



AI-Assisted Translation: Towards Integrating Human-Machine for High-Quality Translation

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Abstract

In recent decades, translation has become a crucial topic in linguistic studies as a result of the growth of machine translation, which has enabled rapid access to information across languages. Thus, machine translation systems such as Google Translate have evolved enormously with the support of artificial intelligence advancements. However, they still face challenges with accuracy, style, and specialized terminology. Human translation is a reliable method in the field of translation, but it often requires more time and effort. To combine the efficiency of technology with the linguistic and cultural knowledge of human translation, post-editing approach is adopted, where machine translation serves as a first draft, and then revised by a human translator. The study aims to propose a novel hybrid translation workflow combining AI-machine translation with human post-editing to improve translation quality. Larson's model (1984) is adopted in the analysis of three distinct texts in this study. It is hypothesized that the post-editing approach provides the strengths of both machine and human translation approaches, ensuring acceptable quality in less time and effort. The study concludes that the post-editing approach generally produces higher quality compared to using either alone, resulting in a balanced advantage of accuracy and efficiency across various texts intended for translation..

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الترجمة المعززة بالذكاء الاصطناعي: نحو تكامل الترجمة البشرية والآلية لتحقيق ترجمة عالية الجودة

انوار عبدالوهاب جاسم *

المستخلص:

صارت الترجمة في العقود الأخيرة موضوعاً جوهرياً في الدراسات اللغوية وذلك نتيجة لتطور الترجمة الآلية الأمر الذي قد أتاح سرعة الوصول إلى المعلومة عبر اللغات. ومن ثم، تطورت أنظمة الترجمة الآلية، مثل ترجمة جوجل تطوراً هائلاً وذلك بتقديم الذكاء الاصطناعي. ومع ذلك، لا تزال تواجه تحديات تتمثل بالدقة والأسلوب والتعامل مع المصطلحات المتخصصة. تُعد الترجمة البشرية الطريقة المثلى في مجال الترجمة، ولكنها غالباً ما تتطلب مزيداً من الوقت والجهد. وللجمع بين كفاءة التكنولوجيا والمعرفة اللغوية والثقافية البشرية، اللتين تقتضيهما الترجمة، اعتمدت الدراسة منهج تصويب الترجمة الآلية، حيث تُوظف الترجمة الآلية بوصفها مسودة أولى ثم يقوم المترجم البشري. تهدف الدراسة إلى تقديم آلية ترجمة هجينة جديدة تجمع بين الترجمة الآلية المدعومة بالذكاء الاصطناعي وتصويبها بشرياً لتحسين

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جودة الترجمة. اعتمدت الدراسة نموذج لارسون (1984) في تحليل النصوص الثلاثة المختارة ميدان الدراسة. حيث افترضت الدراسة أن منهج تصويب الترجمة الآلية يوفر نقاط قوة لكلا المنهجين الآلي والبشري، بما يضمن جودة مرضية بأقل وقت و جهد. وخلصت الدراسة إلى نتيجة مفادها أن منهج تصويب الترجمة الآلية يحقق ترجمة أمثل بشكل عام مقارنة باستعمال أي منهما بمفرده، مما يحدث توازنا مرضيا بين الدقة والكفاءة في مختلف النصوص المراد ترجمتها.

الكلمات المفتاحية: الترجمة الآلية، تصويب الترجمة الآلية، جودة الترجمة

1. Human Translation (HT)

Human translation is a cognitive and creative process in which a skilled translator interprets a source text and provides an equivalent target language, where linguistic accuracy, cultural, stylistic, and contextual factors are taken into consideration (Lau et al., 2024). In human translation, according to Al Rousan (2025), the translator converts a text from one language to another using their linguistic and cultural knowledge, without relying on automated systems or artificial intelligence. Thus, it remains superior to machine translation in capturing slight meanings and cultural differences. Xiu and Yeauyin (2018) explain that human translation is high reliability in specialized fields, such as finding equivalents for metaphors, idioms, or culturally specific references. In many translation studies, human translation is widely regarded as the gold standard because it always offers a higher accuracy, creativity, and cultural awareness.

2. Machine Translation (MT)

Machine translation is the process of automatically translating text from one language into other using computational algorithms, which means that no direct human intervention is required (Koehn, 2020). Thus, machine translation is the use of computer to transfer a text or speech from one language to another and it has been changed from word - for - word substitution to more sophisticated systems that analyze semantics and syntax (Hutchins & Somers, 1992).

Machine translation can be traced back to the 1950s with the Georgetown-IBM experiment (1954), in which more than 60 simple sentences were translated automatically from Russian to English, through a limited word dictionary and basic grammatical rules (Hutchins, 2014, p.2). The gradual progressions included Rule-Based MT (1960 - 1980), which depended on dictionaries and linguistic rules. However, it struggled with ambiguity and context. In the 1980s, Statistical Machine Translation (SMT) emerged, depending on large parallel corpora to calculate translation probabilities. SMT system used algorithms and supported phrase-based translation, improving translation fluency by aligning the words sequence rather than treating them individually (Koehn et al., 2007). In the 2010s, Neural Machine Translation (NMT) was introduced as an artificial neural network by researchers to improve accuracy, fluency, and context processing (Smartling,2023). Thus, Singh (2017) shows that it has become the standard, using deep learning models that analyze large amounts of data to predict the most appropriate translation for a given sentence phrase.

Google Translate is one of the most widely used examples of AI-assisted translation. It relies on neural machine translation (NMT), which employs deep learning and artificial intelligence. It supports translation between a large number of languages and offers various features such as text translation, Website translation, document translation, and real-time speech translation. It is also available as a web application and mobile application, making it accessible across different devices (Wu et al., 2016). In this study, it was used to demonstrate its application and effectiveness in translating texts after human translation.

3. Post-Editing Machine Translation (PEMT)

Although machine translation has achieved exceptional progress in speed and accessibility of tasks, especially with systems such as Google Translate (Wu et al., 2016, p. 21), its output often lacks the stylistic and contextual accuracy expected in human translation. Therefore, according to Koponen (2016, p.21), PEMT has become an essential step in the process of translation and allows human translators to refine and correct machine-generated texts to ensure fluency, cohesion, and quality standards. Gaspari, et al. (2014, p.5) explain that PEMT not only improves translation accuracy but also reduces the effort

compared to the entire manual transmission. PEMT, as a process of pre-translated text, is used as a basis and improving the final translation, combining the advantages of artificial intelligence (AI) and human competence (Herbig et al., 1984). Accordingly, AI-assisted translation can be seen as a hybrid approach, i.e., a complementary process that mixes neural machine efficiency with human competence.

4. Strengths and weaknesses of human and machine translation

Human translation is considered the most reliable choice of translators when a text requires high accuracy and the ability to capture contextual nuances. It efficiently excels at idiomatic expressions, tone, and literary style, making it crucial for literary, legal, and medical texts (Stoichkova, 2025, pp. 12- 13). Thus, this type of translation, according to Li et al. (2024), is the most accurate one since the cultural and social context of the text is perceived by the translator, enabling him to convey the original spirit of the SL. However, Moneus (2024, p. 4) sees it as more costly and time-consuming compared to machine translation.

Machine Translation, by contrast, provides essential advantages in time and cost, allowing large volumes of text to be translated quickly and at lower cost (Li, 2024, pp. 45-47); nevertheless, machine translation can struggle with idiomatic and culturally specific expressions, sometimes conveying extremely literal translations (Marshall, 2024, pp. 33).

To maximize the benefits of both, recent studies show that efficiency and accuracy can be balanced by integrating machine translation and human translation, when machine-generated translations are post-edited by human translators

5. Methodology and data analysis

To ensure a more reliable evaluation, the study adopts a qualitative analytical approach. Three distinct short English texts- scientific, journalistic, and literary- were selected. Each text was translated by three PhD candidates. Additionally, a Google translation was provided, and later post-edited by the same students to correct the possible mistakes. The focused sample was chosen to allow for in-depth qualitative comparison of translation quality, linguistic accuracy, and natural style. The students were instructed to avoid using AI-based machine translation tools and depend only on dictionaries and their knowledge. They were also instructed to record the time spent on each translation, to ensure consistency and traceability. The current study adopts Larson's model (1984), which includes three criteria: accuracy, naturalness, and clarity. For evaluating translation quality in this study, clarity is not treated separately, since it is covered inherently through the linked evaluation of both accuracy and naturalness. Accuracy refers to the faithful transfer of meaning, whereas naturalness refers to the smooth, grammatically correct, and culturally appropriate expression. A translated sentence is regarded accurate and natural only when both criteria are met. Thus, the sentence is deemed inaccurate or unnatural, when either accuracy or naturalness is lacking. Each sentence of the source texts was evaluated semantically and grammatically using a three-level scale:

High: the translation conveys the original meaning accurately and naturally in the target text.

Medium: the translation includes minor issues affecting either accuracy or naturalness.

Low: translation includes multiple or significant issues affecting meaning and naturalness.

Then, an overall evaluation for the whole text was assigned. This reflects the general quality of the translation: high if most sentences are accurate and natural, medium if some sentences are weak or awkward, and low if most sentences are inaccurate. Thus, this two-level evaluation, i.e., sentence and text level, ensures a systematic and comprehensive assessment.

ST (1)

Every increase in global warming matters. In a series of UN reports, thousands of scientists and government reviewers agreed that limiting global temperature rise to no more than 1.5°C would help us

avoid the worst climate impacts and maintain a livable climate. Yet policies currently in place point to up to 3.1°C of warming by the end of the century (United Nations n.d.).

HT (1)

كل إرتفاع في الاحتباس الحراري مهم. أظهرت تقارير الولايات المتحدة اتفاق آلاف العلماء على ان الحد من إرتفاع درجات الحرارة إلى 1.5 درجة مئوية سيساعدنا في تجنب تأثيرات الاحتباس الحراري والحفاظ على مناخ مناسب للعيش . ولكن السياسات الحالية تشير إلى أن إرتفاع درجة الحرارة سيصل إلى 3.1 درجة مئوية في نهاية القرن.

MT

كل زيادة في الاحتباس الحراري لها أهميتها. في سلسلة من تقارير الأمم المتحدة، اتفق آلاف العلماء. والمراجعين الحكوميين على أن الحد من إرتفاع درجة الحرارة العالمية بما لا يتجاوز 1.5 درجة مئوية سيساعدنا على تجنب أسوأ آثار المناخ والحفاظ على مناخ صالح للعيش. ومع ذلك، تشير السياسات المعمول بها حاليًا إلى إرتفاع في درجات الحرارة يصل إلى 3.1 درجة مئوية بحلول نهاية القرن.

PEMT

كل زيادة في الاحتباس الحراري لها أهميتها. في سلسلة من تقارير الامم المتحدة، اتفق آلاف العلماء والمسؤولين الحكوميين على ان الحد من إرتفاع درجة الحرارة العالمية بما لايتجاوز 1.5 درجة مئوية سيساعدنا على تفادي المخاطر المناخية وأثارها والحفاظ على بيئة عيش آمنة. ومع ذلك، تشير السياسات المعمول بها حاليًا إلى إرتفاع في درجات الحرارة يصل إلى 3.1 درجة مئوية بحلول نهاية القرن.

Table (1) Sentence Level Analysis of HT (1), MT, PEMT on Scientific text

Sent.No.	HT Rating	MT Rating	PEMT Rating
1	High	High	High
2	Medium	High	High
3	Low	High	High
Overall	Medium	High	High
Time	13 min	>1 s	4 min

ST & TTs analysis

In sentence (1), the three approaches show accuracy and naturalness in transferring its meaning and structure into the TLT. Concerning sentence (2), HT is less accurate because it omits notably the translation of words “a series of”, “government reviewers”. MT is obviously accurate and natural. PEMT version slightly adjusts “المراجعين الحكوميين” into “المسؤولين الحكوميين” without affecting accuracy and naturalness. In sentence (3), HT omits “in place” and mistranslates “ point to up to ” as “ تشير إلى ” (will reach), referring to an inevitable result leading to inaccurate translation. MT approach captures the meaning accurately and naturally, and PEMT shows no change.

The time spent on HT, MT, and PEMT was respectively 13 min, >1 s, and 4 min.

HT (2)

أدنى إرتفاع في الاحتباس الحراري هو ذو أهمية. ورد في عدد من تقارير الامم المتحدة وبتوافق آلاف العلماء والمراجعين الحكوميين أن الحد من إرتفاع درجة الحرارة بما لايزيد عن 1.5 درجة سيليزية سيساعدنا على تجنب أسوأ التأثيرات المناخية والحفاظ على مناخ ملائم للعيش. ومع ذلك ، تشير السياسات الحالية إلى زيادة ستصل إلى 3.1 درجة مئوية في هذا القرن.

MT

كل زيادة في الاحتباس الحراري لها أهميتها. في سلسلة من تقارير الأمم المتحدة، اتفق آلاف العلماء. والمراجعين الحكوميين على أن الحد من ارتفاع درجة الحرارة العالمية بما لا يتجاوز 1.5 درجة مئوية سيساعدنا على تجنب أسوأ آثار المناخ والحفاظ على مناخ صالح للعيش. ومع ذلك، تشير السياسات المعمول بها حاليًا إلى ارتفاع في درجات الحرارة يصل إلى 3.1 درجة مئوية بحلول نهاية القرن.

PEMT

كل زيادة في الاحتباس الحراري لها. في سلسلة من تقارير الامم المتحدة، اتفق آلاف العلماء والمراجعين الحكوميين على ان الحد من ارتفاع درجة الحرارة العالمية بما لايتجاوز 1.5 درجة مئوية سيساعدنا على الحد من اخطر اثار مناخ والحفاظ على بيئة عيش آمنة. ومع ذلك، تشير السياسات المعمول بها حاليًا إلى ارتفاع في درجات الحرارة يصل إلى 3.1 درجة مئوية بحلول نهاية القرن.

Table (2) Sentence Level Analysis of HT (2), MT, and PEMT on Scientific text

Sent. No.	HT Rating	MT Rating	PEMT Rating
1	Medium	High	High
2	High	High	High
3	Low	High	High
Overall	Medium	High	High
Time	15 min	>1 s	4 min

ST & TTs analysis

In sentence (1), HT is less accurate because it uses “أدنى” (the slightest increase) instead of the word كل (every increase), which negatively affects the meaning. Compared with the Google translation described above, PEMT shows no change. In sentence (2), the overall meaning and the structure are rendered accurately and naturally by HT. Compared with MT, PEMT shows no adjustment. Sentence (3) shows that HT omits “in place” and mistranslates “point to up to” as “3.1 زيادة ستصل إلى”، referring to the figure as an exact rather than an estimate and “by the end of the century” as “هذا القرن”; therefore, it provides an inaccurate meaning. Compared to MT, PEMT shows that the translator modifies “تجنب أسوأ اثار المناخ” into الحد من اخطر اثار مناخ, for better naturalness.

The required time for translating this text by HT, MT, and PEMT is 15 min, >1, and 4min, respectively.

HT (3)

كل ارتفاع في الاحتباس الحراري مهم. في تصريحات متتالية للأمم المتحدة، اتفق آلاف العلماء و السياسيين انه سيؤدي تقييد ارتفاع درجات الحرارة العالمية لأكثر من 1.5 درجة مئوية سيؤدي إلى المساعدة في تجنب أسوأ تأثير مناخي وبحفاظ على مناخ يمكن العيش فيه. لكن السياسة الحالية في نقطة تؤدي لارتفاع الدرجات المؤوية إلى 3.1 بحلول نهاية القرن

MT

كل زيادة في الاحتباس الحراري لها أهميتها. في سلسلة من تقارير الامم المتحدة، اتفق آلاف العلماء والمراجعين الحكوميين على أن الحد من ارتفاع درجة الحرارة العالمية بما لا يتجاوز 1.5 درجة مئوية سيساعدنا على تجنب أسوأ آثار المناخ والحفاظ على مناخ صالح للعيش. ومع ذلك، السياسات المعمول بها حاليًا إلى ارتفاع في درجات الحرارة يصل إلى 3.1 درجة مئوية بحلول نهاية القرن

PEMT

كل زيادة في الاحتباس الحراري لها أهميتها. في سلسلة من تقارير الولايات المتحدة، اتفق آلاف العلماء والمراجعين الحكوميين على أن الحد من ارتفاع درجة الحرارة العالمية بما لا يتجاوز 1.5 درجة مئوية سيساعدنا على تجنب أسوأ آثار المناخ والحفاظ على مناخ صالح للعيش. ومع ذلك، تشير السياسات المعمول بها حاليًا إلى ارتفاع في درجات الحرارة يصل إلى 3.1 درجة مئوية بحلول نهاية القرن.

Table (3) Sentence Level Analysis of HT (3), MT, PEMT on Scientific text

Sent. No.	HT Rating	MT Rating	PEMT Rating
1	High	High	High
2	Low	High	High
3	Low	High	High
Overall	Low	High	High
Time	17 min	>1 s	3 min

ST & TTs analysis

Concerning sentence (1), the meaning and structure are accurately and naturally conveyed by HT. Compared with MT described previously, PEMT reveals no modification. In sentence (2), HT lacks accuracy and naturalness because of multiple mistakes; for example, the translator mistranslates “ a series of UN reports” as “تصريحات متتالية للامم المتحدة”, “ government reviewers” into “سياسيين”, “ limiting” as “تقييد”, and “ rise to no more than” as “ارتفاع درجات الحرارة لاكثر من” in addition to awkward and complex structure. Compared with the MT described before, PEMT is identical to MT. In sentence (3), the translator mistranslates “point to” as “في نقطة” and omits “in place”, leading to inaccurate and unnatural Translation. Compared with MT, PEMT is identical to it.

The required time for translating this scientific text was 17 min by a human, > 1 s by a machine, and 3 min by a post-edited version.

ST(2)

Kirk, who had millions of followers online, would often tour college campuses across the country to debate issues like gender, race, gun control, and immigration. His views - and his confrontational style - often drew criticism from the left and attracted protestors to his on-campus events. At a speaking event at San Francisco State University last spring, one student called him a "rage baiter" while others accused him of using real-life students as "click-bait" - he often posted his heated arguments with liberals online, where the exchanges would go viral (Hayes, 2025).

HT (1)

كان كيرك الذي يتابعه الكثير على منصات التواصل الاجتماعي يجوب الجامعات في البلاد ليناقد مواضيع مثل الجنس والعرق والسيطرة على السلاح والهجرة. آراءه واسلوبه في المواجهة جلبت له الانتقاد من الحزب اليساري واحتشد متظاهرون ضد انشطته في الحرم الجامعي. اطلق عليه احد الطلبة لقب "صائد الغضب" عندما كان يتحدث في مناسبة في جامعة ولاية سان فرانسيسكو الربيع الماضي واتهمه آخرون بانه يستغل الطلبة "كقطع نقري" وقام بنشر نقاشاته الحادة مع الحزب الليبرالي على مواقع التواصل الاجتماعي لكي يشتهر عبر الانترنت.

MT

كان كيرك، الذي كان لديه ملايين المتابعين على الإنترنت، يجول في حرم الجامعات في جميع أنحاء البلاد لمناقشة قضايا مثل النوع الاجتماعي والعرق ومراقبة الأسلحة والهجرة. وكثيرًا ما أثارت آراؤه - وأسلوبه العدائي - انتقادات من اليسار، وجذبت المتظاهرين إلى فعالياته في الحرم الجامعي. في فعالية خطابية بجامعة ولاية سان فرانسيسكو الربيع الماضي، وصفه أحد الطلاب بأنه "مثير للغضب"، بينما

اتهمه آخرون باستغلال الطلاب الحقيقيين " كطعم للنقر " - وكان غالبًا ما ينشر جدالاته الحادة مع الليبراليين على الإنترنت، حيث تنتشر هذه النقاشات على نطاق واسع.

PEMT

كان كبيرك، الذي لديه ملايين المتابعين على الإنترنت، يجول عادة في حرم الجامعات في جميع أنحاء البلاد لمناقشة قضايا مثل النوع الاجتماعي والعرق والسيطرة على السلاح والهجرة. وكثيرًا ما أثارت آراؤه - وأسلوبه العدائي - انتقادات من اليسار، وجذبت المتظاهرين إلى فعالياته في الحرم الجامعي. في فعالية خطابية بجامعة ولاية سان فرانسيسكو الربيع الماضي، وصفه أحد الطلاب بأنه "مثير للاستفزاز"، بينما اتهمه آخرون باستغلال حياة الطلبة الواقعية " كمحتوى لجذب المشاهدات" - وكان غالبًا ما ينشر جدالاته الحادة مع الليبراليين على الإنترنت، حيث تنتشر هذه النقاشات على نطاق واسع.

Table (4) Sentence Level Analysis of HT (1), MT, and PEMT on Journalistic text

Sent. No.	HT Rating	MT Rating	PEMT Rating
1	Low	Medium	High
2	Medium	High	High
3	Low	Medium	High
Overall	Low	Medium	High
Time	19 min	> 1 s	6 min

ST & TTs analysis

In sentence (1), HT is inaccurate because it mistranslates "millions of people" as "الكثير"، "college campuses" as "الجامعات"، and "gender"، which refers to socially and culturally roles, as "الجنس"، which refers to biological differences between males and females. Additionally, it is unnatural in that "would often tour"، referring to habitual action in the past, is rendered as "كان يجوب"، referring to a specific time (past continuous). As a result of these major errors, it is inaccurate and unnatural. In MT, the verb "كان" is used twice in a way that makes the sentence awkward and unclear, in addition to conveying "would often tour" as "كان يجول"، refers to unintended past continuous in the ST. In PEMT, the translator omits the second verb "كان" and modifies "مراقبة الأسلحة" into "السيطرة على السلاح" to make the sentence more accurate and clearer. It also accurately adds "عادة" to express habitual action in the past. Concerning sentence (2), although a human translator appropriately uses "الحزب" with "اليسار" to express that it is a political entity, he inaccurately conveys "attract protestors as "احتشد المتظاهرون"، referring to their gathering, not drawing them to the event. MT is accurate and natural. PEMT is identical to MT. In sentence (3), HT is somehow less accurate because "rage baiter" is inappropriately transferred as "صائد الغضب"، "click-bait" is conveyed literally as "كطعم نقري"، and "go viral" as "لكي يشتهر على الانترنت". It also omits "real-life". Thus, it negatively affects the meaning of the original text; it also omits "real-life". MT is less accurate since "real-life students" is conveyed as "طلاب حقيقيين" and less natural because "click-baiter" is conveyed as "كطعم للنقر". However, in PEMT, the translator tries to keep the spirit of the text by using "مثير للاستفزاز"، "مثير للغضب"، and "كطعم للنقر"، respectively in machine translation. Thus, it is more accurate and more natural.

The time spent to translate this text by a human was 19 min, > 1 sec by a machine, and 6 min by post-edited version.

HT (2)

كيرك الحاصل على ملايين المتابعين في منصات التواصل الاجتماعي أخذ جولات في الحرم الجامعي حول البلاد لمناقشة مسائل الهوية و العرف و السيطرة على السلاح و الهجرة. واجهت آرائه و أسلوبه العدائي الكثير من الانتقادات من حزب اليسار بالإضافة الى استقطاب المحتجين الى حملاته الجامعية. اتهمه بعض الطلاب في الربيع الماضي في جامعة سان فرانسيسكو بكونه متعمد للاستفزاز و اخرون اتهموه بالتزييف اذ انه عادة ما ينشر آرائه الحادة على الانترنت مع الليبراليين حيث تنتشر نقاشاتهم وتشيع.

MT

كان كيرك، الذي كان لديه ملايين المتابعين على الإنترنت، يجول في حرم الجامعات في جميع أنحاء البلاد لمناقشة قضايا مثل النوع الاجتماعي والعرق ومراقبة الأسلحة والهجرة. وكثيرًا ما أثارت آراؤه - وأسلوبه العدائي - انتقادات من اليسار، وجذبت المتظاهرين إلى فعالياته في الحرم الجامعي. في فعالية خطابية بجامعة ولاية سان فرانسيسكو الربيع الماضي، وصفه أحد الطلاب بأنه "مثير للغضب"، بينما اتهمه آخرون باستغلال الطلاب الحقيقيين "كطعم للنقر" - وكان غالبًا ما ينشر جدالاته الحادة مع الليبراليين على الإنترنت، حيث تنتشر هذه النقاشات على نطاق واسع.

PEMT

الذي كيرك، كان لديه ملايين المتابعين على الإنترنت، يجول في حرم الجامعات في جميع أنحاء البلاد لمناقشة قضايا مثل النوع الاجتماعي والعرق ومراقبة الأسلحة والهجرة. وكثيرًا ما أثارت آراؤه - وأسلوبه العدائي - انتقادات من اليسار، وجذبت المتظاهرين إلى فعالياته في الحرم الجامعي. في فعالية خطابية بجامعة ولاية سان فرانسيسكو الربيع الماضي، وصفه أحد الطلاب بأنه "مستفز للآخرين" بينما اتهمه آخرون باستغلال الطلاب في الحياة الواقعية "كطعم للحصول على المشاهدات" - وكان غالبًا ما ينشر جدالاته الحادة مع الليبراليين على الانترنت حيث تنتشر هذه النقاشات على نطاق واسع.

Table (5) Sentence Level Analysis of HT (2), MT, and PEMT on Journalistic text

Sent.No.	HT Rating	MT Rating	PEMT Rating
1	Low	Medium	Medium
2	High	High	High
3	Medium	Medium	High
Overall	Medium	Medium	High
Time	20 min	> 1 s	6min

ST & TTs analysis

In sentence (1), HT inaccurately and unnaturally conveys "would often tour" as "أخذ جولات" (he went on trips or visits, i.e., more general) in addition to ignoring the habitual past tense, and "across the country", as "حول البلاد" (around the country, i.e., without covering the entire country). It also inaccurately conveys "gender" as "الهوية" and "race" as "العرف". MT was explained previously. PEMT shows no changes from MT output except the omission of the verb "كان" in the TT without regard to the tense. Sentence (2) shows that HT is accurate and natural. Compared to MT, PEMT is identical to it. In sentence (3), HT is less accurate because the translator omits "real-life students" and inaccurately translates "click-bait" as تزييف and "arguments" as "آراء". MT is somewhat less natural, as shown previously. PEMT shows more accurate translation since "مثير للغضب", and "استغلال الطلاب الحقيقيين" are accurately replaced by "مستفز للآخرين" and "كطعم للحصول على المشاهدات", besides "كطعم للنقر" into "استغلال الطلاب في الحياة الواقعية".

The time spent on each approach translation was 20 min in HT, >1 s in MT, and 6 min in PEMT.

HT (3)

قام كيرك والذي يمتلك ملايين من المتابعين على منصات التواصل الاجتماعي بجولات في الحرم الجامعي حول البلاد لمناقشة قضايا مثل الجنس والعرق وضبط السلاح والهجرة. جذبت آراؤه واسلوبه التصادمي الانتقادات من اليسار واستقطبت محتجين الى فعالياته الجامعية.

وصفه احد الطلاب في احدى الفعاليات بجامعة سان فرانسيسكو في الربيع الماضي بانه مستفز الغضب بينما اتهمه آخرون باستخدام الطلاب في الحياة الواقعية كطعم للنقر وكان على الاغلب ينشر سجلاته الحادة مع الليبراليين على الانترنت لتصبح رائجة.

MT

كان كيرك، الذي كان لديه ملايين المتابعين على الإنترنت، يجول في حرم الجامعات في جميع أنحاء البلاد لمناقشة قضايا مثل النوع الاجتماعي والعرق ومراقبة الأسلحة والهجرة. وكثيرًا ما أثارت آراؤه - وأسلوبه العدائي - انتقادات من اليسار، وجذبت المتظاهرين إلى فعالياته في الحرم الجامعي. في فعالية خطابية بجامعة ولاية سان فرانسيسكو الربيع الماضي، وصفه أحد الطلاب بأنه "مثير للغضب"، بينما اتهمه آخرون باستغلال الطلاب الحقيقيين "كطعم للنقر" - وكان غالبًا ما ينشر جدالاته الحادة مع الليبراليين على الإنترنت، حيث تنتشر هذه النقاشات على نطاق واسع.

PEMT

كان كيرك الذي كان لديه ملايين المتابعين على الانترنت غالبًا ما يتجول في حرم الجامعات في جميع أنحاء البلاد لمناقشة قضايا مثل النوع الاجتماعي والعرق ومراقبة الأسلحة والهجرة. وكثيرًا ما أثارت آراؤه وأسلوبه العدائي - انتقادات من اليسار وجذبت المتظاهرون الى فعالياته في الحرم الجامعي في فعالية خطابية بجامعة ولاية سان فرانسيسكو الربيع الماضي وصفه احد الطلاب بانه "متعمد لاستفزاز الآخرين" بينما اتهمه آخرون باستغلال الحياة الواقعية للطلاب "كوسيلة لجذب المشاهدات" وكان غالبًا ما ينشر جدالاته الحادة مع الليبراليين على الانترنت لتتحول الى مقاطع رائجة.

Table (6) Sentence Level Analysis of HT (3), MT, and PEMT on Journalistic text

Sent.No.	HT Rating	MT Rating	PEMT Rating
1	Medium	Medium	High
2	Medium	High	High
3	Medium	Medium	High
Overall	Medium	Medium	High
Time	16 min	> 1 s	5min

ST& TTs analysis

In sentence (1), HT is less natural in that it ignores the habitual past tense and less accurate by conveying "race" as "الجنس". Relative to MT, PEMT is accurate and natural because the second verb "كان" is omitted and "كان يجول" was replaced by "كان... غالبًا ما يتجول", referring to a habitual action in the past. In sentence (2), HT provides less natural translation in transferring "drew criticism" as "جذبت الانتقادات" instead of "أثار انتقادات". MT is accurate, as said before. PEMT is identical to MT. In sentence(3), HT is less accurate because the expression "rage baiter" is transferred literally into "مستفز الغضب" and "click bait" into "كطعم للنقر", leading to less natural translation. Compared with MT described before, PEMT is the most accurate because it modifies "مستفز الغضب" into "مستفز للآخرين بشكل متعمد". It also changes "كطعم للنقر" into "وسيلة لجذب المشاهدات", and "تنتشر... على نطاق واسع" into "تنتشر... على نطاق واسع".

The required time for translating this text was 16 min by HT, >1 sec in MT, and 5 min in PEMT.

ST (3)

Hope is the thing with feathers

That perches in the soul

And sings the tune without the words

And never stops at all
(Dickinson, n.d.)

HT (1)

الأمل طائر بجناحين
يجثم بالروح
وينشد اللحن بلا كلمات - ولا يتوقف ابدا

MT

الأمل هو ذلك الشيء ذو الريش
الذي يستقر بالروح
ويغني اللحن دون كلمات ولا يتوقف ابدا - على الإطلاق

PEMT

الأمل طائر مجنح
يقبع بالروح
ويغني لحنه دون كلمات - ولا يصمت ابدا

Table (7) Sentence Level Analysis of HT (1), MT, and PEMT on Literary text

Sent.No.	HT Rating	MT Rating	PEMT Rating
1	High	Low	High
2	High	Low	Low
3	High	Medium	Medium
Overall	High	Low	Medium
Time	12 min	> 1 s	5min

ST & TTs analysis

Only the first stanza was selected for the figurative devices and clear comparison. Concerning the first line, hope is compared to a bird with feathers, giving a concrete image to an abstract idea i.e., metaphor (Literary devices n.d.). In HT, the metaphor is accurately conveyed into the TLT, maintaining its spirit. In MT, clearly, the metaphor is not captured. Thus, it is a literal translation, lacking the figurative element in the TLT. In PEMT, it changes “الشيء ذو الريش” into “طائر مجنح”, thereby expressing the intended meaning rhetorically.

Concerning the second line, a personification is employed in describing a hope as a bird can perch i.e., attributing hope to animal behavior (Literary devices n.d.). In HT, the meaning is most accurately and naturally conveyed by using “يجثم” (to land on something unexpectedly), which conveys the idea of resting gently. In MT, personification is less accurately conveyed into the TLT by using “يستقر” (to become stable in a place), referring to permanent stability. PEMT is inaccurate in that the verb “يستقر” is modified into “يقبع” (lurk), referring to stagnation or captivity. Thus, the hopeful tone is changed into suffering.

Concerning the third line, personification gives the bird (hope) a human-like ability to “sing”, referring to the hope’s presence and comfort, and it is completed in the fourth line, which uses a hyperbole in “ never

stops”, expressing hope's constant nature (Literary devices n.d.). In HT, the translator expresses personification most accurately and naturally in the TLT by using “ينشد”, which conveys a sense of sweet singing. For hyperbole in “and never stops at all”, it is conveyed into “ولايتوقف ابدا”, omitting “at all”, achieving an optimal rendition of the original text. Although MT handles personification, it fails to convey hyperbole because it uses both “ابدا” (never) and “على الاطلاق”(at all), resulting in unnatural, and clumsy TT. PEMT is less accurate because it highlights silence rather than continuity by changing “ولايتوقف ابدا” into “ولايصمت ابدا”.

The time required to translate this text was 12 min by a human, > 1 sec by a machine, and 5 min by PEMT.

HT (2)

الأمل هو طائر جميل
يحط في جنبات الروح
يشدو لحننا دون كلمات ولايفتر قط عن الدوح

MT

الأمل هو ذلك الشيء ذو الريش
الذي يستقر بالروح
ويغني اللحن دون كلمات ولايتوقف ابدا - على الإطلاق

PEMT

يخلق الامل بجناحيه
الذي يستقر بالروح
ويغني اللحن بلا كلمات ولايتوقف ابدا

Table (8) Sentence Level Analysis of HT (2), MT, and PEMT on Literary text

Sent.No.	HT Rating	MT Rating	PEMT Rating
1	High	Low	High
2	High	Low	Low
3	High	Low	High
Overall	High	Low	High
Time	15 min	>1 s	3min

ST & TTs analysis

Concerning the first line, in HT, the translator uses “الامل هو طائر”, providing a creative image that keeps its deep meaning and the optimistic tone in the TL. MT, as explained previously, is inaccurate and unnatural. Although PEMT changes metaphor into personification “يخلق الامل بجناحيه”, the meaning is preserved, and the aesthetic effect is transferred. Thus, it can still be considered highly accurate.

Concerning the second line, the translator, in HT, provides an accurate and natural translation because it uses “يحط” (it lands), which preserves the symbolic image of the bird as a hope within oneself. Compared with MT, described as inaccurate, PEMT is identical to it.

Concerning the third and fourth lines, HT is the most accurate and natural because personification and hyperbole are successfully conveyed into “يشدو لنا” and “ولا يفتر قط عن الدوح” respectively, expressing imagery and an optimistic tone. MT has previously been described as inaccurate. Although PEMT omits “على الإطلاق”, it is still less accurate because it keeps “يستقر”, which is not the intended meaning by the poet.

The time spent on translating this text was 15 min in HT, >1 sec in MT, and 3min in PEMT.

HT (3)

الأمل هو طائر
يحط في الروح
يغني بلا كلمات ولم يتوقف ابدا

MT

الأمل هو ذلك الشيء ذو الريش
الذي يستقر بالروح
ويغني اللحن دون كلمات ولا يتوقف ابدا - على الإطلاق

PEMT

الأمل ناعم كالريش
الذي يستقر بالروح
ويغني لنا بلا كلمات ولا يتوقف ابدا

Table (9) Sentence Level Analysis of HT (3), MT, and PEMT on Literary text

Sent.No.	HT Rating	MT Rating	PEMT Rating
1	High	Low	Low
2	High	Low	Low
3	High	Low	Medium
Overall	High	Low	Low
Time	13 min	>1s	4min

ST & TTs analysis

Concerning human translation, in the first line, it is an accurate and natural translation since the meaning and symbolic image of “hope” is conveyed into “الامل هو طائر” (the hope is a bird). Machine translation, as shown previously, lacks accuracy and naturalness. In post - editing, machine translation “الامل هو ذلك الشيء” is modified inaccurately into “الامل ناعم كالريش” (hope is soft like feathers), distorting the meaning of the original text.

In the second line, personification is accurately rendered by a human into “يحط في الروح”. Machine translation is literal, as previously explained, referring to a permanent state. PEMT shows no change. Thus, MT and PEMT are inaccurate.

The third and fourth lines show accurate and natural translation by a human because imagery is accurately rendered into the TL. Relative to MT, PEMT accurately omits “على الإطلاق”, resulting in accurate and natural translation.

The required time for translating this literary text was 13 min in HT, > 1 s in MT, and 4 min in PEMT.

Table (10) Scientific Text Level Analysis by HT, MT, and PEMT

Translator No.	HT Rating / Time	MT Rating / Time	PEMT Rating /Time
1	Medium / 13	High / > 1 sec	High / 4
2	Medium / 15	High / > 1 sec	High / 4
3	Low / 17	High / > 1 sec	High / 3
Overall rating	Medium	High	High

Table (11) Journalistic Text Level Analysis by HT, MT, and PEMT

Translator No.	HT Rating / Time	MT Rating / Time	PEMT Rating / Time
1	Low / 19	Medium / > 1 sec	High / 6
2	Medium / 20	Medium / > 1 sec	High / 6
3	Medium / 16	Medium / > 1 sec	High / 5
Overall rating	Medium	Medium	High

Table (12) Literary Text Level Analysis by HT, MT, and PEMT

Translator No.	HT Rating / Time	MT Rating / Time	PEMT Rating / Time
1	High / 12	Low / > 1 sec	Medium / 5
2	High / 15	Low / > 1 sec	High / 3
3	High / 13	Low / > 1 sec	Low / 4
Overall rating	High	Low	Medium

Findings

The study revealed the following:

1. In journalistic text, the highest accuracy and naturalness were achieved by PEMT (hybrid approach), which enhances efficiency and maintains quality.

2. In scientific text, the highest accuracy and naturalness were achieved by both MT and PE version (hybrid approach) compared to human translation. Although PE output did not differ significantly from the raw MT, its value lies in verifying and ensuring quality, highlighting the supportive role of human intervention.
3. In literary text, the highest accuracy and naturalness was achieved by HT because it created nuanced and stylistically rich sentences, while PE version concentrated on error.
4. Concerning time, the PEMT (hybrid approach) takes less time than human translation, yet remains slower than fully automated.

Conclusions

Integrating human-machine translation can improve translation quality, with effectiveness varying by text type. Thus, clear differences have emerged in both translation time and quality among the three translation approaches. Human translation generally takes the longest time, to achieve high quality in literary text. MT is almost instantaneous, but often provides high quality in scientific text. PEMT, in contrast, stood out by achieving faster completion times, while maintaining high overall quality in scientific and journalistic texts, showing a balance between reducing effort and time while maintaining performance. Thus, this study demonstrates how the strengths of HT and MT complement each other, providing a practical approach for adoption in academic and professional translation contexts.

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