TERMINOLOGICAL ACCURACY AND SEMANTIC EQUIVALENCE IN GENERATIVE ARTIFICIAL INTELLIGENCE TRANSLATIONS

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Abstract: This article examines terminological accuracy and semantic equivalence in translations produced by generative artificial intelligence. It discusses the capabilities of large language models and neural machine translation systems, alongside challenges involving polysemy, domain-specific terminology, idiomatic expressions, and culturally embedded meanings.

Keywords: generative artificial intelligence, machine translation, terminological accuracy, semantic equivalence, translation quality

Introduction

Globalization and the acceleration of digital communication are increasing the need for rapid translation of scientific, technical, legal, economic and cultural information created in different languages. Especially in the context of international scientific cooperation, e-learning, digital services and multilingual information exchange, along with the speed of translation, its semantic accuracy, terminological consistency and communicative expediency are of great importance.

In recent years, generative artificial intelligence and large language models have begun to be widely used in translation activities. These technologies allow for the reformulation of the grammatical structure of the text, stylistic adaptation, the creation of alternative expressions considering context, and the automation of certain technical tasks for the translator. However, a fluent and grammatically correct text does not always mean a translation that fully preserves the meaning of the original source. Especially in scientific and professional texts, the incorrect choice of a single term can change the content of the entire idea.

Terminological accuracy means the correct and stable expression of a specific concept in the translated text. Semantic equivalence indicates the extent to which the semantic relations, logical emphasis, important details, and communicative function of the source text are preserved in the translated text. Although these two concepts are closely related, they do not mean the same phenomenon: the term can be translated correctly, but the general meaning can be distorted as a result of the incorrect presentation of the negative form of the sentence, the cause-and-effect relationship or the modal meaning.

This issue is particularly relevant for the Uzbek language. The agglutinative nature of the language, the grammatical and semantic functions of suffixes, the connection of word order with context, and the lack of stable formation of terminological alternatives in some areas place additional tasks before automatic translation systems. In Khulkar Zakirova's research on the development and problems of machine translation in Uzbekistan, the lack of resources, syntactic complexity and morphological features are considered as important issues[1].

The relevance of this article lies in the fact that there is a need to evaluate generative artificial intelligence translation based on terminological, semantic, and pragmatic criteria rather than solely on the external fluency of the text.

Research methods. The article utilizes methods of scientific literature analysis, comparative-linguistic analysis, terminological analysis, semantic component analysis, classification, and generalization. The article is conceptual and methodological in nature. It does not claim that an independent experimental corpus test was conducted or statistical results were obtained.

Generative artificial intelligence is used in the translation process to analyze source text, select words and phrases appropriate to the context, and create a grammatical and stylistically structured text in the target language. In this case, large language models use statistical and contextual relationships between language units found in different texts.

While language rules and vocabulary units play a crucial role in traditional rule-based translation systems, neural machine translation relies on modeling the sequence and contextual connections of the text. Generative language models, in addition to performing the function of translation, also have the ability to interpret, reinterpret and stylistically adapt the text. At the same time, the mechanism of operation of these systems is not exactly the same as the process of understanding language by a human translator. The model may generate a variant that appears relevant to the context but is incorrect in content. This situation is especially likely to be observed in rare terms, new scientific concepts, polysemous words and complex syntactic constructions. Koehn's research on neural machine translation extensively covers the architecture of translation systems, the learning process, and quality assessment issues[2]. Based on this scientific direction, it can be said that it is not correct to limit the quality of translation only to the compatibility of individual words: semantic relations at the sentence and text levels should also be taken into account.

For example, the term machine learning in English can be given in Uzbek as "machine learning" or "machine learning." However, once a specific variant is selected in a scientific text, this concept should not be unjustifiably replaced by other expressions. At the same time, the form and content of the term should be verified by specialists in the relevant field and based on available scientific sources.

An important component of terminological accuracy is conceptual consistency. When translating the English term reinforcement learning, it is not enough to combine the lexical meanings of the words "learning" and "consolidation."

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The term refers to a method of acquiring knowledge based on relationships between the agent, environment, reward signal, and actions. Therefore, the translator must understand the scientific concept of the term and choose the appropriate expression in the Uzbek language. Semantic equivalence refers to the semantic correspondence between the source text and the translated text. This consistency is ensured not by replacing all words one by one, but by preserving the main meaning, logical relationships, and communicative purpose of the original text.

Although terminological precision and semantic equivalence must be evaluated separately, they are components of a unified qualitative system. Firstly, an incorrect choice of terminology can lead to a distortion of the content. Secondly, the correct choice of the term does not guarantee the correct translation of the entire sentence. Thirdly, the consistent use of the term improves the logical integrity of the text and its understanding by the reader.

Therefore, it is not enough to evaluate the quality of translation based only on general fluency or lexical compatibility of words. It is advisable to apply terminological, semantic, grammatical, and pragmatic criteria together.

The Uzbek language is an agglutinative language, where grammatical meanings are often expressed through morphemes added to words. Relationships with prepositions and auxiliary units in English can be expressed in Uzbek through case suffixes, possessive forms, prepositions, or sentence structure.

For example, translating the English phrase "data-driven approach" as "data-driven approach" may convey the content more accurately. Literal translation may contradict the rules of natural combination of the Uzbek language.

Also, if the suffixes in the Uzbek language are used incorrectly, the relationship of subject, object or belonging in the sentence can change. Therefore, it is necessary to check the translation not only from a lexical point of view, but also morphologically and syntactically.

During the translation process, the communicative function of certain phrases, proverbs, professional speech forms, and cultural units may be lost while maintaining their lexical meaning. In this case, it would be a mistake to equate semantic equivalence with literal correspondence. Generative AI can create an alternative that fits the context, but it is also possible to misinterpret the author's irony, social relations, or stylistic nuances. Therefore, it is necessary to analyze the pragmatic layer of translation in literary, legal, diplomatic and cultural texts separately.

The development of the Uzbek language in the digital environment, the improvement of automatic translation systems, and the standardization of terminology are increasingly being studied in domestic computational linguistics and translation studies.

Zakirova's study "Machine Translation in Uzbekistan: Problems, Achievements, and Future Directions" analyzes the development of neural machine translation for the Uzbek language, the sufficiency of language resources, and the influence of morphological features. This approach demonstrates the need for high-quality parallel corpora in the Uzbek language, consistent terminological databases, and evaluation criteria that correspond to linguistic characteristics to improve the quality of generative translation.

Sodatova and Abdualimova's article "Research on automatic translation in computer linguistics" summarizes the works of foreign and Uzbek researchers on automatic translation[3]. This study helps to understand the need to view the problems of automatic translation as an interconnected field of computational linguistics and linguistics, rather than limiting them to a single program or platform.

To improve the quality of generative artificial intelligence translations, it is recommended to organize the translation process in several interconnected stages.

In the glossary used in the translation process, the term in the source language, the recommended alternative, the short definition, the field, the contextual example and, if necessary, the alternative variants are recorded.

For example:

English term	Recommended Uzbek version	Aspect to be tested
Generative AI	Generative AI	Terminological consistency
Machine translation	Machine translation	Industry Compliance
Neural machine translation	Neural machine translation	Correct representation of the model type
Semantic equivalence	Semantic equivalence	Semantic compatibility
Terminology consistency	Terminological consistency	A stable translation of a single concept
Large language model	Large language model	Contextual alternative
Post-editing	Post-edit translation	Expressing the task clearly during the translation process
Contextual analysis	Contextual analysis	Consideration of context
Domain-specific term	Domain-specific term	Terminological correspondence
Translation quality assessment	Evaluate translation quality	Accuracy of evaluation criteria

The alternatives in the table are the ones recommended for use in this article. They should not be interpreted as mandatory or officially approved standards for all industries. Instead of giving artificial intelligence only a general task of "translating the text," it is advisable to clearly specify the field of translation, style, terminological requirements, and verification criteria.

The role of generative artificial intelligence in the translation process is related to accelerating certain stages of translation activity and organizing quality control in a new form rather than completely replacing a human translator. Another important task for the Uzbek language is the development of digital linguistic resources. Qualitative parallel corpora, industry-specific terminological databases, morphological analyzers, and standardized dictionaries help identify and reduce language-specific errors in translation systems. In future research, it is advisable to translate the

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same source text using several generative models, compare cases with and without a terminological glossary, obtain expert assessments, and compare automatic metrics with human assessments. Such experiments allow for the quantitative verification of the effectiveness of the proposed methodology.

Conclusion: Although generative artificial intelligence expands the possibilities of speed, text generation, and the proposal of contextual alternatives during the translation process, it does not fully guarantee terminological accuracy and semantic equivalence. Fluent translation is not always a meaningful translation. Therefore, in assessing the quality of translation, the correct choice of the term, its consistent use within a single text, and the preservation of facts and logical relationships in the original text are of particular importance. Thus, achieving high quality in generative artificial intelligence translations depends on a combination of technological capabilities, linguistic knowledge, terminological norms, and human expertise. The consistent development of scientific terminology in the Uzbek language, the creation of high-quality parallel corpora, and the verification of proposed methodological approaches through empirical research are important scientific tasks for the future.

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