

ChatGPT and GPT-4 for Professional Translators: Exploring the Potential of Large Language Models in Translation

Sai Cheong Siu

Abstract ChatGPT, an innovative chatbot powered by advanced large language models such as GPT-3.5 and developed by OpenAI, has attracted significant interest across a range of industries. With the more recent release of GPT-4, the field of language understanding and generation continues to progress rapidly. In this article, we delve into the use cases, strengths, and limitations of both ChatGPT and GPT-4, assessing their potential impact within the context of the translation industry. We emphasize the potential benefits these platforms offer to language professionals, while underlining the ongoing need for human expertise. Furthermore, we provide recommendations for practitioners to adapt to the emergence of these tools and suggest avenues for future development. Our work aims to foster a comprehensive understanding of the role of ChatGPT and GPT-4 within the translation sector, and encourage informed discussions about their potential and implications.

1 Introduction

Since its release in late 2022, ChatGPT (OpenAI 2022), a chatbot powered by advanced large language models, has quickly gained popularity due to its impressive performance in a wide array of natural language processing tasks. These tasks encompass text generation, question-answering, text classification, code generation and language translation, among others (see, for example, Jiao et al. 2023b and Liu et al. 2023). Its ability to comprehend context and generate coherent, relevant responses makes it a promising tool for various industries, including the translation sector. In March 2023, GPT-4 was released as an updated version (OpenAI 2023a), while ChatGPT is based on GPT-3.5.

While several studies (Hendy et al. 2023; Jiao et al. 2023b; L. Wang et al. 2023) have assessed the use of ChatGPT as an automatic translation tool, there has been little exploration of the platform from the perspectives of language and translation professionals. With this context in mind, this article delves into the applications of ChatGPT and GPT-4 within the translation industry, examining their use cases, strengths, and limitations. We also consider their potential impact on language professionals and offer suggestions for future advancements.

S. C. Siu
School of Translation and Foreign Languages
The Hang Seng University of Hong Kong, Hong Kong, China
e-mail: scsiu@hsu.edu.hk

For the rest of the article, we use the term “ChatGPT” to denote both GPT-3.5 and GPT-4 models, except when specific distinctions are mentioned.

The structure of this article is as follows: Section 2 provides an overview of ChatGPT, including its historical development. Section 3 delves into several use cases, demonstrating how the chatbot could benefit translators in their work. Section 4 highlights the key strengths of the tool, particularly in comparison to conventional translation applications. Section 5 identifies its limitations. Based on these findings, Section 6 offers recommendations for practitioners to enhance their skills in response to the rise of ChatGPT, and Section 7 presents suggestions for future development of ChatGPT-like platforms to better address the needs of translators. Section 8 concludes the article.

It is essential to consider both the advantages and limitations of ChatGPT, as well as the enduring need for human expertise in delivering high-quality translations. Through this work, we aim to deepen our understanding of its potential within the context of the translation industry.

2 An Overview of ChatGPT and its Predecessors

Introduced in November 2022, ChatGPT is a widely popular chatbot developed by OpenAI, built upon the GPT (Generative Pre-trained Transformer) language model. Utilizing a multilayer neural network (Transformer) pre-trained on extensive text data, it can generate coherent and contextually relevant text, making it valuable for a myriad of applications.

The Transformer model, initially designed for machine translation, was proposed by Vaswani et al. (2017). It consists of two deep neural networks, namely the encoder and decoder. The encoder converts the source text into an internal representation, which the decoder subsequently utilizes to generate target text by predicting each subsequent target word. Both the encoder and the decoder feature positional encoding, multi-head attention mechanisms, and feed-forward neural networks for processing input text in source or target languages. Positional encoding enables the model to recognize word positions in the input sequence, while the multi-head attention mechanism facilitates context processing by considering the internal representation of each word in conjunction with all other words. Feed-forward neural networks transform input text into a more suitable representation for generating output text.

Building upon the decoder of the Transformer model, OpenAI launched the first version of GPT in 2018 (Radford et al. 2018). Unlike the Transformer, GPT was designed for a variety of language-related tasks. The model was first pre-trained on a vast text corpus comprising thousands of unpublished books in an unsupervised manner and then fine-tuned using labeled data in a supervised way. This task-agnostic model featuring pre-training outperformed models discriminatively trained with architectures tailored to specific tasks, and it demonstrated superior performance in four types of language understanding tasks: natural language inference, question answering and commonsense reasoning, paraphrase detection, and text classification.

In 2019, OpenAI unveiled the second generation of their language model, GPT-2, which encompassed 1.5 billion parameters (Radford et al. 2019). It was an attempt to demonstrate the possibility of building language models that can complete a wide range of tasks without any task-specific training, using only unsupervised pre-training. GPT-2, as a language model capable of generating text, was trained on millions of webpages. It was shown that GPT-2 began to demonstrate natural language processing skills without any supervised training, and the model achieved encouraging results in reading comprehension, question answering, word prediction, summarization, and machine translation in a zero-shot manner. OpenAI initially withheld the full model due to concerns about potential misuse. Only smaller variants of GPT-

2 with fewer parameters were made available at first (OpenAI 2019a), and it was not until nine months later that the full model was released (OpenAI 2019b).

GPT-3, the third generation model of the GPT series, was released in 2020, featuring four models, including the DaVinci model with over 175 billion parameters (Brown et al., 2020). GPT-3 employed a few-shot learning approach with upscaling of model sizes, enabling users to provide task instructions along with a few examples, instead of requiring task-specific fine-tuning datasets of thousands or tens of thousands of examples as in the case of pre-training followed by fine-tuning. This methodology involves prompt engineering, which uses prompts containing task-specific instructions, context (domain, audience, and purpose), and a few examples. By completing tasks through text interaction alone without gradient updating, GPT-3 bolstered its versatility and achieved strong performance on many NLP datasets, including translation, question-answering, and cloze tasks, as well as several tasks requiring on-the-fly reasoning or domain adaptation. However, for GPT-3 and subsequent models, only application programming interfaces (APIs) were released to the public, with no actual models made available.

Following the success of GPT-3, ChatGPT, built upon an advanced GPT model known as GPT-3.5, integrates instruction fine-tuning and reinforcement learning with human feedback (Ouyang et al. 2022). Instruction fine-tuning trains a language model on specific examples of tasks, enhancing its understanding of language nuances and enabling it to generate more accurate and relevant responses. As for reinforcement learning with human feedback, researchers collect evaluations comparing outputs on different prompts and used this feedback to train a reward model predicting which responses users would prefer. They then fine-tuned the original language with reinforcement learning to generate responses matching the reward model's predictions of users' preferences. By providing a chat-based user experience, ChatGPT has demonstrated outstanding performance across tasks and domains, such as language translation, text completion, and cross-lingual summarization (Jiao et al. 2023b; J. Wang et al. 2023; L. Wang et al. 2023). Within one week of its launch, ChatGPT attracted 100 million users (Haque et al. 2022). According to Leiter et al. (2023), the platform has been generally regarded as high quality, with the majority of social media responses expressing positive sentiment and joy. ChatGPT's applications extend to diverse fields, such as education, history, healthcare, and mathematics (Liu et al. 2023).

In March 2023, OpenAI announced the release of GPT-4, the highly anticipated fourth generation of their GPT language model series (OpenAI 2023a). According to OpenAI (2023b), this new model introduces visual input and enhanced natural language capabilities. These allow GPT-4 to generate more sophisticated responses, demonstrating impressive results in answering complex questions in academic and professional examinations. As reported in Bubeck et al. (2023), in addition to mastery of language, GPT-4 can solve a diverse range of challenging, real-world problems spanning mathematics, coding, vision, medicine, law, psychology and more, without requiring special data or training for each problem type, and its performance on these tasks approaches human level. However, the training data and model size needed to develop GPT-4's broad, adaptable abilities remain undisclosed.

ChatGPT can follow complex instructions, perform various tasks, demonstrate extensive knowledge, and respond quickly to user requests. However, it has certain limitations (Liu et al. 2023). For example, its training data and design may introduce biases. It can also provide inaccurate information when lacking enough context or asked questions beyond its abilities. It is also noteworthy that its knowledge is largely limited to events through 2021. As a result, users should critically evaluate its responses and verify them with independent sources when necessary. While it is a promising tool that can increase access to information and productivity by generating initial answers, it remains an AI model, and human oversight and judgment are essential.

3 ChatGPT as a Tool for Translators: Exploring Use Cases

ChatGPT has demonstrated its potential in various applications, including translation tasks (Jiao et al. 2023b; L. Wang et al. 2023). Although not specifically designed for the translation industry, its ability to follow complex instructions makes it a valuable resource for translators. This section presents several use cases that illustrate how ChatGPT can be employed to support translation tasks.

3.1 Contextual Clarification of Expressions

ChatGPT can clarify the meanings of various textual elements, including words, phrases, and clauses, by taking into account their context within a sentence or paragraph. This feature is particularly useful when dealing with words that have multiple meanings, which can pose challenges for translators. To illustrate this capability, consider the following example in Table 1. We provide a paragraph discussing the advantages Hong Kong possesses in the development of innovation and technology (Leung 2016) and request an explanation of the meaning of the expression “a sound system” within the context of the text.

Table 1 Contextual interpretation of multi-word expressions

Input/output	Content
User	Consider the text below: Hong Kong has many advantages in developing innovation and technology. These include excellent information infrastructure, a robust legal system, a sound system of intellectual property protection and a high quality talent pool. What is the meaning of the expression "a sound system" in the text?
ChatGPT	In the context of the given text, the expression "a sound system" refers to a strong and reliable system of intellectual property protection in Hong Kong. The term "sound" means stable, secure, and based on solid principles. Therefore, the phrase "a sound system of intellectual property protection" implies that Hong Kong has a well-established and trustworthy legal framework for protecting the intellectual property rights of individuals and businesses, which is an advantage for the development of innovation and technology in the region.
GPT-4	In the given text, the expression “a sound system” refers to a well-established, reliable, and effective system. In this context, it is used to describe the system of intellectual property protection in Hong Kong, indicating that it is a solid and dependable system that effectively safeguards intellectual property rights.

This example highlights ChatGPT’s ability to accurately interpret a multi-word expression with multiple meanings, based on the context of the text. In this case, ChatGPT correctly identifies that “a sound system” refers to a reliable and solid system of intellectual property protection in Hong Kong, as opposed to an audio system or other possible interpretations. GPT-4’s output is similarly accurate and demonstrates a strong understanding of the context, providing a clear explanation of the expression. This showcases the two models’ proficiency in understanding language nuances and selecting the most contextually appropriate meaning, which is particularly useful for interpreting complex texts or conversations. Unlike conventional dictionaries that require users to manually search for definitions and determine the most suitable one based on context, ChatGPT and GPT-4 can process not just words but also larger linguistic units and offer context-sensitive explanations based on the user’s input.

sentence, rather than merely enumerating all possible definitions. This approach not only saves time but also enhances users’ comprehension of the text at hand.

3.2 *Cultural Explanation of Expressions*

ChatGPT’s capabilities go beyond simply clarifying words and expressions based on their linguistic context. It can also offer explanations that consider cultural and historical contexts, which is especially helpful when dealing with culture-specific expressions, idioms, or phrases that may not be easily understood by individuals from different cultural backgrounds. To illustrate this capability, consider the example in Table 2. Our input pertains to a recent advancement in the smartwatch industry, specifically concerning Google’s Pixel Watch (Ashworth 2023). The text discusses the company’s delayed entry into the market compared to its competitors and describes the latest feature added to the device—fall detection. Subsequently, we request an explanation for the expression “I’ve fallen and I can’t get up,” which is used in reference to the fall detection feature.

Table 2 Explanation of culture-specific expressions

Input/output	Content
User	Consider the following text: Google has been fashionably late to the smartwatch game. The Pixel Watch, released back in October 2022, was several years behind the Apple, Samsung, and Garmin watches that dominate the market. Undeterred, Google has been plugging away at adding features to its smooth wrist disc. The latest is fall detection, aka the “I’ve fallen and I can’t get up” feature. If the device detects that the user took a tumble, an alarm will sound and a screen will pop up to let you indicate if it’s a false alarm. If you don’t tap anything for a minute, the Pixel Watch can automatically call 911 and negotiate a rescue on your behalf. Explain the expression “I’ve fallen and I can’t get up”.
ChatGPT	The expression “I’ve fallen and I can’t get up” is a well-known catchphrase from an iconic television commercial for a medical alert service called Life Alert. The service was marketed towards older adults who lived independently and may have been at risk of falling or experiencing a medical emergency. The commercial featured an elderly woman who had fallen and was unable to get up, and she used the Life Alert service to call for help. The catchphrase became popular and has been used in various contexts to refer to situations where someone has fallen and needs assistance. In this context, the expression is used to describe the fall detection feature of the Pixel Watch, which can detect if the user has fallen and automatically call for help if necessary.
GPT-4	The expression "I've fallen and I can't get up" is a popular catchphrase that originated from a 1980s television commercial for LifeCall, a medical alert system. The phrase was used in the advertisement to demonstrate the purpose of the product, which was to provide help to elderly or disabled individuals who had fallen and were unable to get up without assistance. In the context of the text, the expression is used to describe the fall detection feature of the Google Pixel Watch, which can detect when a user has fallen and potentially needs help.

The expression “I’ve fallen and I can’t get up” is a catchphrase from a well-known commercial for a medical alert service. Both models explain the meaning of the expression and provide context by explaining the commercial’s background and how the catchphrase became popular. Furthermore, they contextualize the expression within the given text by highlighting its use to describe the fall detection feature of the Pixel Watch. While there is a slight discrepancy between the two responses regarding the name of the medical alert service, this

difference does not significantly impact the overall understanding, as both models explain the cultural context and relevance of the expression.

3.3 *Explanation of Technical Terminology and Simplification of Complex Text*

ChatGPT's ability to clarify technical terms and transform complex documents into accessible language is particularly beneficial for translators working with specialized texts, such as legal or medical documents. For example, a user can input a sentence or a paragraph from a legal document, and ChatGPT can provide a plain-language explanation of the relevant legal terminology. This helps the translator gain a better understanding of the source text, ensuring accurate conveyance of meaning in the target language. Similarly, when given a medical document, the chatbot can interpret medical terminology and offer layperson-friendly explanations. This feature supports translators in conducting background research and familiarizing themselves with terminology before embarking on translation tasks. In the example presented in Table 3, our input consists of a short paragraph containing medical terms related to cardiovascular diseases (NHS 2020). We request that ChatGPT and GPT-4 extract these medical terms from the text and provide clear explanations in plain English.

Table 3 Explanation of medical terminology

Input/output	Content
User	Consider the following text: Coronary heart disease (CHD) is a major cause of death in the UK and worldwide. CHD is sometimes called ischaemic heart disease or coronary artery disease. Extract medical terms from the above text and explain them in plain English.
ChatGPT	Medical terms extracted from the text: <ul style="list-style-type: none"> • Coronary heart disease (CHD) • Ischaemic heart disease • Coronary artery disease Plain English explanations: <ul style="list-style-type: none"> • Coronary heart disease (CHD) is a condition where the heart's blood vessels become narrowed or blocked, which reduces blood flow to the heart muscle and can lead to chest pain, heart attacks, and other complications. • Ischaemic heart disease is another term used to describe the same condition as CHD, where the reduced blood flow to the heart muscle can cause damage and lead to various heart problems. • Coronary artery disease refers to the specific type of CHD where the blood vessels that supply the heart muscle (coronary arteries) become narrowed or blocked, which can lead to heart attacks and other complications.
GPT-4	Here are the medical terms from the text and their explanations in plain English: <ol style="list-style-type: none"> 1. Coronary heart disease (CHD): Coronary heart disease is a condition where the blood vessels that supply oxygen and nutrients to the heart muscle become narrow or blocked. This can lead to chest pain, heart attacks, and other heart problems. 2. Ischaemic heart disease: Ischaemic heart disease is another term for coronary heart disease. "Ischaemic" means that the heart muscle is not getting enough blood and oxygen due to narrowed or blocked blood vessels. 3. Coronary artery disease: Coronary artery disease is also another term for coronary heart disease. It specifically refers to the narrowing or blockage of the coronary arteries, which are the blood vessels that supply oxygen and nutrients to the heart muscle.

Both models can extract medical terms from the given passage and offer clear explanations in plain English (e.g., “Coronary heart disease (CHD)”, “Ischaemic heart disease”, and “Coronary artery disease”, which are commonly used in diagnosing, treating, and managing cardiovascular diseases). This helps ensure that translators have a comprehensive understanding of the technical terms they are dealing with, thereby enhancing the accuracy and quality of their translations.

Table 4 is another example illustrating the use of the two models to simplify technical content for translators, focusing on banking and finance. Our input consists of a complex passage detailing disclosure requirements for authorized institutions (Hong Kong Monetary Authority 2021), and we ask the AI models to break down the information into plain English bullet points, making it easier for translators to understand and work with the content.

Table 4 Simplification of technical content in the context of banking regulations

Input/output	Content
User	<p>Consider the following text:</p> <p>The disclosure requirements applicable to authorized institutions (AIs) are provided mainly in the Banking (Disclosure) Rules (BDR) issued by the Monetary Authority (MA) under section 60A of the Banking Ordinance. All AIs, except for those exempted such as smaller banks, are required to comply with the disclosure requirements. The Supervisory Policy Manual (SPM) module CA-D-1 “Guideline on the Application of the Banking (Disclosure) Rules” provides guidance on the interpretations of certain provisions of the BDR.</p> <p>In addition, AIs are required to use the standard templates specified by the MA under sections 6(1)(ab) and 88(1)(b) of the BDR to make disclosures associated with the Basel regulatory standards to promote user relevance, consistency and comparability of disclosures among banks across jurisdictions.</p> <p>Explain the text in bullet points in plain English.</p>
ChatGPT	<ul style="list-style-type: none"> • Authorized institutions (AIs) are required to disclose certain information. • The requirements for disclosure are outlined in the Banking (Disclosure) Rules (BDR) issued by the Monetary Authority (MA) under section 60A of the Banking Ordinance. • All AIs are required to comply with the disclosure requirements, except for smaller banks that may be exempted. • The Supervisory Policy Manual (SPM) module CA-D-1 provides guidance on how to interpret certain provisions of the BDR. • AIs are required to use standard templates specified by the MA under sections 6(1)(ab) and 88(1)(b) of the BDR. • The templates are used to make disclosures associated with Basel regulatory standards. • The use of standard templates promotes user relevance, consistency and comparability of disclosures among banks across different jurisdictions.
GPT-4	<ul style="list-style-type: none"> • The text discusses disclosure rules for banks, called the Banking (Disclosure) Rules (BDR), created by the Monetary Authority (MA). • These rules come from section 60A of the Banking Ordinance. • Most banks, except smaller ones, must follow these disclosure rules. • A Supervisory Policy Manual module, CA-D-1, helps clarify and interpret parts of the BDR. • The Monetary Authority also provides standard templates for banks to use when sharing information related to Basel regulatory standards. • These templates help make disclosures more relevant, consistent, and easy to compare among banks in different areas.

By breaking down the technical text into simple bullet points, both models make the information more accessible and easier to comprehend. This assist translators who may be new to financial translation in understanding the key concepts and requirements outlined in the original text.

3.4 *Draft Translations and Inspiration*

Another key feature of ChatGPT, as emphasized in various studies (Hendy et al. 2023; Jiao et al. 2023b; L. Wang et al. 2023), is its ability to generate translations automatically. These translations, similar to those provided by traditional machine translation systems, can be regarded as translation drafts that provide users a useful starting point for translating a text. For instance, a user can input a sentence or paragraph to be translated into another language, using prompts such as “Translate the following into [the target language]”. ChatGPT will then generate a draft or even give multiple suggestions according to the instructions given in the prompt. Such machine-generated options offer translators inspiration and spark ideas for how to translate the text, allowing them to refine and improve the draft and ensure that the final translation accurately conveys the meaning of the source text. Table 5 presents an example where we ask the system to suggest three translation options for a paragraph about primary healthcare extracted from the Policy Address 2022 (HKSAR Government 2022b).

Table 5 Generation of multiple translation suggestions

Input/output	Content
User	<p>Please suggest three ways to translate the following into English:</p> <p>我們會在今年推出「基層醫療健康藍圖」，以地區康健中心作為樞紐，統籌為市民提供的基層醫療服務，與私營醫療界別共同推廣「一人一家庭醫生」理念，並協調不同醫療專業，在社區內提供全面、持續、以人為本的基層醫療服務。</p>
Reference Translation	<p>We will publish the Primary Healthcare Blueprint within this year. With District Health Centres (DHCs) as the hub for co-ordinating primary healthcare services for our people, we will partner with the private healthcare sector to promote the concept of "family doctor for all" and collaborate with various healthcare professions to provide comprehensive, sustainable and people-centric primary healthcare services in the community. (HKSAR Government 2022a)</p>
ChatGPT	<p>Here are three possible translations of the Chinese text into English:</p> <ol style="list-style-type: none"> 1. We will launch a "Primary Healthcare Blueprint" this year, which will use community health centers as the hub to coordinate and provide comprehensive, continuous, patient-centered primary healthcare services to citizens. We will also work with the private healthcare sector to promote the idea of "one person, one family doctor," and coordinate different medical specialties to provide high-quality primary healthcare services in the community. 2. This year, we will introduce a "Primary Healthcare Blueprint" that uses community health centers as the central hub to coordinate and provide primary healthcare services to citizens. We will work closely with the private healthcare sector to promote the concept of "one person, one family doctor," and collaborate with different medical specialties to offer comprehensive, sustainable, and people-centered primary healthcare services in the community. 3. In the coming year, we will unveil a "Primary Healthcare Blueprint" that utilizes community health centers as a hub for the coordination and provision of primary healthcare services to citizens. We will collaborate with the private healthcare sector to promote the "one person, one family

	doctor" philosophy, and coordinate different medical specialties to provide holistic, sustainable, and patient-centered primary healthcare services within the community.
GPT-4	<ol style="list-style-type: none"> 1. This year, we will launch the "Grassroots Medical Health Blueprint" with community health centers serving as hubs, coordinating primary healthcare services for citizens. In collaboration with the private medical sector, we will promote the concept of "one family doctor per person" and coordinate various medical specialties to provide comprehensive, continuous, and people-centered primary healthcare services within the community. 2. In this year, we plan to introduce the "Primary Healthcare Blueprint", using regional health and wellness centers as pivotal points to coordinate the provision of basic medical services for citizens. Together with the private healthcare sector, we will advocate for the "one family doctor per person" philosophy and synchronize different medical professionals to deliver holistic, sustainable, and person-centered primary healthcare services within the community. 3. We will be rolling out our "Community Medical Health Plan" this year, which utilizes local health centers as key nodes to oversee primary healthcare services provided to citizens. Working alongside the private medical industry, we will jointly promote the idea of "one family doctor for each individual" and coordinate the efforts of diverse medical specialists to offer comprehensive, long-term, and people-focused primary healthcare services within the community.

The example demonstrates that both ChatGPT and GPT-4 can generate multiple effective translations for a given text. In response to the input text in Chinese, ChatGPT produces three distinct translations into English that vary in wording and structure while conveying the original meaning. Comparing the outputs, GPT-4's translations appear to be on par with ChatGPT's in terms of quality, maintaining a similar level of clarity and naturalness. This showcases the flexibility and versatility of both language models in language translation.

It is true that certain terms in the two automatic translations differ from the official translations (e.g., “地區康健中心” should be “District Health Centres” and “一人一家庭醫生” should be “family doctor for all”). To address such issues, especially when translating texts containing technical terms, users can provide ChatGPT with bilingual terms in the prompt, alongside the source text for translation. If necessary, additional contextual information can be included in the prompt to facilitate the generation of accurate translations (see, for example, Gao et al. 2023; He et al. 2023; and Peng et al. 2023). In the example below (Table 6), using the same text as in the previous example, we provide more information about the text, including the text type and glossary. Note the addition of the context (“The text is extracted from the 2022 Policy Address delivered by the Chief Executive of the HKSAR”), followed by the official translations of three terms.

Table 6 Enhancement of translation results with a revised prompt providing additional information

Input/output	Content
User	<p>Please suggest three ways to translate the following into British English:</p> <p>我們會在今年推出「基層醫療健康藍圖」，以地區康健中心作為樞紐，統籌為市民提供的基層醫療服務，與私營醫療界別共同推廣「一人一家庭醫生」理念，並協調不同醫療專業，在社區內提供全面、持續、以人為本的基層醫療服務。</p> <p>The text is extracted from the 2022 Policy Address delivered by the Chief Executive of the HKSAR. The following additional information may assist you with the translation task:</p>

基層醫療健康藍圖 => Primary Healthcare Blueprint 地區康健中心 => District Health Centres 一人一家庭醫生 => "family doctor for all"	
ChatGPT	<p>Here are three ways to translate the text into British English:</p> <ol style="list-style-type: none"> 1. We will launch a Primary Healthcare Blueprint this year, using District Health Centres as the hub to coordinate and provide comprehensive, person-centred primary healthcare services to the public. We will work with the private healthcare sector to promote the "family doctor for all" concept and coordinate different medical professions to offer comprehensive, continuous primary healthcare services in the community. 2. This year, we will introduce a Primary Healthcare Blueprint that will use District Health Centres as a hub to coordinate and provide primary healthcare services to the public. We will work with the private healthcare sector to promote the "family doctor for all" concept and coordinate different medical professions to offer comprehensive, continuous primary healthcare services in the community with a person-centred approach. 3. Our plan for this year is to launch a Primary Healthcare Blueprint, which will use District Health Centres as the central point to provide comprehensive, continuous primary healthcare services to the public. We will collaborate with the private healthcare sector to promote the "family doctor for all" concept and coordinate different medical professions to offer person-centred primary healthcare services in the community.
GPT-4	<p>Here are three suggested translations of the given text into British English:</p> <ol style="list-style-type: none"> 1. This year, we will launch the "Primary Healthcare Blueprint" with District Health Centres serving as hubs, coordinating primary healthcare services provided to citizens. We will work together with the private healthcare sector to promote the "family doctor for all" concept and coordinate various medical specialties to provide comprehensive, continuous, and people-centred primary healthcare services within the community. 2. In the current year, we will introduce the "Primary Healthcare Blueprint", utilising District Health Centres as pivotal points for coordinating the provision of primary healthcare services to the public. In collaboration with the private healthcare industry, we will advance the idea of "family doctor for all", and harmonise different medical disciplines to offer well-rounded, ongoing, and person-focused primary healthcare services in the community. 3. We shall be rolling out the "Primary Healthcare Blueprint" this year, with District Health Centres acting as central hubs for orchestrating primary healthcare services for our citizens. In partnership with the private medical sector, we shall jointly advocate for the "family doctor for all" philosophy, and synchronise various medical professions to deliver all-inclusive, sustained, and people-oriented primary healthcare services within the community.

With additional contextual information from users, both GPT-4 and ChatGPT are able to produce improved translation results. For example, ChatGPT employs British spellings and incorporate the official terms provided, such as “District Health Centres” and “family doctor for all,” into the translation. This highlights its ability to generate context-aware and accurate translations that are tailored to the user’s requirements. Similarly, GPT-4 effectively corrects the inaccurate translation of the term “基層醫療健康藍圖” (e.g., “Grassroots Medical Health Blueprint” and “Community Medical Health Plan” in two translation suggestions in Table 5) and uses the proper term “Primary Healthcare Blueprint” instead.

3.5 Error Detection, Grammar Checking and Quality Assessment

ChatGPT can serve as a valuable tool for quality assurance in translations by adeptly detecting missing translations, mistranslated numbers, and grammatical lapses. According to Wu et al. (2023), for example, ChatGPT prefers rephrasing certain phrases or restructuring sentences while maintaining grammatical correctness and could be a promising tool for grammar error correction. Kocmi and Federmann (2023) also suggested that GPT models such as ChatGPT could potentially outperform machine translation metrics in assessing quality at the system level. Table 7 presents a simple use case illustrating how translators can leverage its error detection capabilities to enhance the quality and accuracy of their translation work. In this example, we provide a Chinese sentence along with its English translation as input, asking the system to evaluate the accuracy and grammar of the translated text, highlight any errors, and suggest a revised version if necessary.

Table 7 Examples of Error Detection

Input/output	Content
User	Consider the following text and its English translation: Text: 香港 2019 年人口 751 萬。 Translation: Hong Kong's population in 2018 was 751 million. Comment on the accuracy and grammar of the translated text. Use bullet points to highlight any errors and provide a revised version when appropriate.
ChatGPT	Accuracy and grammar of the translated text: <ul style="list-style-type: none"> The translated text states that Hong Kong's population was 751 million in 2018, which is incorrect as it is an order of magnitude higher than the actual figure. The translated text uses the wrong year, as it says "2018" instead of "2019." The translated text does not convey the unit of measurement for the population, which is "million" in the original text. Revised version: Hong Kong's population in 2019 was 7.51 million.
GPT-4	<ul style="list-style-type: none"> Accuracy error 1: The original text says “2019 年” which means “2019” in English, but the translation mentions “2018”. Accuracy error 2: The original text says “751 萬” which means “7.51 million” in English, not “751 million”. Grammar: There are no grammar errors in the translated text. Revised translation: Hong Kong's population in 2019 was 7.51 million.

This example demonstrates that both GPT-4 and ChatGPT can detect errors in translations. They can identify two mistakes in the given English translation, which incorrectly states the population figure and uses the wrong year. Subsequently, both models provide revised translations that accurately reflect the original Chinese sentence while adhering to proper grammar. This illustrates the practical use of these models in helping translators refine their work and ensuring clear communication across languages.

Moreover, both models have the capability to evaluate the overall quality of translations, offering users a general understanding of the chatbots' translation performance and assisting them in determining the extent of editing and revision needed. By incorporating error analysis prompting (Lu et al. 2023), which combine chain-of-thought prompting (Wei et al. 2022) and error analysis (Lu et al. 2022), this error detection functionality can be further enhanced, enabling both models to serve as automated translation evaluation tools and produce human-like machine translation evaluations at the system and segment level.

3.6 Editing and Stylistic Recommendations

ChatGPT can provide various suggestions to refine translations, improving their accuracy, clarity, and fluency. One possibility is asking the model to propose alternative word choices for the translator’s own work or machine-generated translations, using it as a supplement to thesauri and collocation dictionaries, with the context awareness as previously discussed. For instance, given a source sentence and its translation, ChatGPT can recommend synonyms or related terms for a specific word, helping the translator enrich the vocabulary of the target text. It can also suggest commonly co-occurring words, ensuring that the translation is both precise and natural. The following example (Table 8) shows the user providing a Chinese sentence and its translation, “I had a delicious meal at that restaurant,” then asking the system to suggest alternatives for “delicious.”

Table 8 Context-aware suggestion of synonyms

Input/output	Content
User	<p>Given the following source text and its translation, suggest synonyms or related words for the word “delicious” in the sentence. Please explain the meaning of each suggestion.</p> <p>Source text: 我在那家餐廳吃了一頓美味的飯。</p> <p>Translation: I had a delicious meal at that restaurant.</p>
ChatGPT	<p>Here are some synonyms and related words for the word “delicious” in the given sentence:</p> <ol style="list-style-type: none"> 1. Tasty – “Tasty” is a synonym for “delicious” and means having a pleasant flavor or taste. It can be used to describe food that is enjoyable to eat. “I had a tasty meal at that restaurant” means the same thing as “I had a delicious meal at that restaurant.” 2. Yummy – “Yummy” is a slang word for “delicious” and is used to describe food that is tasty and enjoyable. It is often used by children or in a playful manner. “I had a yummy meal at that restaurant” means the same thing as “I had a delicious meal at that restaurant.” 3. Delectable – “Delectable” is a synonym for “delicious” and means extremely pleasing to the sense of taste. It is often used to describe food that is rich, flavorful, and enjoyable. “I had a delectable meal at that restaurant” means the same thing as “I had a delicious meal at that restaurant.” 4. Savory – “Savory” is a word used to describe food that is full of flavor, often with herbs and spices. It is often used to describe salty or umami flavors. “I had a savory meal at that restaurant” means the same thing as “I had a delicious meal at that restaurant.” 5. Palatable – “Palatable” is a word used to describe food that is pleasant to taste or eat. It can be used to describe food that is not necessarily delicious but is still enjoyable. “I had a palatable meal at that restaurant” means the same thing as “I had a delicious meal at that restaurant.” <p>All of these words can be used to describe food that is enjoyable to eat. The choice depends on the context and the tone of the sentence.</p>
GPT-4	<ol style="list-style-type: none"> 1. Tasty: A synonym for delicious, "tasty" refers to food that has a pleasant and satisfying flavor. This word implies that the meal was enjoyable and appealing to the taste buds. 2. Scrumptious: This is an informal synonym for delicious, used to describe food that is extremely appetizing and delectable. It has a more playful and enthusiastic connotation compared to "delicious." 3. Savory: "Savory" is a word used to describe food that has a rich, full, and pleasant taste. It is often used to describe food that is not sweet and has a

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- more salty or spicy flavor profile. In this context, it could be used to emphasize the hearty and satisfying nature of the meal.
4. **Delectable:** This term is used for food that is highly enjoyable and pleasurable to the taste. "Delectable" conveys a sense of refinement and elegance and could be used to describe a meal that was prepared with great care and skill.
 5. **Flavorful:** "Flavorful" is a more general term that describes food with a strong, distinct, and enjoyable taste. It can be used to emphasize the variety and intensity of flavors in the meal.
 6. **Mouth-watering:** This term evokes strong imagery of food that is so delicious and appetizing that it makes a person's mouth water in anticipation. "Mouth-watering" can be used to describe a meal that was particularly tempting and enticing.
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In this example, the model provide alternative expressions for the term “delicious” within the context of a sentence describing an individual’s enjoyable dining experience at a restaurant. As for the GPT-4 model, its performance is on par with ChatGPT in generating contextually relevant and linguistically natural synonyms. Both models exhibit an extensive understanding of the nuances inherent to language and provide a range of synonyms to suit various styles and tones. A notable distinction between conventional thesauri and the AI models lies in their ability to discern the contextual usage of a word, and subsequently offer synonyms that are congruent with that context. The suggestions provided by ChatGPT and GPT-4 surpass a mere compilation of analogous words; they represent a carefully curated selection of terms capable of effectively conveying the intended meaning while maintaining linguistic coherence and naturalness.

ChatGPT can also help rewrite target text to match a particular style (including poetic styles, as illustrated in Lyu et al. (2023)). For instance, it can generate translations in different styles, which is especially useful when we need a more creative or adaptive style that differs from a literal translation or the style of the original. This is often the case in social media and news translation, where creativity or adaptation tends to play an integral role in achieving the purpose of translation. For example, in Table 9 we provide a Chinese paragraph on Hong Kong's tourism industry (HKSAR Government 2020d) along with an English translation (HKSAR Government 2020c). We then ask the language model to revise the English text into a less formal style.

Table 9 Revision of translation style

Input/output	Content
User	<p>Consider the following text and its translation:</p> <p>Text: 旅遊業是香港的主要經濟支柱之一。2018 年，旅遊業佔本地生產總值約 4.5%，就業人數約 257 000 人，佔全港總就業人數約 6.6%。</p> <p>Translation: Tourism is one of the major economic pillars of Hong Kong. In 2018, it accounted for about 4.5% of the Gross Domestic Product (GDP) and employed about 257 000 people, or about 6.6% of the total employment in Hong Kong.</p> <p>Suggest ways to make the translation less formal.</p>
ChatGPT	<p>Here are some ways to make the translation less formal:</p> <ol style="list-style-type: none"> 1. Use simpler language: Instead of using complex words, use simpler words that are easier to understand. For example, instead of "accounted for", use "made up". 2. Use contractions: Contractions make the language more conversational and less formal. For example, instead of "it is", use "it's".

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3. Use colloquial phrases: Colloquial phrases are informal expressions that are commonly used in everyday speech. For example, instead of "employed about", use "had around".
 4. Use shorter sentences: Shorter sentences are easier to read and understand, and they also make the text less formal. For example, instead of "Tourism is one of the major economic pillars of Hong Kong", use "Tourism is a big part of Hong Kong's economy."
 5. Use active voice: Active voice makes the language more direct and less formal. For example, instead of "it was employed by", use "it employed".

Using these techniques, the translation could be revised to:

Tourism is a big part of Hong Kong's economy. In 2018, it made up about 4.5% of the Gross Domestic Product (GDP) and employed around 257,000 people, which is about 6.6% of all the jobs in Hong Kong.

GPT-4	Tourism's a big deal for Hong Kong's economy. Back in 2018, it made up around 4.5% of the GDP and gave jobs to about 257,000 folks, which is like 6.6% of all jobs in Hong Kong.
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The example shows how ChatGPT and GPT-4 models suggest ways to make translations sound less formal. By simplifying the language, using contractions, adding colloquial phrases, shortening sentences, and maintaining an active voice, the AI makes the translation more conversational. For example, it replaces “accounted for” with “made up,” uses “it’s” instead of “it made up,” and replaces “employed about” with “gave jobs to.” The models also choose shorter sentences, such as “Tourism’s a big deal for Hong Kong’s economy,” and keep the active voice for directness and informality. These changes improve the readability of the translation, give it a casual tone, and make it accessible to a wider audience.

3.7 Interactive Translation and Editing with Progressively Improving Results

ChatGPT’s multi-turn dialogue capabilities may potentially improve performance on natural language processing tasks, including machine translation, as discussed in Bang et al. (2023). The conversational mode of interaction provided by ChatGPT allows translators to progressively enhance outputs through multi-round dialogue. In each round, they can provide instructions on how to modify the previous output by specifying the changes needed based on quality or user needs.

In the example shown in Tables 10 (ChatGPT) and 11 (GPT-4), initially, we ask the models to translate a Chinese paragraph about an exhibition co-organized by the Leisure and Cultural Services Department and the Hong Kong Film Art Association into English (HKSAR Government 2023d; see HKSAR Government (2023c) for the English version for reference). We then ask the systems to explain their translation methods to better understand the chatbots’ capabilities. Based on the outputs, we ask the tools to improve the text by fixing the English name of the exhibition. We then ask them to further revise the text by adding the original Chinese names to the translations. After that, we ask ChatGPT to add the Chinese term for the “Hong Kong Museum of Culture,” and ask GPT-4 to remove the Chinese expression for “LCSD” from the text, before instructing both platforms to adapt the text to a social media post with emojis. They also self-evaluate the outputs from three perspectives (e.g., fluency, adequacy, and style) along with suggestions for improvement.

This process, analogous to the integration of “Interactive MT” and “Stylistic MT” as discussed in Lyu et al. (2023), allows our instructions and the system’s outputs evolve collaboratively over multiple rounds of interaction. Users can ask increasingly complex questions and provide feedback at a level of nuance and detail that suits their needs. The AI

system, in turn, continues learning from each interaction and producing increasingly sophisticated responses. This dynamic, adaptive experience offers more possibilities for enhancing results than conventional electronic translation applications.

Table 10 Multi-round dialogue with ChatGPT for interactive translation and editing

Input/output	Content
User	Translate the following text from Chinese into English: 由康樂及文化事務署（康文署）與香港電影美術學會聯合主辦的「無中生有——香港電影美術及服裝造型展」，明日（五月三日）起於香港文化博物館展出，是首個全面闡述香港電影美術及服裝造型的展覽，旨在記錄香港電影美術的發展。
ChatGPT	The "From Sketches to the Silver Screen: The Art of Hong Kong Movie Posters" exhibition, jointly organized by the Leisure and Cultural Services Department (LCSD) and the Hong Kong Film Art Association, will be showcased at the Hong Kong Heritage Museum starting from tomorrow (May 3rd). It is the first comprehensive exhibition that showcases the development of Hong Kong movie art and costume design, with the aim of documenting the history of Hong Kong movie art.
User	Please explain how you translated the above text. Give some examples, if any.
ChatGPT	To translate the text, I first identified the Chinese characters and their meanings using my language model. Then, I applied the rules of grammar and syntax to generate a coherent and accurate English translation. For example, I identified the characters "康樂及文化事務署" as "Leisure and Cultural Services Department" and "香港電影美術學會" as "Hong Kong Film Art Association". I also recognized that "展覽" means "exhibition" and "發展" means "development". In some cases, I had to make decisions based on context to ensure accuracy and naturalness. For instance, the phrase "無中生有" can be translated literally as "to create something out of nothing", but I chose to use the more idiomatic English expression "From Sketches to the Silver Screen" to convey the idea of bringing movie posters to life. Overall, my translation process involved analyzing the Chinese text in detail, identifying key phrases and their meanings, and using my knowledge of English grammar and syntax to generate a clear and accurate translation.
User	The official English name for the event should be "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition". Could you revise your translation accordingly?
ChatGPT	Certainly, here is the revised translation: The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition", jointly organized by the Leisure and Cultural Services Department (LCSD) and the Hong Kong Film Art Association, will be showcased at the Hong Kong Heritage Museum starting from tomorrow (May 3rd). It is the first comprehensive exhibition that showcases the development of Hong Kong movie art and costume design, with the aim of documenting the history of Hong Kong movie art.
User	Could you add the original Chinese terms in parentheses after proper nouns in the English translation?
ChatGPT	Sure, here's the revised translation with the original Chinese terms in parentheses: The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition" (「無中生有——香港電影美術及服裝造型展」), jointly organized by the Leisure and Cultural Services Department (LCSD) (康樂及文化事務署) and the Hong Kong Film Art Association (香港電影美術學會), will be showcased at the Hong Kong Heritage Museum starting from tomorrow (May 3rd). It is the first comprehensive exhibition that showcases the development of Hong Kong movie art and costume design, with the aim of documenting the history of Hong Kong movie art.

User	Could you add the Chinese expression for the “Hong Kong Museum of Culture” to the translation?
ChatGPT	Certainly, here's the revised translation with the Chinese expression for the "Hong Kong Museum of Culture" added: The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition" (「無中生有——香港電影美術及服裝造型展」), jointly organized by the Leisure and Cultural Services Department (LCSD) (康樂及文化事務署) and the Hong Kong Film Art Association (香港電影美術學會), will be showcased at the Hong Kong Heritage Museum (香港文化博物館) starting from tomorrow (May 3rd). It is the first comprehensive exhibition that showcases the development of Hong Kong movie art and costume design, with the aim of documenting the history of Hong Kong movie art.
User	Could you modify it for a Facebook post and add some emojis if possible?
ChatGPT	Sure, here's a possible Facebook post with some emojis added: 🎬 Exciting news for movie lovers in Hong Kong! 🎬 Starting from tomorrow (May 3rd), the "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition" (「無中生有——香港電影美術及服裝造型展」) will be showcased at the Hong Kong Heritage Museum (香港文化博物館)! 🥳 Organized jointly by the Leisure and Cultural Services Department (LCSD) (康樂及文化事務署) and the Hong Kong Film Art Association (香港電影美術學會), this is the first-ever exhibition that fully explores the development of Hong Kong movie art and costume design! 🎉 Don't miss this fantastic opportunity to learn more about the history of Hong Kong movies! 🥰🎬📺
User	Could you evaluate the quality of the English social media post above in terms of fluency, adequacy, and style, and give any suggestions you may have for improvement?
ChatGPT	Sure, here's my evaluation of the English social media post: Fluency: The post is fluent and easy to read. The sentences are well-constructed, and the vocabulary and grammar are appropriate for a social media post. Adequacy: The post effectively conveys the key information about the exhibition, including its name, location, and organizers, as well as its significance as the first comprehensive exhibition on the development of Hong Kong movie art and costume design. The post also includes a call to action to encourage readers to visit the exhibition. Style: The post has an upbeat and enthusiastic tone, which is appropriate for a social media post promoting a cultural event. The use of emojis adds some visual interest and helps convey the excitement of the event. Suggestions for improvement: One suggestion for improvement would be to include more specific details about the exhibition, such as some of the artworks or costumes that will be on display, to make the post more engaging. Additionally, the post could benefit from a more attention-grabbing headline or introduction to entice readers to keep reading.

Table 11 Multi-round dialogue with GPT-4 for interactive translation and editing

Input/output	Content
User	Translate the following text from Chinese into English: 由康樂及文化事務署（康文署）與香港電影美術學會聯合主辦的「無中生有——香港電影美術及服裝造型展」，明日（五月三日）起於香港文化博物館展出，是首個全面闡述香港電影美術及服裝造型的展覽，旨在記錄香港電影美術的發展。
GPT-4	The "Creation from Nothingness – Hong Kong Film Art and Costume Design Exhibition", co-organized by the Leisure and Cultural Services Department (LCSD)

	and the Hong Kong Film Art Association, will be on display at the Hong Kong Heritage Museum starting tomorrow (May 3rd). This is the first comprehensive exhibition on Hong Kong film art and costume design, aiming to document the development of Hong Kong film art.
User	Please explain how you translated the above text. Give some examples, if any.
GPT-4	<p>To translate the given Chinese text into English, I followed a systematic approach to ensure an accurate and coherent translation. Here's a breakdown of the process:</p> <ol style="list-style-type: none"> 1. Understanding the context: The text is about an exhibition related to Hong Kong film art and costume design, co-organized by two organizations. 2. Identifying key terms and phrases: Some key terms and phrases in the original text are 康樂及文化事務署 (Leisure and Cultural Services Department), 香港電影美術學會 (Hong Kong Film Art Association), 無中生有 (Creation from Nothingness), 香港文化博物館 (Hong Kong Heritage Museum), and 首個全面闡述香港電影美術及服裝造型的展覽 (the first comprehensive exhibition on Hong Kong film art and costume design). 3. Translating phrases and sentences: I translated the key terms and phrases, as well as the entire sentence structure, to ensure that the meaning is preserved in English. <p>For example:</p> <ul style="list-style-type: none"> • 由康樂及文化事務署（康文署）與香港電影美術學會聯合主辦 => co-organized by the Leisure and Cultural Services Department (LCSD) and the Hong Kong Film Art Association • 無中生有——香港電影美術及服裝造型展 => Creation from Nothingness – Hong Kong Film Art and Costume Design Exhibition • 明日（五月三日）起於香港文化博物館展出 => will be on display at the Hong Kong Heritage Museum starting tomorrow (May 3rd) • 首個全面闡述香港電影美術及服裝造型的展覽 => the first comprehensive exhibition on Hong Kong film art and costume design • 旨在記錄香港電影美術的發展 => aiming to document the development of Hong Kong film art <ol style="list-style-type: none"> 4. Ensuring coherence and readability: After translating individual phrases and sentences, I combined them to create a coherent and readable English translation that retains the original meaning and context. <p>As a result, the translated text is: "The "Creation from Nothingness – Hong Kong Film Art and Costume Design Exhibition", co-organized by the Leisure and Cultural Services Department (LCSD) and the Hong Kong Film Art Association, will be on display at the Hong Kong Heritage Museum starting tomorrow (May 3rd). This is the first comprehensive exhibition on Hong Kong film art and costume design, aiming to document the development of Hong Kong film art."</p>
User	The official English name for the event should be "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition". Could you revise your translation accordingly?
GPT-4	Certainly, here is the revised translation with the official English name for the event: The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition", co-organized by the Leisure and Cultural Services Department (LCSD) and the Hong Kong Film Art Association, will be on display at the Hong Kong Heritage Museum starting tomorrow (May 3rd). This is the first comprehensive exhibition on Hong Kong film art and costume design, aiming to document the development of Hong Kong film art.
User	Could you add the original Chinese terms in parentheses after proper nouns in the English translation?
GPT-4	<p>Of course, here's the revised translation with the original Chinese terms in parentheses:</p> <p>The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition" (無中生有——香港電影美術及服裝造型展), co-organized by the Leisure and Cultural Services</p>

	Department (LCSD) (康樂及文化事務署, 康文署) and the Hong Kong Film Art Association (香港電影美術學會), will be on display at the Hong Kong Heritage Museum (香港文化博物館) starting tomorrow (May 3rd). This is the first comprehensive exhibition on Hong Kong film art and costume design, aiming to document the development of Hong Kong film art.
User	Could you remove the Chinese expression for 'LCSD' from the translation?
GPT-4	<p>Certainly, here's the revised translation with the Chinese expression for 'LCSD' removed:</p> <p>The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition" (無中生有——香港電影美術及服裝造型展), co-organized by the Leisure and Cultural Services Department (康樂及文化事務署) and the Hong Kong Film Art Association (香港電影美術學會), will be on display at the Hong Kong Heritage Museum (香港文化博物館) starting tomorrow (May 3rd). This is the first comprehensive exhibition on Hong Kong film art and costume design, aiming to document the development of Hong Kong film art.</p>
User	Could you modify it for a Facebook post and add some emojis if possible?
GPT-4	<p>📣 Exciting news! 🎉 The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition" (無中生有——香港電影美術及服裝造型展) is coming to town! Co-organized by the Leisure and Cultural Services Department (康樂及文化事務署) and the Hong Kong Film Art Association (香港電影美術學會), this amazing exhibition will be on display at the Hong Kong Heritage Museum (香港文化博物館) starting tomorrow (May 3rd) 📅.</p> <p>Don't miss the first-ever comprehensive exhibition on Hong Kong film art and costume design 🎬👗, aiming to document the development of Hong Kong film art! 😊 See you there! #OutOfThinAirExhibition #HongKongFilmArt #CostumeDesign #HongKongHeritageMuseum</p>
User	Could you evaluate the quality of the English social media post above in terms of fluency, adequacy, and style, and give any suggestions you may have for improvement?
GPT-4	<p>The English social media post above is generally of high quality in terms of fluency, adequacy, and style. It effectively conveys the excitement and importance of the exhibition while incorporating relevant emojis to add a playful and engaging tone. The post also includes essential information about the event, such as its name, organizers, and venue. The use of hashtags at the end helps categorize the post and potentially reach a wider audience.</p> <p>However, there's always room for improvement. Here are a couple of suggestions:</p> <ol style="list-style-type: none"> 1. Fluency: The post is fluent and easy to read. However, you may consider breaking the first sentence into two for better readability: <p>📣 Exciting news! 🎉 The "Out of Thin Air: Hong Kong Film Arts & Costumes Exhibition" (無中生有——香港電影美術及服裝造型展) is coming to town! Co-organized by the Leisure and Cultural Services Department (康樂及文化事務署) and the Hong Kong Film Art Association (香港電影美術學會), this amazing exhibition will be on display at the Hong Kong Heritage Museum (香港文化博物館). The event starts tomorrow (May 3rd) 📅.</p> <ol style="list-style-type: none"> 2. Adequacy: The post is already adequate in terms of providing necessary information. However, if relevant, you could consider adding details about ticket prices or the exhibition's duration. 3. Style: The style of the post is engaging and fitting for a Facebook post. You may consider adding an emoji to the last sentence to maintain consistency with the rest of the post:

Don't miss the first-ever comprehensive exhibition on Hong Kong film art and costume design 🎬👗, aiming to document the development of Hong Kong film art! 😊 See you there! 😊 #OutOfThinAirExhibition #HongKongFilmArt #CostumeDesign #HongKongHeritageMuseum

4 Strengths of ChatGPT in the Context of Translation

After analyzing the potential use cases of ChatGPT for translation, it is important to consider both the strengths and weaknesses of this advanced AI technology. Here we will first explore the significant benefits of ChatGPT, focusing on aspects such as speed, cost, versatility, creativity, and context-awareness.

4.1 Speed and Cost

ChatGPT has considerable advantages in terms of speed and cost. While it may not translate as quickly as specialized machine translation engines, ChatGPT outpaces human translators. As a preliminary analysis, considering the two translation prompts in Table 12, at the time of writing, the GPT-3.5 model took 8 seconds for Chinese-English translation (i.e. 22 characters/second, considering the source text length) and 10 seconds for English-Chinese translation (i.e. 7.6 words/second, considering the source text length); and GPT-4 took 20 seconds and 30 seconds respectively. Here we can see that the translation speed depends on the specific model and hardware, but it is generally very fast, making it appealing for rapidly generating automatic translations. Moreover, ChatGPT's affordability makes translation accessible to individuals and organizations with limited budgets (see OpenAI (2023c) for API pricing). Although the output may still require editing, the speed and low cost make ChatGPT and GPT-4 attractive options for quickly and affordably translating large volumes of text.

Table 12 Prompts for a preliminary analysis of translation speed

Type	Translation prompt
Chinese-English translation (Source of the text: HKSAR Government 2020b; Length of the source text: 177 characters)	Translate the following Chinese text into English: 香港是首屈一指的國際貿易、金融和商業中心，具有多方面的優勢，包括優良法治傳統和司法獨立、公平和方便的營商環境、規模小而效率高的政府、簡單的稅制及低稅率、自由開放的貿易體制、資本和資訊自由流通、具良好教育水平的勞動人口，以及世界級的基礎設施等。過去 20 年，香港經濟平均每年有 3.5% 的實質增長。2019 年，本地生產總值以當時市價計算達 28,657 億元，而人均本地生產總值則為 381,714 元。
English-Chinese translation (Source of the text: HKSAR Government 2020a; Length of the source text: 76 words)	Translate the following English text into Traditional Chinese: On the whole, Hong Kong has a good health and healthcare system. The general health indices compare favourably with those in Western countries. The hospitals are among the finest and best equipped in the world. Comprehensive medical facilities and specialist services are available throughout Hong Kong. There is no National Health Service and medical consultation and treatment have to be paid for. However, public medical services are available to Hong Kong residents at highly subsidized rates.

4.2 *Versatility and Flexibility*

ChatGPT demonstrates versatility and flexibility for natural language processing tasks (Qin et al. 2023). Unlike conventional translation technologies designed for specific purposes, such as machine translation for generating draft translations, translation memory for reusing previous translations, and terminology databases for ensuring term consistency, ChatGPT can handle a variety of tasks as discussed in Section 3. Users can leverage ChatGPT for tasks ranging from source text explanation to draft production to error detection, all within a single application. Furthermore, users can continuously develop innovative use cases to address future needs by designing appropriate prompts. The primary limitation is conveying instructions clearly in prompts within the constrained context window size.

4.3 *Creativity and Adaptability in Translation*

Another key strength of ChatGPT is its ability to flexibly select expressions and reorganize ideas in the target language. As Hendy et al. (2023) discussed, ChatGPT demonstrates “longer range reordering” and enhanced discourse-aware performance, especially in the GPT-4 model (L. Wang et al., 2023). Unlike machine translation systems trained on bilingual sentences, which often produce limited translation styles with little reorganization across sentences, ChatGPT can generate translations in various styles for both formal and creative contexts (see, for example, Section 3.7). This capability makes ChatGPT ideal for translation tasks demanding high creativity or adaptability, such as news translation. Translating news articles requires not only accurately conveying the text but also preserving its essence and impact. In the example below (Table 13), we ask the chatbot to write a news article in English with reference to a lengthy Chinese news report on Hong Kong’s evolving COVID-19 situation, including announcements from the World Health Organization, updated government responses and policies, warnings for high-risk groups, and rising case numbers (news.gov.hk 2023b; see news.gov.hk (2023a) for the English version). The key challenge here is effectively translating the content while crafting an engaging headline for English readers.

Table 13 Adaptability of ChatGPT and GPT-4 in news translation

Input/output	Content
User	<p>Write a news article in English with reference to the following Chinese news:</p> <p>繼續密切監察新冠病毒變異情況</p> <p>世界衛生組織宣布，新冠疫情不再構成國際關注的突發公共衛生事件，政府會繼續密切監察 2019 冠狀病毒變異情況和風險，重點保護高危群組，留意世衛的最新評估。</p> <p>政府今日回應傳媒查詢時指，本港自 3 月初撤銷口罩令後，所有對大眾適用的防疫措施均已解除，社會全面復常，新冠已按一般上呼吸道感染方式管理，防疫措施則以保護高危群組為重點。</p> <p>隨着世衛昨日宣布新冠疫情不再構成國際關注的突發公共衛生事件，政府會參考世衛對疫情的最新意見，評估本地情況和風險，以及病毒變異情況，檢視疫情防控應變級別，並相應調整餘下與疫情相關的措施及安排。</p> <p>世衛指出，即使新冠疫情作為突發公共衛生事件的階段完結，但大流行持續。本港感染個案近日持續上升，政府呼籲仍未完成接種首三劑疫苗的市民，以及未按專家建議接種加強劑的高風險人士盡快安排接種，保護自己和家人。</p>
ChatGPT	<p>WHO Announces COVID-19 No Longer a Global Public Health Emergency, Hong Kong to Continue Monitoring Virus Variants</p> <p>The World Health Organization (WHO) announced that the COVID-19 pandemic no longer constitutes a public health emergency of international concern. However, the</p>

Hong Kong government will continue to closely monitor the situation regarding the 2019 coronavirus variants and risks, with a focus on protecting high-risk groups and keeping track of the latest assessments from the WHO.

Responding to media inquiries today, the government noted that since the lifting of the mask mandate for the general public in early March, all applicable epidemic prevention measures have been lifted, and society has returned to normal. COVID-19 is now managed as a respiratory tract infection, with a focus on protecting high-risk groups.

With the WHO's announcement yesterday that COVID-19 is no longer a global public health emergency, the Hong Kong government will refer to the latest opinions from the organization, evaluate the local situation and risks, examine the virus variants, review the epidemic prevention and control response level, and adjust measures and arrangements accordingly.

The WHO pointed out that even though the COVID-19 pandemic is no longer a public health emergency of international concern, the pandemic continues to spread. In recent days, the number of cases in Hong Kong has continued to rise. The government urges citizens who have not yet received their first three doses of the vaccine, as well as high-risk individuals who have not received a booster shot according to expert recommendations, to arrange for vaccination as soon as possible to protect themselves and their families.

GPT-4 **WHO Announces COVID-19 No Longer a Public Health Emergency of International Concern; Government Continues to Monitor Virus Variants**

The World Health Organization (WHO) has announced that the COVID-19 pandemic no longer constitutes a Public Health Emergency of International Concern (PHEIC). In response, the government will continue to closely monitor the situation of the 2019 coronavirus variants and risks, with a focus on protecting high-risk groups and paying close attention to the latest assessments from the WHO.

In response to media inquiries today, the government stated that since the removal of the mask mandate in early March, all general public health measures have been lifted, and society has returned to normal. COVID-19 is now being managed as a general upper respiratory infection, with a focus on protecting high-risk groups.

Following the WHO's announcement yesterday that the COVID-19 pandemic no longer constitutes a PHEIC, the government will consult the WHO's latest opinion on the situation, assess local conditions and risks, as well as the virus's mutation status. It will also review the pandemic prevention and control response levels and make corresponding adjustments to the remaining related measures and arrangements.

The WHO has pointed out that even though the COVID-19 pandemic is no longer considered a PHEIC, it still persists on a global scale. The number of infection cases in the region has continued to rise in recent days. The government is urging citizens who have not yet completed their first three doses of the vaccine and high-risk individuals who have not yet received the recommended booster shot to get vaccinated as soon as possible to protect themselves and their families.

In the above example, ChatGPT and GPT-4 translate the Chinese news into English and craft an engaging headline for an English-speaking audience. Rather than directly translating the original headline ("Continue to closely monitor the situation of COVID-19 variants"), the two models opt for more creative alternatives:

- ChatGPT: "WHO Announces COVID-19 No Longer a Global Public Health Emergency, Hong Kong to Continue Monitoring Virus Variants"
- GPT-4: "WHO Announces COVID-19 No Longer a Public Health Emergency of International Concern; Government Continues to Monitor Virus Variants"

These headlines effectively communicate the key points while appealing to readers, demonstrating the importance of creativity in translation. Throughout the article, the two

models ensure the content is accurately conveyed while making it easily understandable for English readers.

The translation flexibility of ChatGPT and GPT-4 stems from their training on vast, diverse ranges of monolingual documents. This enables them to learn complex patterns and develop the capability to generate highly natural-sounding text without relying on rigid bilingual examples or translations. Machine translation engines, conversely, tend to depend heavily on bilingual examples and translations, which may result in stilted, unnatural “translationese.”

4.4 *Translation with Contextual Awareness*

As discussed in Section 3, ChatGPT allows users to provide additional contextual information alongside the source text, enabling it to determine appropriate translation methods accordingly. Users can supply information like the target audience, source background, purpose, and bilingual terms, potentially incorporating details relevant to Nord’s “Translation Brief” (1997) analysis into the prompt. With context identified upfront, ChatGPT can tailor translations to suit the situation, achieving a natural result in the target language. For example, a legal document requires a very different approach than a medical study or novel; with context, ChatGPT is better equipped to adapt elements such as register, terminology, and style to the audience and purpose, understanding that contract translation demands precision, while a novel allows flexibility to convey ideas. While some machine translation platforms allow users to specify domain (e.g., law, medicine and engineering) and upload glossaries, the ability to provide user-defined context is limited. In this sense, ChatGPT’s capacity to account for translation context through prompts gains a substantial edge over other machine translation platforms.

5 Limitations of ChatGPT in the Context of Translation

ChatGPT demonstrates promising capabilities as a tool for cross-lingual natural language processing. However, as Bubeck et al. (2023) discussed, GPT-4 has substantial flaws, some of which may be inherent to its next-word prediction architecture. In addition, OpenAI (2023b) found that GPT-4 suffer from issues like unreliability, hallucination, limited knowledge, overconfidence in incorrect predictions, and insufficient self-checking. Given these issues, it is critical to recognize the chatbot’s limitations when applying it to translation tasks. This section examines various constraints of ChatGPT, including translation quality, hallucination and bias tendencies, limited Chinese language support, output randomness, and security and stability concerns. By understanding these limitations, users can make informed decisions when leveraging the model for translation and better assess the accuracy and reliability of its output.

5.1 *Quality*

While ChatGPT shows potential as an automatic translation tool, there is room for improvement in the quality of its translations. Jiao et al. (2023b) suggested that ChatGPT (the GPT-3.5 model) perform less favorably than commercial engines when translating domain-specific content, such as biomedical text, while it does a better job with spoken languages. Hendy et al. (2023) showed that GPT models have limited capabilities for low-resource languages. Khoshafah’s (2023) discussion on Arabic-English translation argues that while

ChatGPT can competently translate simple content, it falls short in handling complex translations that require human intervention, making it unsuitable for specialized texts such as legal documents, medical reports, scientific studies, and literature. Given the above, it would be highly desirable for language professionals to pay attention to long, complex sentences that could challenge the model, as they may cause it to lose coherence or syntactic structure. They should also consider using ChatGPT in conjunction with mainstream translation engines customized or finetuned for technical or domain-specific content, such as scientific, legal, or medical texts. These engines may translate such texts with greater accuracy while preserving proper names, locations and product names more precisely than ChatGPT, especially if such information is not exposed to the model during training.

5.2 *Hallucination and Bias*

Hallucination is a well-documented shortcoming of ChatGPT and similar language models (Bang et al. 2023; Bubeck et al. 2023; OpenAI 2023b). A major limitation of ChatGPT in translation is its tendency to generate text that lacks grounding in the source text or is biased towards specific viewpoints, and this can lead to incorrect analysis of the source text or the presentation of misleading information in the translation. According to Peng et al. (2023), ChatGPT can hallucinate when performing non-English translation tasks, where both the input and expected output are in other languages. The chatbot also appears to have potential weaknesses in some higher-order reasoning, such as inductive, spatial, and complex reasoning, as well as non-textual semantic reasoning, according to Bang et al. (2023). Therefore, it is important to exercise caution when using ChatGPT for translation. The quality and accuracy of the generated responses should be thoroughly evaluated to determine whether the model introduces missing information, omits important details, or exhibits biases towards particular ideas. These factors could result in insensitive or disrespectful expressions towards marginalized groups or incorrect translations that spread misinformation.

Table 14 provides an example. We provide a paragraph in Chinese and request an English translation. The input describes the meetings and exchanges that Hong Kong’s Chief Executive Mr. John Lee conducted during his trip to Beijing on March 15th (HKSAR Government 2023b). Specifically, the input lists the various government ministries and officials that Lee met with and names the Hong Kong government officials who attended the meetings.

Table 14 Examples of hallucination in translation

Input/output	Content
User	Translate the following into English: 行政長官李家超今日（三月十五日）繼續在北京的訪問行程。他先後拜訪國家科學技術部、文化和旅遊部、海關總署和商務部，與各部門領導就共同關注的事宜交換意見。文化體育及旅遊局局長楊潤雄、政制及內地事務局局長曾國衛、保安局局長鄧炳強、商務及經濟發展局局長丘應樺、醫務衛生局局長盧寵茂教授和創新科技及工業局局長孫東教授亦有出席相關會面。
Reference translation	The Chief Executive, Mr John Lee, today (March 15) continued his visit in Beijing, where he called on the Ministry of Science and Technology, the Ministry of Culture and Tourism, the General Administration of Customs of the People’s Republic of China (GACC), and the Ministry of Commerce to exchange views with the respective leaders on issues of common interest. The Secretary for Culture, Sports and Tourism, Mr Kevin Yeung; the Secretary for Constitutional and Mainland Affairs, Mr Erick Tsang Kwok-wai; the Secretary for Security, Mr Tang Ping-keung; the Secretary for Commerce and Economic Development, Mr Algernon Yau; the Secretary for Health, Professor Lo Chung-mau; and the Secretary for Innovation,

	Technology and Industry, Professor Sun Dong, also joined relevant meetings. (HKSAR Government 2023a)
ChatGPT	On March 15 th , the Chief Executive, Mr. Carrie Lam, continued her visit to Beijing. She visited the Ministry of Science and Technology, the Ministry of Culture and Tourism, the General Administration of Customs, and the Ministry of Commerce, and exchanged views with leaders of these departments on matters of common concern. The Director of the Tourism Bureau, Mr. Yang Runxiong, the Director of the Constitutional and Mainland Affairs Bureau, Mr. Patrick Nip, the Director of the Security Bureau, Mr. John Lee Ka-chiu, the Director of the Commerce and Economic Development Bureau, Mr. Edward Yau Tang-wah, the Director of Health, Professor Sophia Chan Siu-chee, and the Director of the Innovation and Technology Bureau, Professor Alfred Sit Wing-hang, also attended the relevant meetings.
GPT-4	Chief Executive Carrie Lam continued her visit to Beijing today (March 15 th). She successively visited the Ministry of Science and Technology, Ministry of Culture and Tourism, General Administration of Customs, and Ministry of Commerce, exchanging views with leaders from various departments on matters of common concern. Heads of various departments, including Yang Runxiong, Director of the Cultural, Sports and Tourism Bureau, Tsang Kwok-wai, Director of the Constitutional and Mainland Affairs Bureau, Tang Bingqiang, Director of the Security Bureau, Qiu Yinghua, Director of the Commerce and Economic Development Bureau, Professor Lu Chongmao, Director of the Medical and Health Bureau, and Professor Sun Dong, Director of the Innovation, Science and Technology and Industry Bureau, also attended the relevant meetings.

In the above example, we can observe several inaccuracies in ChatGPT’s translation, particularly with proper nouns. Limited to its 2021 training data, when Mrs. Carrie Lam was Hong Kong’s Chief Executive, ChatGPT erroneously translate references to Mr. John Lee, who held this position in 2023, and used the inconsistent pronoun “she” instead of “he.” Furthermore, the names of bureaus established after the current government took office in 2022 and the corresponding government officials are inaccurately translated, either by using fabricated names or names from similar bureaus in 2021. These errors need to be rectified during the post-editing stage. Similarly, while GPT-4 demonstrate stronger capabilities in handling contemporary named entities and changes in government leadership by using pinyin transliteration (though still inaccurate for Hong Kong where Cantonese transliteration is preferred), it makes errors in translating certain official titles and names. For example, GPT-4 translates “Professor Lo Chung-mau, Secretary for Health” as “Professor Lu Chongmao, Director of the Medical and Health Bureau.” Although GPT-4 is still limited to data from 2021, its outputs suggest that it is less constrained by the information gained during its initial training stage.

While the availability of more up-to-date data could significantly enhance the capability of the AI models to generate translations that more accurately reflect current events and socio-political contexts, as the inaccuracies in their translations indicate, they continue to require human intervention to produce professional-level translations.

5.3 *Limited Support for Chinese Language*

Another limitation of ChatGPT in translation contexts is its limited support for the Chinese language. Since most of the training data for the model is in English, it may struggle to capture the nuances and complexities of Chinese, such as idioms and tones, and may have difficulty generating fluent and precise translations of Chinese text. In addition, the grammatical structure of Chinese differs substantially from that of English, which could result in errors in sentence construction and grammar when translating between these two languages, especially given the

model’s limited exposure to non-English data compared to English data. While ChatGPT shows promise in machine translation, its limited support for Chinese could impair its effectiveness in some contexts and result in inaccurate and unnatural translations. Further research and development is necessary to improve its ability to translate Chinese.

The following example (Table 15) illustrates ChatGPT’s deficiencies in translating from English to Chinese. We provide a sentence in English about Hong Kong and its international standing (HKSAR Government 2020a) and ask the system to translate it into Traditional Chinese.

Table 15 Examples of English-Chinese translation

Input/output	Content
User	Translate the following into Traditional Chinese: Hong Kong, with a population of about 7.51 million in mid-2019, is a small but dynamic city which has earned an international reputation as a leading commercial and financial centre as well as a highly efficient entrepot.
Reference translation	在 2019 年年中，香港人口約 751 萬。香港雖然面積小，但朝氣 蓬勃、幹勁十足。香港被譽為全球首屈一指的商業及金融中心，亦是一個效率超卓的轉口港。(HKSAR Government 2020b)
ChatGPT	香港是一座人口約在 2019 年中期達到 750 萬的小而有活力的城市，不僅因為是一個高效的貿易港口而享有國際聲譽，同時也是一個領先的商業和金融中心。
GPT-4	香港在 2019 年中期的入口約為 751 萬，雖然面積不大，卻是一個充滿活力的城市。這座城市以其國際知名的商業和金融中心地位以及高度有效的轉口港而聞名於世。

There are three issues with ChatGPT’s translation. Firstly, even though Traditional Chinese characters are requested, it still uses Simplified Chinese characters. Secondly, the first part of the sentence, “香港是一座人口約在 2019 年中期達到 750 萬的小而有活力的城市” (which corresponds to “Hong Kong, with a population of about 7.51 million in mid-2019, is a small but dynamic city”), needs further editing to improve fluency. Thirdly, the translated number is incorrect, stating 7.5 million instead of the source text’s 7.51 million. As for GPT-4, its translation is better since it uses Traditional Chinese characters with the correct number and is more fluent. However, the expression “這座城市以其國際知名的商業和金融中心地位以及高度有效的轉口港而聞名於世” (which corresponds to “which has earned an international reputation as a leading commercial and financial center as well as a highly efficient entrepot”) may still require editing for clarity, naturalness, and readability.

5.4 Output Variability

It is worth noting that ChatGPT tends to generate different translations for the same source text at different times. As a result, producing multiple outputs may be necessary to find the optimal translation, given the inconsistency in quality. Several factors contribute to variability in its output, including the prompt, context, and randomness from decoding. For instance, the context history, comprising previous prompts and texts, can impact the output, especially if the history is not regularly cleared. Moreover, the temperature setting used in sampling can also lead to variability in results. Higher temperatures frequently yield more random and creative outputs, while lower temperatures typically generate more conservative, predictable results. Although this output variability can occasionally be useful, for example, in creative writing or brainstorming, it may also introduce inaccuracies and errors in translation. It is therefore crucial

to carefully evaluate ChatGPT's output and consider generating multiple results to achieve the most accurate translation possible.

In the following example (Table 16), we provide an English sentence about Hong Kong (HKSAR Government 2020a) and request the system to improve its Chinese translation (HKSAR Government 2020b). Even though the input remains the same, the outputs produced at different times vary (see Output 1, Output 2, and Output 3 for each chatbot), even when no adjustments have been made to decoding parameters such as temperature by the user.

Table 16 Variability in ChatGPT and GPT-4 outputs

Input/output	Content
User	<p>Consider the following text and its translation:</p> <p>Text: Almost from the outset 150 years ago, Hong Kong enjoyed a prosperous entrepot trade, thanks mainly to its world-class harbour strategically located on the main Far Eastern trade routes.</p> <p>Translation: 香港得天獨厚，位處遠東主要的貿易航道上，擁有世界上其中一個最優良的海港，所以早在 150 年前，香港轉口貿易已蓬勃發展。</p> <p>Suggest ways to improve the Chinese translation.</p>
ChatGPT (Output 1)	<p>The Chinese translation is generally accurate and conveys the main idea of the original text. However, there are a few areas where the translation could be improved:</p> <ol style="list-style-type: none"> 1. Tone and style: The original text uses a formal and sophisticated tone, which is not fully reflected in the translation. To improve the translation, the translator could use more formal language and sentence structures to match the tone of the original text. 2. Clarity: While the translation is generally clear, there are a few areas where the meaning could be more precise. For example, the phrase "world-class harbour" could be translated more specifically as "世界一流的港口", and the phrase "strategically located" could be translated as "戰略性地位於". 3. Grammatical accuracy: The translation contains a few grammatical errors, such as the use of "其中一個" instead of "其中之一" and the use of "已蓬勃發展" instead of "已經蓬勃發展". The translator should review the translation for grammatical accuracy and make any necessary corrections. <p>With these considerations in mind, a revised translation of the text could be:</p> <p>香港得天獨厚，位於遠東主要貿易航道上，擁有世界一流的港口，自 150 年前起即享有繁榮的轉口貿易。這歸功於其戰略性地位於貿易航路上的優越條件。</p>
ChatGPT (Output 2)	<p>The Chinese translation provided is generally accurate, but there are a few areas where it could be improved:</p> <ol style="list-style-type: none"> 1. "得天獨厚" is a good translation for "advantageous position," but it may not be the best fit for the context of the sentence. A more appropriate phrase might be "地理位置優越" or "區位優勢," which both convey the idea of a favorable location. 2. The phrase "主要的貿易航道" could be more specific. It might be more accurate to say "主要的海上貿易航線" or "主要的海運貿易路線," which specifies that the trade routes are maritime in nature. 3. The phrase "其中一個最優良的海港" is accurate but could be more concise. A simpler phrase like "世界一流的海港" or "世界頂尖的港口" would convey the same meaning more efficiently. <p>With these suggestions in mind, an improved translation might read:</p> <p>香港地理位置優越，位於遠東主要的海上貿易航線上，擁有一個世界一流的海港。早在 150 年前，香港就因此蓬勃發展了轉口貿易。</p>
ChatGPT (Output 3)	<p>The Chinese translation of the text is generally accurate, but there are a few areas where it could be improved:</p>

1. Use more natural phrasing: While the translation is grammatically correct, some of the phrasing sounds a bit unnatural. For example, "得天獨厚" could be replaced with a more common phrase like "具有獨特優勢" or "地理位置優越".
2. Clarify the meaning of "entrepot trade": The term "轉口貿易" used in the translation is accurate, but it might not be immediately clear to all readers what this refers to. Adding a brief explanation (e.g. "轉口貿易指的是進口商品轉手再出口的貿易活動") could help readers who are not familiar with the term.
3. Use more descriptive language: The translation accurately conveys the basic facts about Hong Kong's harbor and trade history, but it could be more engaging and descriptive. Adding details about the size and importance of the harbor, or the types of goods that were traded, could make the text more interesting to readers.

A possible revised translation that incorporates these suggestions could be:

香港憑藉其位於遠東主要貿易路線上的世界級海港，享有繁榮的轉口貿易。這裡的港口規模龐大，船舶往來頻繁，貨品種類繁多，早在 150 年前就已經蓬勃發展。香港具有獨特優勢，成為了貿易中心。

GPT-4 (Output 1)	<p>The given translation is already fairly accurate in conveying the meaning of the original English text. However, there are a few minor suggestions to make it more fluent and precise:</p> <ol style="list-style-type: none"> 1. Change "得天獨厚" to "地理位置得天獨厚" for more clarity on the advantage being discussed. 2. Add "幾乎" at the beginning to emphasize "almost" from the original text. 3. Change "其中一個" to "其中之一" for a more natural expression. 4. Change "所以" to "因此" for a smoother conjunction.
	<p>Revised translation: 幾乎從 150 年前一開始，香港地理位置得天獨厚，位處遠東主要的貿易航道上，擁有世界上最優良海港之一，因此轉口貿易便蓬勃發展。</p>
GPT-4 (Output 2)	<p>The given translation is quite good, but there are some minor adjustments that can be made to make it more accurate and smoother. Here's an improved version: 原文：Almost from the outset 150 years ago, Hong Kong enjoyed a prosperous entrepot trade, thanks mainly to its world-class harbour strategically located on the main Far Eastern trade routes. 改进后的翻译：自 150 年前起，香港几乎立刻就享有繁荣的转口贸易，这主要归功于其位于远东主要贸易航线上的世界级港口。</p> <ol style="list-style-type: none"> 1. Use "自...起" instead of "早在" to better convey the meaning of "from the outset." 2. Use "几乎立刻" to better express "almost." 3. Rearrange the sentence structure to make it more coherent and clear. 4. Replace "得天獨厚" with "这主要归功于" to better express "thanks mainly to" and make the sentence more precise.
GPT-4 (Output 3)	<p>The original translation is quite accurate and fluent, but there are a few minor adjustments that can be made to improve it. Here's my suggestion: 原文：Almost from the outset 150 years ago, Hong Kong enjoyed a prosperous entrepot trade, thanks mainly to its world-class harbour strategically located on the main Far Eastern trade routes. 修改后的译文：早在 150 年前，香港就因其地理位置得天独厚，坐拥世界级的优良港口并位于远东主要贸易航线上，因此转口贸易便蓬勃发展。 In this revised translation:</p>

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1. I changed "得天獨厚" to "地理位置得天獨厚" to emphasize the strategic location.
 2. I rephrased "擁有世界上其中一個最優良的海港" to "坐擁世界級的優良港口" for a more concise expression.
 3. I moved "位處遠東主要的貿易航道上" closer to its corresponding phrase in the original text and merged it with the previous sentence.
-

The three ChatGPT outputs offer varying suggestions for improving the Chinese translation, which could be challenging for users who rely on the tool for editing assistance. Although each output provides largely useful suggestions, users need to carefully evaluate the recommendations and generate multiple outputs to see if there are any commonalities. Similar inconsistencies appear in GPT-4's outputs, with two of them proposing suggestions in Simplified Chinese instead of Traditional Chinese. In practice, this means comparing and combining suggestions across all outputs and then applying the most relevant and valuable advice to enhance the translation. By synthesizing the strongest aspects of each output, users can achieve a more accurate and polished translation that captures the essence of the source text.

5.5 *Security and Stability Concerns*

Given that ChatGPT is a closed model accessible only through its API, all requests – including prompts and source texts – must be submitted to its server for processing to obtain results. Therefore, this approach may be unsuitable for translating sensitive information that cannot be shared with external servers due to confidentiality agreements or legal restrictions. Moreover, as the platform becomes more popular and requires more computing power, it could experience service stability issues like system downtime or delayed responses. These potential problems may negatively impact its usefulness as a translation aid, especially for tasks requiring high stability. For instance, if an organization relies on the system to translate crucial documents or communications, any service delays or downtime could lead to unfavorable outcomes such as missed deadlines. Meanwhile, as noted by Lyu et al. (2023), large language models risk potentially revealing sensitive information in either the source text or translation output. In light of these security and stability concerns, it is important for users to carefully consider the implications of using the tool for translation. It is also advisable to develop alternative solutions for handling sensitive or critical translation tasks to mitigate risks.

6 **Impacts of ChatGPT on Translators and Language Professionals**

ChatGPT and similar AI tools could transform the work of translators and language professionals. These systems may function as potential partners rather than just tools, augmenting human intelligence and amplifying professional skills. By adopting a collaborative approach that reimagines they interact, organize work, and define roles, translators can leverage AI to increase productivity and creativity while maintaining control of the translation process. This opens up new opportunities for translators and the language industry. However, realizing the benefits of human-AI collaboration requires continuously developing knowledge and skills, and they will need to learn how to collaborate effectively with AI and integrate it into their daily work. Here we explore how ChatGPT will reshape translation, providing insights into preparing for the AI era.

6.1 *Unprecedented Partnership between Translators and Technology*

ChatGPT tools enable translators to leverage AI in novel ways that surpass conventional translation applications. As detailed in Section 3, ChatGPT can assist with tasks ranging from explaining source language expressions to suggesting translations and edits. More importantly, users can give instructions and feedback to the AI model in natural language. Rather than just post-editing machine translation results, users can provide context for better translations, offer additional contextual information after the initial draft, if necessary, and iteratively guide the AI to improve the output. Such an interactive feedback loop was hardly feasible with earlier technologies.

This human-AI partnership suggests an unprecedentedly close collaboration between translators and AI that optimally combines their strengths in new ways. AI excels at rapid initial drafts and suggestions by processing massive data, but it lacks the cultural knowledge, subject expertise, style mastery, emotional expressiveness, and intuitive sense of clarity that remain fundamentally human talents. AI cannot easily replicate the empathy, nuance and “human touch” fundamental to quality translations – attributes uniquely enabled by human intelligence.

In essence, professional translators and AI can achieve more together than either could accomplish alone, in a way that was previously unattainable. Human translators focus on overseeing AI outputs to ensure high quality, culturally-appropriate translations while AI handles routine groundwork with a speed that surpasses human capabilities. This division of labor frees up translators to concentrate on the most valuable aspects of their work. Through this closer collaboration enabled by ChatGPT and similar tools, humans and AI can learn from each other, improve their understanding of problems, and progress jointly. In this co-evolutionary process, language professionals and AI work together, leveraging one another’s strengths to usher in the next wave of growth, productivity, and global reach for the translation industry.

6.2 *Focus on Specialized Translation*

While ChatGPT and other AI systems may be adequate for simple, casual tasks such as translating blog articles for personal use, professional translators remain essential for complex, high-stake translation that demands deep expertise, cultural fluency, and domain knowledge. Areas such as medical translation, for example, are too important to entrust solely to AI, regardless of its capabilities. Translating patient materials, clinical studies or healthcare policies requires sensitivity, precision, and judgment in addressing ambiguity that AI cannot yet achieve. Errors or ambiguities could have real consequences for patients. Legal translation similarly needs professional translators who understand subtleties in both the source and target languages and legal systems.

There may even be specialized translation needs going unmet, potentially due in part to a shortage of sufficiently trained translators. Translating Hong Kong court judgments into English or Chinese, for example, could facilitate bilingual legal proceedings, but much of this work remains to be done (see SCMP Editorial (2022) and Hargreaves (2022)). With AI assistance, legal translators could translate considerably more while maintaining high quality and consequently meet such demand.

It is therefore imperative that translators develop expertise in highly specialized domains through focusing on the most complex work that requires critical translation decisions. In these fields, AI serves as a tool to augment human capability and reach, not a replacement for humans. While AI can assist with routine work, human oversight and judgment remains indispensable.

It is imperative that translators develop expertise in specialized domains through focusing on the most complex work that requires critical translation decisions. In these fields, AI serves as an augmentation tool, not a replacement for humans. While AI can help with routine tasks, human oversight and judgment remain indispensable.

6.3 New Opportunities for Creative Forms of Translation

As AI technologies like ChatGPT demonstrate increasingly sophisticated and open-domain language abilities, new opportunities are emerging for creative forms of translation and cross-lingual activities. Unlike conventional electronic translation tools that typically facilitate repetitive tasks (such as translation memories for reusing old translations), ChatGPT can provide more support by generating creative ideas. Areas such as game translation, bilingual content creation, and transadaptation require human creativity, cultural knowledge, and artistic sense that AI still lacks. However, AI can enhance human productivity and creativity in these domains.

For example, in game translation, AI could assist not only with the translation of dialogue but also by suggesting names for characters, locations, weapons, and other gaming elements. Human translators would decide on the most natural and compelling options that resonate with target players and gaming culture. AI thereby acts as a brainstorming and productivity tool rather than wholly replacing the human translator role.

Similarly, for bilingual social media content, AI might initially suggest how to translate or adapt visuals, hashtags, and other elements for different cultural contexts. Human translators would then review, refine and determine the final creative approach based on their expertise and sense of style preferences in each language, informed by their knowledge of social media channels, products and target audiences. They guide AI as an enhanced creative partner, determining which AI suggestions to refine and implement.

In transadaptation, AI could help identify possible ways to adapt plots, characters, settings, and other details to resonate more deeply with the target audience. Yet human translators would make the final creative choices around how best to adapt the essence and impact of stories for a given culture. They use AI as one tool among many to stimulate creativity but not dictate solutions.

The future of creative, culturally compelling translation in fields ranging from digital entertainment to marketing requires a partnership between language professionals and AI. Neither alone suffices. Together, they can unlock new creative horizons where translation becomes an artistic collaboration, with translators steering AI to enhance innovative vision and share it with broader audiences worldwide. Creativity thrives most when translation professionals and AI each contribute in the ways they do best.

6.4 Development of New Skills for Harnessing ChatGPT's Power

Another key impact is that it is essential for translators to develop new skills to effectively leverage the strengths of both human and machine with the help of ChatGPT for cross-lingual communication tasks. Several areas of competence will be vital:

First, translators must become adept at crafting prompts that provide ChatGPT with clear instructions to address language and translation issues. Through experience, they can optimize prompt design to improve AI outputs. There are techniques such as incorporating linguistic knowledge (Gu 2023) and providing high-quality or relevant translation examples (Hendy et al. 2023). It may be helpful to ask ChatGPT to suggest translation prompts (i.e., asking the system to provide "ten concise prompts or templates that can make you translate") or consider pivot prompting for low-resource languages (i.e., asking the platform to translate the source

language sentence into one in a high-resource language first before the target language), as proposed by Jiao et al. (2023b). It is also important to understand how language models work, especially their decoding processes and adjustable parameters like temperature and top-p values. As suggested by Peng et al. (2023), for example, a lower temperature may improve performance in “difficult languages.”

Second, translators must strengthen their ability to evaluate the quality, accuracy, and appropriateness of ChatGPT’s outputs. They should be aware of the system’s tendency to occasionally generate nonsensical or problematic responses and know how to identify and address them. Detecting AI flaws and inaccuracies requires experience evaluating many system responses and developing evaluation metrics.

Third, translators should leverage complementary tools and resources to validate, improve, and refine ChatGPT’s outputs. This includes using search engines, domain-specific websites, dictionaries, parallel corpora, terminology databases, and concordancers. Checking AI responses against multiple references helps identify potential errors. Generating multiple AI outputs by rephrasing prompts may yield better results.

Finally, translators must stay up-to-date with new translation tools and technologies that employ ChatGPT and similar models. Following ongoing AI development helps translators determine which new products offer benefits like more intuitive interactions, improved accuracy or creativity, and easier access. Continuous learning about AI for translation ensures that professionals understand the state-of-the-art and future directions of these technologies.

With the proper knowledge and skills, translators can play an active role in guiding and shaping how AI technologies evolve to best support cross-lingual communication. Rather than passively reacting to whatever outputs AI provides, translators can empower themselves by leveraging AI as an augmenting tool and collaborative partner, thereby enhancing their productivity and creativity and extending their abilities beyond what was previously possible.

7 The Future of ChatGPT as a Translation Tool

ChatGPT shows much promise as an invaluable tool for translators, but it still has room to grow. This section envisions how ChatGPT might build on its existing abilities to enhance its role as a translation companion. By embracing new frontiers like multimodal translation, improving fluency in non-English languages, and allowing model fine-tuning or customization for individual users, ChatGPT could become an even more versatile navigator of our multilingual world. In addition, by tapping into longer contexts and trusted third-party resources, the chatbot could produce translations that feel more natural and sensitive to cultural nuances. There are exciting possibilities ahead for how ChatGPT may continue to evolve as a translation aid, and the improvements discussed in this section could further enhance its capabilities.

7.1 *Multimodal Support*

As models like GPT-4 that can process images as input emerge (OpenAI 2023a) alongside tools to generate images and videos like Stable Diffusion (Rombach et al. 2022), ChatGPT has an opportunity to expand beyond text translation and venture into the realm of multimodal translation. By incorporating image-to-text translation, such as creating captions or descriptions based on images, or text-to-image translation, such as producing images from textual descriptions, ChatGPT could significantly increase its value for translators. Furthermore, the addition of audio capabilities for speech-to-text and text-to-speech translation could transform ChatGPT into a more versatile tool. By enabling ChatGPT to translate between

modalities, not just languages, it would become a more powerful aid that generates translations optimized for the most suitable medium - text, images, audio, or video - for a given context. These new capabilities could help ChatGPT produce more natural, engaging, and culturally appropriate translations, providing greater flexibility and richness of expression. However, as highlighted by Lyu et al. (2023), there are challenges to be addressed in multimodal machine translation, including imbalanced datasets and the need for new algorithms that can generalize across modalities. Overcoming these challenges is crucial to realizing the full potential of ChatGPT as a multimodal translation tool.

7.2 *Enhanced Support for Non-English Languages*

While ChatGPT excels in English language processing, achieving comparable fluency and accuracy in other languages remains a challenge (see, for example, Khoshafah 2023). To address this issue, it is essential to develop language models that offer enhanced multilingual support, allowing us to handle the nuances and complexities of diverse languages and dialects more effectively. One promising example is PaLM2, a new language model introduced by Google in May 2023. It incorporates more non-English data and parallel multilingual data, with the aim of enhancing its multilingual capabilities (Google, 2023). Enhancing multilingual support requires a range of techniques, such as training models with larger datasets in multiple languages, designing larger models that capture more complex language patterns, and adopting linguistically-informed architectures. By implementing such methods, we could narrow the gap between ChatGPT's English language abilities and its fluency in other languages.

7.3 *Dedicated Chatbots for Translators*

Another potential approach is to create a specialized model optimized for translation tasks or to allow users to fine-tune the existing ChatGPT model using instructions and data directly relevant to common editing and translation tasks (Jiao et al. 2023a). This fine-tuning option, which is already available for GPT-3 models (OpenAI n.d.), could offer significant benefits for ChatGPT. By giving users the ability to customize the chatbot for particular use cases, such as translation in specialized domains, more accurate and fluent translations that address individual needs can be achieved. For example, a legal translator could fine-tune the model using bilingual legal documents, potentially enhancing its ability to process legal terminology and generate outputs in the appropriate writing style. Fine-tuning the model with data tailored to the needs of specific users and domains may enable ChatGPT to produce more precise and idiomatic translations, which could be particularly useful for industries such as finance, healthcare, and law.

7.4 *Integration with Offline Alternatives*

Recent efforts have been focused on developing large language models that can be used offline (see, for example, Cui et al. 2023; Jiao et al. 2023a). Although these offline models typically have limited multilingual capabilities, they share similar functionalities with ChatGPT. By operating locally or on self-hosted machines, these models give users more control over their data and prevent sensitive information from being stored on external servers. They may also benefit users with limited internet connectivity.

At present, ChatGPT generally outperforms these offline alternatives (Jiao et al. 2023a), but ongoing advancements in the field could bridge the performance gap between the two approaches. Integrating offline models with ChatGPT could provide users with more flexibility and options for translation based on their needs. For instance, users could choose between

online and offline systems depending on factors such as their operating environment and task requirements. They could also combine offline and online models to offset each other's limitations.

7.5 *Third-party Plug-in Incorporation for ChatGPT*

To improve the accuracy and reduce hallucinations in texts generated by ChatGPT, a promising solution could be the development of third-party systems or plug-ins for external information integration. Hendy et al. (2023) and Lyu et al. (2023) proposed using machine translation and translation memories, respectively. Bubeck et al. (2023) also discussed the exciting potential of GPT-4 for incorporating external information during text generation. Building on this, plug-ins that integrate information and results from various sources (e.g., reputable websites, electronic dictionaries, translation memories, and terminology databases) into prompts before ChatGPT generates a translation could be beneficial. For example, a plug-in could search for relevant sentences and their translations from a translation memory database and automatically add them to the source text prompt. This would allow ChatGPT to reuse the verified translations provided, improving output quality through integration with other translation tools. Projects such as LangChain (2023) and AutoGPT (2023) could serve as starting points for developing such plug-ins. By incorporating trusted external tools and resources, coupled with innovative prompting strategies, ChatGPT and tools alike could become even more powerful translation assistants, generating more accurate, coherent, high-quality translations with fewer hallucinations (see, for example, He et al. 2023).

7.6 *Longer Context*

Providing ChatGPT with a broader context by including more contextual information in the prompt allows for the translation of longer texts, opening up new possibilities such as full document translation without dividing the input file into disconnected sentences and paragraphs. The entire document could serve as the context. Currently, the GPT-4 models handle up to 8,000 or even 32,000 tokens (OpenAI 2023d). Recent experiments by Bulatov et al. (2023) have shown that the Transformer architecture, which underpins ChatGPT, can extend the context length to 2 million tokens. This suggests that ChatGPT could eventually process lengthy texts such as books, not just sentences or paragraphs as it currently does. By extending the context length, the model could handle longer and more complex texts with greater ease and accuracy.

8 ChatGPT and GPT-4: The Translation Revolution Is Here

ChatGPT, including GPT-4, has the potential to revolutionize the language industry due to its impressive capabilities as a powerful language model based on the Transformer architecture. It can perform various natural language processing tasks, including translation, enabling wider access to translation services and facilitates multilingual communication at scale.

When it comes to translation, ChatGPT offers several advantages: it can help analyze the source text, generate initial draft translations, detect translation issues, offer editing suggestions, featuring speed, cost-effectiveness and unprecedented interactivity. Its ability to rapidly translate large volumes of text makes it an appealing choice for businesses and individuals. However, ChatGPT's capabilities are not without limitations, including occasional

difficulties processing Chinese and issues related to hallucinations, which can yield inaccurate translations.

Despite these constraints, ChatGPT offers exciting possibilities for language professionals. It enables close collaboration between translators and AI, producing results greater than the sum of their parts and opening up opportunities for highly specialized and creative forms of translation, such as cross-lingual content creation and digital media localization.

To effectively leverage ChatGPT while recognizing its strengths and limitations, language professionals should develop skills that allow them to integrate the system seamlessly into their workflows. These skills include writing prompts with clear instructions and contextual information for different tasks, evaluating and revising its outputs, customizing the system, and integrating it with other applications like translation memories and terminology databases.

As ChatGPT and other large language models advance, they will enable additional use cases. For example, multimodal support will facilitate translating between text, images, videos, and other media. Expanded multilingual data will boost accuracy for less common languages. Model fine-tuning can enhance translation quality for specific domains or languages. Offline models will permit use without internet access, which is critical when processing sensitive data. A longer context history will allow processing longer text and providing more context. Integrating plug-ins or databases will further improve ChatGPT's output, allowing it to better assist translation and language services.

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