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MODERN VECTORS OF SCIENCE AND EDUCATION DEVELOPMENT IN CHINA AND UKRAINE

中国与乌克兰科学及教育前沿研究

Harbin Engineering University
State institution "South Ukrainian National Pedagogical University named after K. D. Ushynsky"
Educational and Cultural Center "Confucius Institute"

Odesa, Ukraine

Harbin, the People's Republic of China

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This international journal, as a periodical, includes scientific articles of Ukrainian and Chinese scholars on the problems of Sinology, Cross-cultural Communication, Pedagogy and Psychology: contemporary review. Odesa, Ukraine.

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The ninth issue of the materials represented by the Ukrainian and Chinese scholars are dedicated to the relevent issues of General and Contrastive Linguistics within the Chinese, English, Ukrainian, Turkish and Korean languages; linguodidactic problems of teaching native and foreign languages within polycultural educational space; peculiarities of cross-cultural communication in geopolitical space alongside education-related aspects regarding profession-oriented training of future specialists under conditions of multicultural environment and military actions in Ukraine; post-COVID-19 pandemic chalanges.

The given articles may be of use to researchers, graduates, postgraduates and practising teachers who are interested in various aspects of Sinology, Cross-cultural Communication, Linguistics, Pedagogy and Psychology.

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AN ANALYSIS OF THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE TRANSLATION OF SHIPBUILDING ENGINEERING ENGLISH TEXT - TAKING CHATGPT AS AN EXAMPLE

Most of the translations of shipbuilding engineering English are carried out manually or by using Computer Aided Translation (CAT) software, but such traditional translation methods have disadvantages like inefficient translation. Artificial intelligence, as a new emerging technology, has made up for the defects of traditional translation methods. Meanwhile, as a generative artificial intelligence, ChatGPT has demonstrated the formidable vitality. By analyzing the text characteristics and AI development, this research focuses on the application of artificial intelligence in the

translation of shipbuilding engineering English text and the comparation of ChatGPT's translations with those of the Chinese version textbook published by Shanghai Jiao Tong University Press. Our research suggests that when tasked with translating Engineering Scientific and Technical (EST) texts, ChatGPT exhibits proficiency in several key areas. These include handling specialized terminologies after training, maintaining sentence structure integrity, and preserving coherence and logic within discourses. However, it's worth noting that ChatGPT also presents certain limitations. Specifically, it may face challenges in accurately rendering some specific words and adhering to the unique styles of certain languages. This nuanced understanding of ChatGPT's advantages and disadvantages aim to shed light on the possibilities and challenges of applying AI in the translation of specialized technical content, specifically within the domain of shipbuilding engineering.

Keywords: *Shipbuilding Engineering English; Translation; Artificial Intelligence; ChatGPT*

Introduction

In traditional translation process, especially in the field of English for Science and Technology (EST) texts, human translation and computer-aided translation (CAT) played the key role (Xu and Guo, 2015). Machine Translation (MT), a burgeoning technology, has seen substantial growth and wide application in translating Engineering Scientific and Technical (EST) texts (Cui and Li, 2015). The field of translation has been notably galvanized by the advent and proliferation of Artificial Intelligence (AI), a cutting-edge technology that has become a focal point of discussion in recent years. The integration of AI into our lives has introduced profound transformations, shaping not only the way we live but also how industries operate. By harnessing the power of AI, dramatic enhancements in work efficiency have been achieved, liberating human labor to a significant degree and propelling a shift towards greater productivity. Furthermore, AI has paved the way for an influx of novel business prospects. Smart manufacturing and smart home solutions are prime examples of such opportunities, marking a new era where enterprises can capitalize on AI-driven

innovations to grow and thrive. As generative artificial intelligence models like ChatGPT gather momentum, there has been an increase in their applications in various fields including translation. Compared with traditional translation methods, AI has a faster translation speed and a relatively high accuracy rate. ChatGPT, as another major milestone in AI, has gradually transformed AI content recognition into AI content output with its huge data search capability, deep text recognition capability and efficient content generation capability (Shen and Liu, 2023), positively affecting many processes of translation. As a result, the position of human translators in the translation industry is in jeopardy. While AI translation offers numerous advantages, it is important to acknowledge its limitations. While it may appear to pose a significant threat to the human translation industry, there are still shortcomings in the AI translation process. Specifically, translations in specialized fields often cannot solely rely on AI and necessitate the expertise of professional human translators.

The field of shipbuilding and maritime transportation is highly technical, with numerous specialized terms and vocabulary, making it challenging for humans to translate effectively and efficiently. The application of AI in translation is expected to improve the quality and speed of translation and reduce the workload on translators.

In this study, the characteristics of shipbuilding engineering English text and the development and application of artificial intelligence are discussed. Segments of the book “SEA LOADS ON SHIPS AND OFFSHORE STRUCTURES” were chosen as the analysis material and compared ChatGPT’s translations with the translated text of the Chinese version textbook published by Shanghai Jiao Tong University Press, aiming to analyze the advantages and disadvantages of artificial intelligence like ChatGPT in translating shipbuilding engineering English text. By analyzing the performance of ChatGPT translation in lexical, syntactic and discourse level, this study is intended to summarize the positioning and development direction of human translators in the era of artificial intelligence. Ultimately, research guidance and reference are provided for future researchers who are interested in studying and exploring the potential of AI development, especially in the field of translation.

2. Features of Shipbuilding Engineering English Text

Lexical, syntactic and discourse are three typical perspectives generally analyzed when it comes to the field of translation or second language acquisition (Danzak, 2011). The features of shipbuilding engineering English text will be discussed from these three aspects in the following part.

2.1 Lexical Features

Shipbuilding engineering is an interdisciplinary field of linguistics and shipbuilding, emphasizing practicality, knowledge, and professionalism. It falls within the realm of scientific and technological English and exhibits distinctive features of such a domain. For example, in the "Chinese English Translation of Scientific and Technological Guidelines", it is mentioned that "there is no person, formal tone, objective and accurate statement, standardized language, simple style, accurate content, clear organization, logical nature, practicality, and strong technical terminology" (Feng, 2001).

Firstly, the shipbuilding engineering vocabulary is highly professional. These terms are not commonplace words; rather, they are used within distinct, specialized fields associated with maritime construction and design. Words such as "bulkhead", "keel", or "starboard" might be alien to those outside the industry but serve as a lingua franca for those within the field. This professional lexicon allows experts to communicate complex ideas and intricate details efficiently and precisely. For translators tasked with interpreting these terms, a simple word-for-word translation may not suffice due to the precision and context-specific nature of such vocabulary. Instead, translators must equip themselves with a comprehensive understanding of shipbuilding engineering as a subject. This not only involves familiarizing themselves with the terminologies but also comprehending the underlying principles, techniques, and concepts of the trade. In this way, they can ensure accuracy in translation while retaining the essence and specificity of the original message.

Secondly, shipbuilding engineering often employs compound words. Compounding is a prevalent process in many languages, including English, and it plays a significant role in technical languages like that of shipbuilding engineering. There are primarily three forms of compound formation: compounding, addition, and

overlapping. Compounding involves combining two separate words to create a new term. Addition refers to forming a word by adding a prefix or suffix to a base word. Overlapping, on the other hand, involves the merger of parts of two or more similar or identical words to form a new term, such as “shipshape”. The use of compound words adds another layer of complexity to translating shipbuilding engineering vocabulary. They cannot always be translated directly or literally, as their meanings often rely heavily on context and specialized knowledge. Translators must, therefore, have a deep understanding of both the source language and the specific field to accurately interpret and convey these compound words.

2.2 Syntactic Features

The accuracy, conciseness and objectivity of EST documents can be achieved by some syntactic characteristics, such as the extensive use of passive voice, long and complicated sentences, etc. (Li& Li, 2015). EST texts mainly describe and discuss scientific discoveries or facts. As a type of scientific English, shipbuilding engineering is no exception. (Zhou, 2010).

Another distinctive syntactic trait is the frequent employment of passive sentence structures (Zhou, 2010). According to the statistical research by Swales, J. (1990), in EST documents, the passive voice is employed with at least one-third of the predicative verbs. The substantial use of passive phrases satisfies the standards for objectivity, compactness, and coherence in source text materials. The passive voice is a common tool in shipbuilding engineering English texts, used to underscore the recipient of an action or to highlight specific components or systems. The passive voice is used to make the sentence more objective, emphasizing the roles and relationships of the different components of the ship. By using the passive voice, the shipbuilding engineering English text highlights important components in the design, construction, and operation of the ship, making the reader pay more attention to the function and performance of these parts.

Furthermore, a notable hallmark of shipbuilding engineering is its intricate sentence composition featuring complex and extended structures (Li, 2017). Lengthy and intricate sentences in English denote intricate structures containing diverse clauses,

each modifying distinct elements. Generally, these sentences exceed a word count of 20 words.

2.3 Discourse Features

The objectivity, compactness and coherence of ES materials can be further enhanced by the discourse features of EST, such as logical and structural integrity, clear expression, and context-dependent language.

Shipbuilding English text is logical and structural integrity. Shipbuilding engineering English text is presented in a clear structure and logical organization. This ensures that the information is sequenced and presented in a way that is both comprehensible and relevant, facilitating the reader's organized assimilation of the content.

The language of shipbuilding English text is concise and clear. These texts tend to utilize language that is succinct and unambiguous. This approach aids in the precise conveyance of information, minimizing any potential for confusion or ambiguity. By employing concise sentence structures and making clear lexical choices, the clarity and accessibility of these texts are enhanced.

Shipbuilding engineering English texts are notably context-dependent. The comprehension of shipbuilding engineering English text usually depends on the reader having relevant background knowledge and context understanding ability. This is because shipbuilding engineering English involves specific ship types, ship equipment or ship operating environment, requiring readers to possess a grasp of the corresponding professional knowledge and contextual information.

In the course of its development and evolution, EST exhibits its own distinctive characteristics. It is unquestionably beneficial for ST personnel to comprehend the features of EST that set it apart from standard or literature English. It is important to keep in mind, nevertheless, that EST's qualities are relative rather than absolute. To put it another way, EST shares many traits with literature or standard English, but these traits are emphasized in EST. On the other hand, EST frequently appropriates literary expressions to heighten the impact of language (Li& Li, 2015).

3. Development and Application of Artificial Intelligence in the Field of

Translation

In the previous section, we extensively discussed the characteristics of shipbuilding Engineering English text, including lexical features, syntactic features and discourse features, which play a crucial role in translation and document handling within the field of shipbuilding engineering. However, with advancing technology, artificial intelligence is gradually being applied in the field of translation. This section will focus on the development and application of artificial intelligence in the field of translation. By analyzing the potential and challenges of AI technology in translation, we aim to explore how this technology can improve the quality and efficiency of translating Shipbuilding Engineering English text.

3.1 Development of AI in the Field of Translation

The concept of Artificial Intelligence was first proposed by John Mc Carthy at the Dartmouth Conference in 1956, and after a long period of development, its connotation has been greatly enriched and expanded.

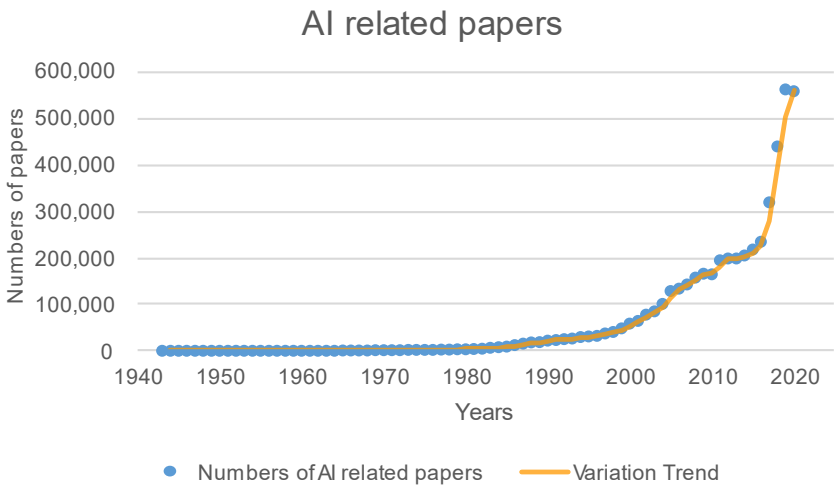

Figure 1. The number of AI related papers published in Google Scholar from 1940 to present

We used Google Scholar database to present the number of papers published from 1943 to the present with the keyword “AI Development” and plotted the figure 1. The horizontal coordinate is the year, and the vertical coordinate represents the approximate number of papers published in that year, so we used this graph to analyze the development of AI research.

At the beginning of the development of artificial intelligence, it was with the help

of the initial understanding of the mechanism of the human brain that the first climax of artificial intelligence was initiated. In 1958, the American scholar Frank Rosenblatt proposed the perceptron (Frank, 1958), which is a single-layer neural network model with variable parameters. This was the first time that humans expressed the learning functions they possessed in the form of an algorithmic model, and it is the prototype of today's neural networks. From the early work of Allen Newell, Herbert A. Simon, Wang Hao and others in machine theorem proving to the invention of the induction algorithm in 1965 by J.A. Robinson (Robinson, Alan John, 1965). These works were the spark for the second surge in AI research in the early 1980s. The early years of the 21st century saw significant advances in natural language processing and speech recognition, with applications in healthcare, financial services and customer service. The era of Big Data has also brought advances in machine learning algorithms that can process vast amounts of data.

In recent years, deep learning technology has revolutionized the field of AI by enabling the efficient training of complex neural networks. From Google's release of the 340 million-parameter BERT model in October 2018, OpenAI's release of the 175 billion-parameter GPT-3 model in May 2020 (Wang and Zhang, 2023), to Beijing Zhiyuan Artificial Intelligence Research Institute's release of the 1.75 trillion-parameter "Wudao 2.0" model released by Beijing Zhiyuan Artificial Intelligence Research Institute in June 2021, and Ali Dharma Research Institute achieved the first commercialized trillion multi-modal model in China with only 480 GPUs in June 2021, all of which indicate that today's AI is heading towards the "intelligent energy" industrial model.

Looking ahead, as technology continues to rapidly evolve and open up new application scenarios for AI-powered tools and systems, AI, as one of the key frontier technologies, is bound to free human hands in the development of the Industrial Internet (Gao, 2022).

The development of AI in translation can be traced back to the middle of the last century. In the middle of the 20th century, AI translation technology was formally introduced under the auspices of advanced technological development and the

invention of computers. During this period, the practice of AI translation took shape, but did not achieve widespread development. In 1946, Eckert and Mauchly of the University of Pennsylvania manufactured the world's first electronic computer ENIAC (Feng, 2018), providing a solid material foundation for the innovation of translation technology. In 1949, Warren Weaver formally proposed machine translation with electronic computers in the memorandum "Translation" (Joos M, Locke W N, Booth A D., 1956). 7th January 1954, Georgetown University in the United States, in collaboration with the International Business Machines Corporation, the world's first machine translation experiments, to achieve a simple Russian to English. After this until the 1960s, a boom in artificial intelligence research was launched in many countries.

In the mid-1960s，machine translation was not well supported due to limited computing power and storage space, and artificial intelligence programs did not have simple reasoning capabilities, so research progress was in a slow pace. It was not until the 1970s, when scientific research was generally strengthened and people's dependence on technology gradually increased, that the exploration of AI translation attracted renewed attention. During this period, researchers found that the translation in AI translation is not smooth, partly because there are more than lexical differences between different languages, there are also differences in grammatical structure (Feng, 1997), so during this period, most of the machine translation is the primary consideration of syntactic analysis, based on the linguistic rules, the development of the rule-based machine translation (Feng, 2018). At the end of the 1970's, the study of AI translation is gradually pragmatic, a large number of practical machine translation systems appeared. Although the quality of machine translation is still problematic, AI has achieved better practical results in specific fields (Hu and Li, 2016).

Since the 1990s, AI translation technology has developed vertically, achieving the real maturity of translation technology and the construction of the theoretical system of translation technology. Researchers have introduced corpus tools on the basis of rule-based machine translation, which is conducive to AI translation to achieve the strategic goal shift (Gao and Zhao, 2020).

In recent years, a neural machine translation system based on “deep learning” has emerged. Deep learning was proposed by Hinton et al. in 2006 to achieve higher accuracy and performance in dealing with model analysis and classification problems (Hutchins J., 2010).

At present, the improvement of machine translation level has become the focus and hotspot of research. AI algorithm translation, as the most advanced tech, adopts the unique neural network structure to model the whole process of translation, so as to ensure the accuracy of machine translation results. AI algorithm can simulate the human brain to analyze and decode sentences, and use the context information to judge the translation object organically, and generate high-quality translation (Cheng, 2021). ChatGPT has also been widely used in the field of machine translation. In translation tasks, ChatGPT can understand and learn the grammar rules, vocabulary & expression methods of various languages through extensive corpus training which then allows it to perform automated translations. Compared with traditional machine translations ChatGPT maintains high accuracy while also having better contextual understanding & expressive abilities. Therefore, ChatGPT has broad application prospects in the field of translation, and will continue to be improved and optimized in the future.

3.2 Application of AI in Translation

Technologies such as deep learning, machine learning, and neural networks in the field of AI have driven the progress of machine translation (Zhou and Wang, 2020). With the gradual maturity of AI translation and machine translation tech, it has been widely used in several aspects as shown in Figure 2, and has brought significant changes to these fields.

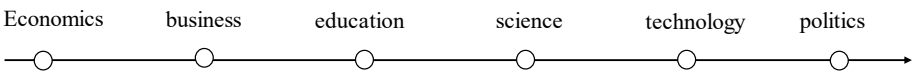

Figure 2. Application areas of AI translation

Artificial Intelligence translation has made great contributions in the economic field. In terms of economic forums and conferences, AI translators have demonstrated great advantages and strong impetus in both interpretation and translation. Machine interpreting technology is emerging, for example, Youdao Simultaneous Interpreting,

which can meet the daily interpreting needs. The application of machine interpretation can save the expenses of hiring human interpreters and renting equipment, and reduce translation costs (Wang and Liu, 2021). In addition, text translation technology is also becoming more mature. For example, the content of documents can be quickly known by using translation software such as Youdao Translator. In addition to effectively reducing translation costs, these technologies have triggered new economic growth points. For example, the Youdao Translator software is equipped with paid human and AI translation options, which will attract stakeholders to purchase due to its convenient translation function.

The advantages of AI translation in promoting diplomacy, cross-cultural communication and cultural transmission among countries are also becoming more and more prominent. Different countries mostly communicate politically by conducting diplomacy. Translation, on the other hand, is considered to be an important means of spreading values, promoting inter-country communication, and enhancing national image (Wu and Jiang, 2021). Communication between countries and international organizations can be facilitated with the help of AI translation to improve translation efficiency and reduce translation errors.

AI translation also has a great deal to do in spreading world culture. For a long time, due to different languages, it is difficult to promote the excellent culture of each country and even each region. Different language speakers can quickly and effectively understand the content of the target language text by means of AI translation. With the help of AI translation, writers can also innovate the form of writing and try cross-language writing.

In the field of education, AI translation also plays an important role. The continuous development of AI translation has impacted the existing teaching mode and learning mode, and has promoted the updating of the teaching mode and learning methods while improving the interest of the classroom and students' interest in learning (Chen, 2017). In translation teaching, AI university English translation teaching based on cloud services and computer-assisted translation has led to changes in English teaching at the current stage of higher education (Zhang, 2019). Existing studies have

provided insights from the level of teaching concepts, teaching methods, etc., with the hope that AI translation can be deeply integrated with teaching in future teaching practice, and that brand-new projects, such as the construction of AI translation laboratories, are expected to appear and develop in translation teaching and practice.

4. Application and Evaluation of ChatGPT Translation in Shipbuilding Engineering English Text

Based on the above-mentioned development of AI and the features of shipbuilding engineering English text, we will introduce specific texts to compare the translation from ChatGPT and the published book, thus discussing the advantages and disadvantages of ChatGPT in translating shipbuilding engineering English text.

4.1 Translation Process of ChatGPT Translation

As examples, we have chosen specific chapters from the book “SEA LOADS ON SHHIPS AND OFFSHORE STRUCTURES”, along with its Chinese version, which was published by Shanghai Jiao Tong University Press. Since its publication, this version of the translation has been used as a teaching reference for undergraduate of ship and ocean engineering in higher education, and at the same time for scientific and technical personnel engaged in ship and ocean engineering research, design and operation, so it is safe to say, this book is authoritative enough as an amenity for analysis in this study.

We chose GPT 3.5 as the translation method to analyze the selected text from lexical, syntactic as well as discourse perspective. We input the selected English content into ChatGPT and provided it with translation instructions. To evaluate GPT’s understanding of English words, phrases, sentences, and paragraphs, as well as its ability to discern ambiguous sentences in Chinese, we compared the expression in the manually proofread Chinese edition of the book, which is publicly available, with the translation produced by ChatGPT from various viewpoints. We also explored ChatGPT’s ability to query for terminology. After an evaluation (Colina,2008; Castilho, et al, 2018), we concluded that using ChatGPT for translation work can help us complete translation tasks faster and more accurately, improving translation efficiency.

4.2 Advantages of ChatGPT Translation in Shipbuilding Engineering English Text

Considering the features of shipbuilding engineering text analyzed above, the advantages of ChatGPT in translating shipbuilding engineering English texts will be represented from three levels: terminologies, sentences and discourses.

4.2.1 Terminologies

Shipbuilding engineering English text often involves a large number of professional terms and vocabulary, making it necessary to perform multiple queries during the translation process to obtain the most accurate translation. Based on this difficulty, we referred to the "English-Chinese Noun, Technical Term Comparison" section at the end of the Chinese version of the book, and inputted the English terms from the comparison table into ChatGPT for querying.

The "English-Chinese Noun, Technical Term Comparison" glossary at the end of the Chinese book provides about 350 term translations. We input these 350 terms into ChatGPT in batches of about 30 each time and instruct ChatGPT to perform term translation queries. After comparing the term translations provided by ChatGPT with those given in the glossary, we found that without inputting a large amount of text for ChatGPT training, in the first batch of 30 terms, 12 of the translations given by ChatGPT were completely consistent with those in the glossary, with an accuracy of about 40%. As the number and content of inputs increased, the accuracy of the final group of term translations reached 84%. As is shown in figure 3, a steady growth of the accuracy can be found after inputting a large number of terms in this field.

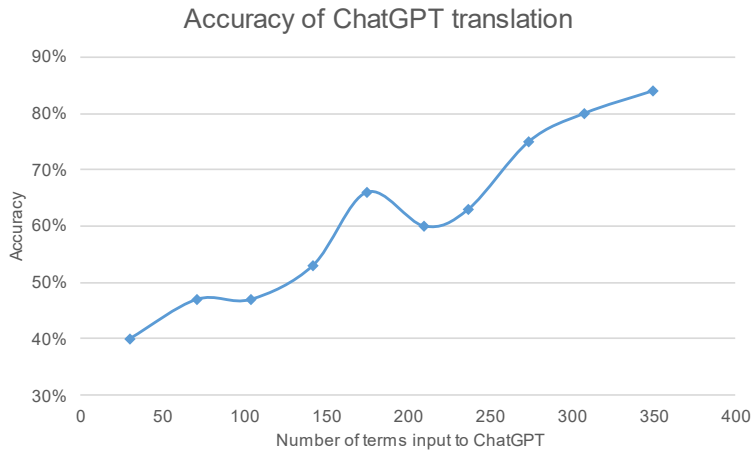

Figure 3 The accuracy of ChatGPT translation increased as the number of input

terms accumulated.

Subsequently, we selected some terms and inputted them one by one into GPT for queries. As can be seen in figure 4 and figure 5, here we take “barge, motions and loads”, and “springing” as examples. The corresponding translation given in the book for barge, motions, and loads is “驳船，运动和载荷” (p249), and for springing is “弹振” (p257). The explanations given by ChatGPT are as follows:

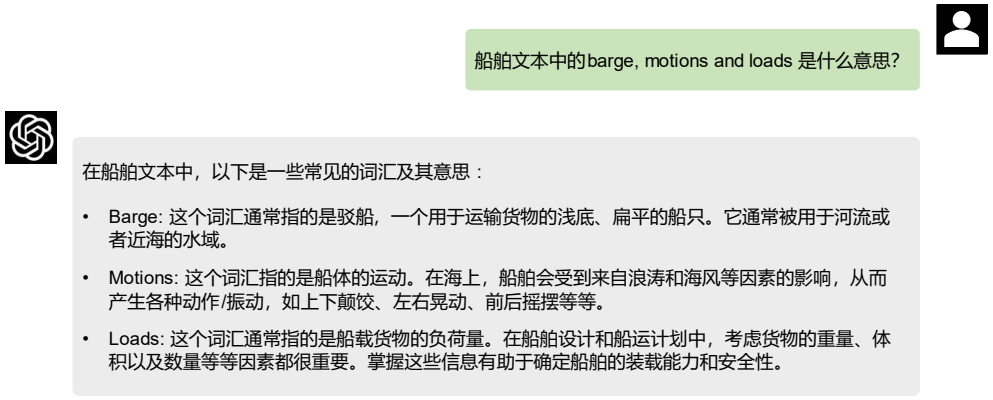

Figure 4. ChatGPT’s explanation for “barge, motions and loads”.

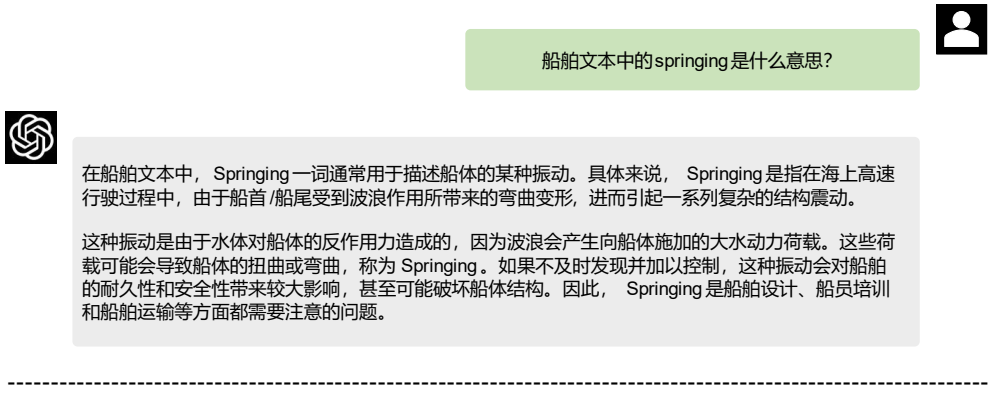

Figure 5. ChatGPT’s explanation for “springing”

After comparison, we can easily find that the translations and explanations given by ChatGPT are completely accurate, indicating that ChatGPT can help us understand the meanings of these terms very well. Therefore, when translating, ChatGPT can help us improve the efficiency and accuracy of translation after training by inputting more relevant contents.

4.2.2 Sentences

When it comes to sentence translation, ChatGPT’s advantages are also evident. In

shipbuilding engineering English text, there are many non-personal subject sentences, complex sentences, and long sentences. In the translation process, ChatGPT's strengths in analyzing syntactic structures and accurately grasping the relationships and connections between different sentence components can be well demonstrated. Therefore, ChatGPT is particularly suitable for translating shipbuilding engineering English text with their unique language features. For example,

Table 1. The comparison of ChatGPT translation and the translation in the book (Example 1)

Example 1	If the flow has not separated when wt=π/2+a i.e. When the force according to Morrison's equation (see equation (7.1)) is only due to drag forces, it is assumed that the flow separation has no impact on the drag forces
Translation 1a	如果当 wt=π/2+a 时流动仍未分离，即当 Morison 公式（见式（7.1））中物体所受的力只有阻力时，则假设流动分离对阻力没有影响。
Translation 1b	如果在 wt=π/2+a 时流动没有分离，即当根据莫里森方程（见方程（7.1））计算的力只由阻力产生时，则假定流动分离不会对阻力产生影响。

This sentence has over 40 words, and the main sentence is "it is stated that the flow separation has no influence on the drag forces", while "if" and "when" guide the adverbial clause respectively. After comparison, we can easily find that the translation by ChatGPT is almost identical to the version given in the book. This indicates that ChatGPT has strong ability and high efficiency in handling such sentences, and it has very obvious advantages compared with human translation.

Table 2. The comparison of ChatGPT translation and the translation in the book (Example 2)

Example 2	From an ideal point of view full-scale tests are desirable but expensive and difficult to perform under controlled conditions.
Translation 2a	从理想的观点来看，实尺试验是合意的，但是昂贵并难以在可控条件下操作。
Translation 2b	从理论上讲，全尺寸试验是理想的选择，但成本昂贵，且难以在受控条件下进行。

After inputting a large amount of shipbuilding engineering text into ChatGPT, its

translations for some expressions have become increasingly accurate. In addition, an important difference between English and Chinese is that English prefers passive voice while Chinese prefers active voice (Lian, 1993, P86-103). In the above example, we can see that translation 2a excerpted from the published book still uses the passive voice, while translation 2b by ChatGPT has converted the passive voice in the original sentence to active voice, which conforms to the expression habits in Chinese.

In example 2, we can find that unlike the translation given in the published book in Translation 1, ChatGPT used a series of short sentences to process this sentence. Compared with the translation given in the book, ChatGPT's translation is clearer, and "全尺寸试验是理想的选择" in Translation 2 is more consistent with Chinese expression habits than "从理想的观点来看，实尺试验是合意的" in Translation 1. Moreover, the expression "but expensive and difficult to operate under controlled conditions" is clearer than "but expensive and difficult to operate under controllable conditions," presenting two parallel conditions in a clearer way for readers.

4.2.3 Discourses

ChatGPT exhibits a strong contextual understanding ability in the process of translating scientific and technological texts. Unlike ordinary translation software such as Youdao Translation, Baidu Translation, etc., ChatGPT uses a large-scale language model based on sufficient training. GPT models are decoder-only models that use the same parameters to process the context and the source as a single input for generating the next output (Hendy, A. et al, 2023), which makes it possible for ChatGPT to "understand" the context and meaning of an entire paragraph or passage. This kind of understanding enables ChatGPT more accurately translate specific words and sentences in articles or paragraphs, as well as common technical terms. Trained with a deep learning algorithm, ChatGPT can constantly adjust itself and improve translation quality based on actual usage. This means that it can constantly learn and refine its models from unprecedented real data, improving its ability to process paragraphs and texts while translating more efficiently and even accurately. This understanding can also help ChatGPT translate specific vocabulary, sentences, and common scientific and technological terms in articles or paragraphs more accurately. Through deep-learning

algorithms for training, ChatGPT can continuously adjust and improve the translation quality according to actual use. This means that it can continuously learn and improve its model from unprecedented real data, while effectively enhancing its ability to process paragraphs and chapters, achieving more efficient and precise translation. For example;

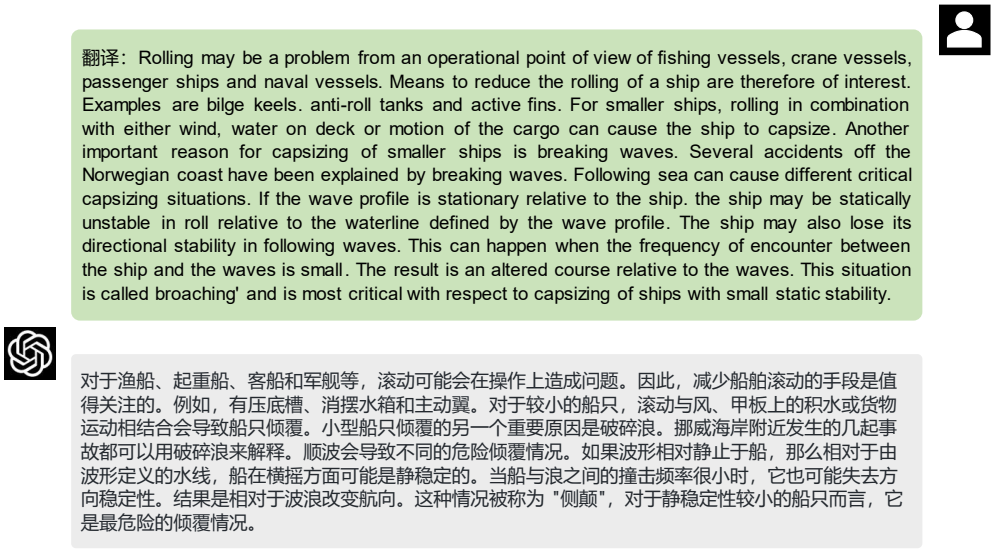

Figure 6. ChatGPT's translation of the paragraph.

In the figure 6 shown above, we chose a long paragraph as input for ChatGPT. We can see that there are no obvious connective words such as "therefore" or "for example" in the original text. Unlike traditional machine translation, which lacks context and logical connections (Xie, 2023), ChatGPT pays attention to inherent logical connections in the text when translating this passage. It organizes logical relationships in the original text, such as causal relationships, enumeration relationships, and conditional relationships, and appropriately supplements them during the translation process, such as using "因此" in the second sentence, indicating that ChatGPT has a significant advantage in organizing logical relationships.

4.3 Disadvantages of ChatGPT Translation in Shipbuilding Engineering English Text

ChatGPT requires continuous optimization based on a large amount of training data and specialized domain knowledge to meet the translation requirements of the specialized domain. Because language involves rich cultural backgrounds and factors, machine translation all needs to be flexible and adaptable with the characteristics of

the business domain to achieve better results. In the following content, we will analyze ChatGPT's disadvantages from the perspective of inaccurate meaning and inappropriate style.

4.3.1 Inaccurate Meaning

Despite the desirable accuracy of ChatGPT translation, it is not immune to translation errors. We have selected some examples to illustrate its inaccuracy in some translations.

Table 3 The comparison of ChatGPT translation and the translation in the book (Example 3)

Example 3	The ballast tanks are used to adjust the vessel's stability and draught.
Translation 3a	配载水舱被用于调整船舶的稳定性和吃水深度。
Translation 3b	压载水舱被用于调整船舶的稳定性和吃水深度。

In the above example, ChatGPT's translation of "ballast tanks" as "压载水舱" may not fully capture the depth and nuances of this term, as "ballast tanks" can refer to containers on a ship that are used to adjust stability and draft by adding or pumping out water. "压载水舱" usually only refers to specific types of "ballast tanks" such as "fuel oil ballast tanks" in oil tankers. In contrast, human translation correctly translates "ballast tanks" as "配载水舱" by emphasizing the term's actual role in a ship to adjust stability and draft, through a deep understanding of the context and background knowledge. Therefore, ChatGPT's translation in this example has limitations and needs to be combined with professional background and knowledge, as well as contextual information, to provide a more accurate translation of technical terminology. Human translation can consider more comprehensive information and provide more accurate and appropriate translations for ambiguous terms in language.

Table 4. The comparison of ChatGPT translation and the translation in the book (Example 4)

Example 4	In the deep water, both horizontal pipes and vertical brackets, if present, will be subjected to wave slamming load.

Translation 4a	在深水中，水平的管道和垂直的支架都可能受到海浪猛撞载荷的影响。
Translation 4b	在深水中，水平管道和垂直支架（如果存在）都可能受到海洋猛烈撞击的影响。

ChatGPT translated “slamming” as “violent collision” without the concept of “load”, which may lead readers to misunderstand the meaning of the sentence. In the field of ocean engineering, wave slamming is a very common type of load, which refers to the dynamic pressure of waves on structures, rather than just “collision” or “violent collision”. Therefore, when translating, “wave slamming load” should be treated as a whole to ensure the accuracy and professionalism of the translation.

This example illustrates a fundamental challenge of machine translation in professional fields, which is to obtain the correct terms and ensure accuracy and consistency. ChatGPT has strong ability to continuously learn and update, but it cannot understand the differences in meaning and context between different languages like human translation, and convert them into corresponding translations. In machine translation, in-depth understanding and training are required for each professional term to ensure accurate and error-free translation.

4.3.2 Inappropriate Style

As mentioned above, though the advantages of ChatGPT translation in discourse level is quite obvious, the disadvantages still exist. Another disadvantage is located at the style. The disadvantage of words can be replaced by translators in a rather efficient way, but that of style would cost lots of time. we provided some examples in the following part.

Table 5.The comparison of ChatGPT translation and the translation in the book (Example 5)

Example **5**	Panel methods are based on potential theory. It is assumed that oscillation amplitudes of the fluid and the body are small relative to cross-sectional dimensions of the body.
Translation 5a	面元法基于势流理论，并假设流体振荡和物体摇荡的幅度与物体的横截面尺寸相比为小量，且忽略流体分离的影响。
Translation 5b	面板方法基于势流理论，假定流体和物体的振动幅度相对于横截面尺寸较小，忽略流动分

	离的影响。

Table 6. The comparison of ChatGPT translation and the translation in the book (Example 6)

Example 6	Since the hydrodynamic forces due to potential flow effects become small other physical effects are important. In this case viscous effects matter.
Translation 6a	由于势流效应引起的水动力变小，其他的物理效应就显得重要。在这种情况下，黏性效应不可忽视。
Translation 6b	由于势流效应产生的水动力力变小了，其他物理效应就变得重要了。在这种情况下，粘性效应是有影响的。

According to Example 5, translation 5a and 5b give different expressions when translating the proportions. “小量” and “较小” can demonstrate the differences in style. Actually, “较小” is quite more common than another in the context of target language, which means that the word tends to be more oral. “小量” is the opposite, uncommon in the context, and the addition “量” was only used in EST texts. Besides, translation 5b also distinguishes “流体振荡” and “物体摇荡” from “流体和物体的振动” in translation 5a, which shows the specialized knowledge the machine translation cannot acquire. Besides, in Example 6, the whole sentence in translation 6b tends to be more moral than that in translation 6a, which can be shown through the oral words like “了” and “的”. The usages of oral words in translation 6b are more frequent in that in translation 6a. Therefore, the disadvantage in style by machine translation is very common because machine translation like ChatGPT is more likely to good at the translation of the informal texts and their target readers are ordinary people. Therefore, it is deficient in translating EST texts, let alone ship English texts where the terminology and the style cannot be translated accurately.

Despite ChatGPT’s high processing speed and cost-effectiveness, it has a long way to go to replace human translation services in marine engineering and other specialized fields. In the actual marine translation, ChatGPT needs to improve the translation quality and accuracy based on human assistance, using deep learning and

other technologies, combined with professional knowledge in the field of marine engineering.

5. Conclusion

In this study, we analyzed the performance of ChatGPT in translating shipbuilding engineering English text and found that utilizing this AI technology can significantly improve translation efficiency and accuracy. After training, ChatGPT effectively translates technical terms and vocabulary related to shipbuilding while also handling sentences and paragraphs with ease. However, it is important to note that limitations exist in ChatGPT's ability to accurately translate EST texts where terminology and style are challenging to convey. As such, the quality of translations may depend on text input size and language complexity.

While recognizing the advantages and disadvantages of AI translation, it is crucial to acknowledge the essential role that humans play in proofreading and post-editing processes, leveraging their strengths to enhance the accuracy of translations. Nonetheless, ChatGPT remains an excellent tool for improving the speed and consistency of translations for those requiring shipbuilding engineering English text translations. Researchers in the field can take advantage of ChatGPT’s effectiveness to conduct further studies.

However, this study still has some limitations. First, the availability of data is insufficient. Currently, we lack access to the latest version of ChatGPT, making our study of upgraded features insufficient due to insufficient data availability. Second, the selected text is not sufficient in quantity. We only selected one book in this field as the analysis material for the study, and the types of ship texts involved are rather homogeneous. Third, the training in ChatGPT is insufficient. Due to the time constraint, we were not able to input a very large amount of ship text content to ChatGPT for training. Therefore, there is still room for improvement in the accuracy of social workers in the translation process. In response to these limitations, further research and exploration should be conducted to provide research ideas and guidance for possible future related studies.

The findings of this research provide compelling evidence for the immense

potential of AI technology in the field of translation. By leveraging artificial intelligence, we can revolutionize the way translation tasks are approached and overcome challenges in a wide range of domains. Overall, this research showcases the vast possibilities that lie ahead in utilizing AI technology for translation and solving complex tasks across different domains. With continued advancements, AI has the potential to transform global communication, foster cross-cultural understanding, and drive innovation in an increasingly interconnected world.

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人工智能在船舶英语文本翻译中的应用分析——以 CHATGPT 为例

船舶英语翻译大多采用人工翻译或计算机辅助翻译（CAT）软件，但这种传统翻译方法存在诸如翻译效率低等弊端。人工智能作为一种新兴技术，弥补了传统翻译方法的缺陷。同时，作为一种生成式人工智能，ChatGPT 也展现出了强大的生命力。本研究通过对文本特点和人工智能发展的分析，重点探讨了人工智能在船舶英文文本翻译中的应用，并将 ChatGPT 的译文与上海交通大学出版社出版的中文版教材的译文进行了对比。我们的研究表明，在翻译科技英语（EST）文本时，ChatGPT 在几个关键领域表现出了熟练的能力，其中包括在经过训练后处理专业术语、保持句子结构的完整性以及保持论述的连贯性和逻辑性。不过，值得注意的是，ChatGPT 也存在一定的局限性。具体来说，它在准确呈现某些特定词汇和遵循某些语言的独特风格方面可能会面临挑战。通过对 ChatGPT 优缺点的细微理解，我们希望了解将人工智能应用于专业技术内容翻译，尤其是船舶领域的可能性和挑战。

关键词：*船舶英语；翻译；人工智能，ChatGPT*