstanding of the target text. The following verbs are translated literally: decelerate (التباطؤ)، turning (تتحول)، and off (خارج). The verb *decelerate* is a command verb that means (قلل السرعة)، and *turning off* is a phrasal verb that means (إطفاء) in this context. Google Translate uses literal translation, while ChatGPT uses formal equivalence.

Proposed translation

إذا كان لابد من إيقاف المحرك أثناء القيادة.
سيتم فقدان التحكم بنظام الكبح والتوجيه المؤزرين كهربائياً (وهو نظام مدعوم كهربائياً أو هيدروليكيًا يساعد على تعزيز قوة المكابح ويقلل الجهد المبذول من السائق ويجعل التحكم بالمقود أكثر خفة وسلاسة). مما يسبب صعوبة في الضغط على دواسة المكابح وتقل في دوران المقود. خفف السرعة قدر الامكان قبل اطفاء المحرك.

Sample (6)

| Input text |
|--|
| When initializing the tire pressure warning system. Do not set tire inflation pressure without first adjusting it to the specified level. Otherwise, the tire pressure warning light may not come on even if the tire inflation pressure is low, or it may come on when the tire inflation pressure is actually normal. (Toyota Motor Corporation, 2024:367) |
| Output Google translation |
| عند تهيئته ضغط الهواء في الاطارات نظام التحذير لا تتم بتهيئته نفخ الاطارات الضغط دون التعديل الاول ضغط نفخ الاطارات الى المستوى المحدد. خلاف ذلك، الاطارات ضوء تحذير الضغط قد لا هيا حتى لو تضخم الاطارات الضغط منخفض، او قد ياتي عندما يكون ضغط نفخ الاطارات طبيعي في الواقع. |
| Output ChatGPT |
| عند إعادة ضبط نظام التحذير لضغط الإطارات لا تتم بإعادة ضبط ضغط الإطارات دون ضبط ضغط نفخ الإطارات أولاً إلى المستوى المحدد. وإلا، فقد لا يضيء ضوء التحذير لضغط الإطارات حتى لو كان ضغط نفخ الإطارات منخفضاً، أو قد يضيء عندما يكون ضغط نفخ الإطارات فعلياً في المستوى الطبيعي. |

By analyzing the original version alongside the two translations, we identify several discrepancies between the two translations and the original. Google Translate commonly depends on literal translation, prioritizing verbatim matches over reflecting implied meaning. Using literal translation might produce awkward or vague text, which does not match the source text. The term *initializing* is rendered as (تهيئة) in the target text, which could confuse the reader. In addition, the translation of (نظام التحذير) occurs after the expression

عند ضبط نظام تحذير ضغط (ضغط الهواء في الاطارات). The accurate translation is (تهيئته) not (ضغط). The correct translation for the word *initializing* here is (أولاً). The phrase (نفخ الاطارات الضغط) is not clear and needs to be reorganized to (ضغط هواء الاطارات). It is better to replace the word (الأول) with (أولاً). The following errors are found in Google Translate: the phrasal noun *the tire pressure warning light*, should be translated as a grammatical unit (ضوء تحذير) (ضغط الإطار). The verb *come on* in this context should be translated as (يعمل), like turning on a light, not (هيا), and should come at the beginning of the sentence. The phrase (تضخم الاطارات الضغط منخفض) is inaccurate and confusing. The phrase (ضغط هواء الاطارات) should be corrected to (تضخم الإطارات الضغط) and the noun (منخفض) must be changed to the adjective (منخفضاً). Moreover, the verb *come on* is occasionally misunderstood as (يأتي), and the phrase *tire inflation pressure* is translated as (ضغط نفخ الاطار). The appropriate translation is (قد يعمل). ChatGPT's translation is acceptable and does not confuse the reader. ChatGPT's translation approach is dynamic equivalence. The target text involves the same effect as that of the original text would have. It focuses on the content and effect of the target text over the form of the source text to align with the audience.

Proposed translation

عند ضبط نظام تحذير ضغط الإطار.
لا تقم بضبط ضغط هواء الإطار من دون تنظيم ضغط هواء الإطار أولاً الى المستوى المحدد.
وبخلاف ذلك، قد لا يعمل ضوء تحذير ضغط الإطار حتى عندما يكون ضغط هواء الإطار منخفضاً، او قد يعمل عندما يكون ضغط هواء الإطار في المستوى الحقيقي الاعتيادي.

Conclusion

This study investigates the challenges of technical translation using machine translation, focusing on assessing translation quality by ChatGPT and Google Translate. The results demonstrate that technical language involves complex grammatical structures, demanding particular translation strategies such as

equivalence. Technical language is characterized by the presence of ready-made phrases, and translating them requires expanding elaboration in the target text. The recurring repetition of the ready-made phrases makes the text complex and difficult to comprehend. The nature of complex technical texts makes literal machine translation, which is often provided, difficult for readers to understand. ChatGPT's product is of higher quality than Google Translate, and it almost rivals human translation. Google Translate faces challenges in recognizing syntactic constituents such as (noun phrases), word order (subject-verb-object), and word classes (nouns or verbs) in the original texts. Therefore, the product is difficult to comprehend and obscure. Google's products lack conjunctions and linking words, and the sentences are disjointed. Moreover, the contextual text is missing in Google Translate. ChatGPT and Google Translate sometimes cannot distinguish between the technical and ordinary senses of the same term. The research recommends that the data for such applications should involve technically translated vocabulary and texts that faithfully reflect the target texts. Although machine translation provides initial drafts quickly and efficiently, human translators play a critical role in ensuring translation quality and avoiding errors. Ultimately, there is a necessity to enhance technical translation logics that connect concepts of technical language and meanings, ensuring the creation of connected and flawless texts.

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