

The Impact of Translation Quality on Semantic Accuracy in Literary Texts During Computational Processing

Original Study

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Abstract: The purpose of this study is to analyse the influence of translation quality on the accuracy of meaning transfer in literary texts processed through computational methods. A comparative analysis method is applied to translations generated by automated systems. The findings show that machine translation often fails to preserve *semantic accuracy*, especially with polysemous words or complex cultural contexts. Translation systems struggle with emotional nuance and stylistic features, leading to errors in contextual interpretation and meaning distortion. Neural network-based systems offer improvements but still cannot fully convey semantic content, particularly in texts with idiomatic expressions, metaphors, and abstract language. This study provides recommendations for improving machine translation, focusing on preserving semantic accuracy and cultural nuance in literary texts.

Keywords: machine translation, semantic accuracy, computational methods, contextual processing, computer-based text analysis

1. INTRODUCTION

In the contemporary digital age, computer-based text processing plays a substantial role, particularly in the field of literary analysis. Translation quality is a crucial factor in preserving the *semantic accuracy* and artistic expressiveness of a text. In this study, *semantic accuracy* is understood as the degree to which a translation faithfully preserves the meaning, nuances, stylistic intent, and *cultural references* of the original text, ensuring that both explicit content and implicit literary elements are conveyed without distortion. An inadequate translation may result in the loss of semantic nuances, *stylistic*

features, and cultural contexts, which can distort the perception of the original work (Kulbachaev 2022; Papa et al. 2025). Empirical research in translation studies has repeatedly demonstrated that machine translation systems frequently struggle to preserve *semantic accuracy* in literary texts, especially with regard to implicit meaning, stylistic nuance, and *cultural references* across structurally and culturally distinct language pairs, including English-Russian and English-Albanian (Tavares et al. 2023; Jooste et al. 2022). It is therefore essential to examine how translation quality influences the accuracy of meaning transmission in literary texts during computational

analysis. Several empirical studies indicate that semantic distortions are not marginal but systematic. For instance, evaluations of machine-translated literary excerpts reveal that a substantial proportion of translations contain meaning shifts or stylistic inaccuracies that affect interpretation, even when overall grammatical correctness is maintained (Lee 2023; Deng, Yu 2022). These findings support the claim that translation quality has a direct and measurable impact on meaning transmission in literary texts. Recent academic literature reflects growing interest in the impact of translation quality on the *semantic accuracy* of literary works in the context of computer processing. A growing body of research focuses specifically on major European language pairs, highlighting persistent challenges in preserving stylistic, emotional, and cultural dimensions of literary texts when translating between English and morphologically rich or culturally distant target languages. Analysis of recent studies indicates that this issue is multifaceted and encompasses various dimensions, such as the preservation of *stylistic features*, cultural contexts, and semantic subtleties of the original.

Some studies have also explored machine translation for less-resourced languages, showing the challenges of preserving semantic accuracy across diverse linguistic and cultural contexts (e.g., Musaev et al. 2024). The paper by Zhang et al. (2024) explored the influence of translation quality on the emotional perception of literary works. The author demonstrated that inaccuracies in translation can alter the emotional tone of a text, thereby affecting its reception. Tavares et al. (2023) focused on the issue of preserving an author's unique style in machine translation. Their study discovered that current translation systems often fail to adequately convey the distinctive stylistic voice of the author, which may compromise semantic precision.

The following studies address machine translation development for the Uzbek language primarily from a technological perspective, focusing on linguistic resources, corpus creation, and system architecture rather than literary translation quality across the language pairs examined in this research. Zokirova (2024) examined the challenges and achievements in the development of machine translation for the Uzbek language. The study highlighted difficulties such as the limited availability of parallel texts and the complexity of grammar, along with key achievements, including the development of the first machine translation models. The study also addressed prospects for this technology, particularly improvements in translation quality through the use of text corpora and integration with other technologies such as speech recognition and synthesis. Eisele et al. (2022) investigated the impact of syntactic structures on the quality of literary translation. They noted that complex syntactic constructions are frequently mistranslated, which leads to a loss of meaning. Juraev and Salaev (2022) analysed the state and prospects of machine translation development in Uzbekistan. They observed that, although computational linguistics in the country began developing only

in the past two decades, notable progress has already been achieved. Their study highlights research focused on linguistic support for English-to-Uzbek translation programmes and the foundations for developing context-aware machine translation systems.

The study by Deng and Yu (2022) examined the influence of multilingual translation models on the quality of literary translation. The authors concluded that such models can improve *semantic accuracy*, although further refinement is required. Allaberdiev et al. (2024) presented a corpus of parallel texts in Uzbek and Kazakh, created for machine translation purposes. These texts were compiled from open-access sources and manually translated, ensuring alignment accuracy. The corpus serves as a valuable resource for training and testing machine translation models and is accessible via the Hugging Face platform. Sharipov and Sobirov (2022) developed a lemmatisation algorithm for the Uzbek language, employing finite automata. The algorithm effectively processes morphological features of Uzbek words, particularly affixes, and demonstrates high lemmatisation accuracy, which enhances both machine translation and text processing.

Jooste et al. (2022) explored the challenge of rendering dialects and sociolects in translation. They found that modern translation systems often fail to accurately represent these linguistic features, which can affect the perception of characters and plot. In the study conducted by Lee (2023), the impact of translation post-editing on the *semantic accuracy* of literary texts was examined. The author demonstrated that post-editing of machine translations can improve quality, though it requires the involvement of specialists with a deep understanding of both source and target cultures.

Thus, the analysis of current research indicates that translation quality significantly affects the *semantic accuracy* of literary texts during computational processing. The primary challenges involve preserving stylistic and cultural features, conveying emotional tone, and maintaining the author's unique style. However, there remain gaps in the literature, such as insufficient attention to lexical aspects, specific language-pair characteristics relevant to English-Russian and English-Albanian translation, and the economic dimensions of post-editing, all of which require further investigation. Accordingly, the purpose of the study is to conduct an in-depth examination of the factors that ensure the semantic and stylistic integrity of literary works in translation, particularly in the context of computational processing, with empirical analysis focused on English-Russian and English-Albanian language pairs. Based on the purpose of the study, the following objectives are set: to examine the main issues related to the loss of *semantic accuracy* in the machine translation of literary texts, to evaluate the effectiveness of modern translation methods, particularly in preserving stylistic, cultural, and syntactic features of texts, and to identify approaches for improving translation quality to maintain artistic value and semantic precision.

2. MATERIALS AND METHODS

This study employs a comprehensive methodological approach, incorporating a review of literature, comparative translation analysis, and content analysis of machine-translated literary texts. Content analysis enabled the identification of how specific machine translation systems handle complex stylistic constructions, *metaphors*, and *cultural references*. Through this method, translations produced by each system were compared, typical errors and shortcomings were identified, and the impact of these errors on the overall *semantic accuracy* of the text was evaluated. Content analysis also provided a deeper understanding of how translated information conveys the cultural context, emotional tone, and style of the original.

The choice of methods was determined by the need to evaluate the influence of translation quality on *semantic accuracy*, which required a multi-layered examination of the issue. The initial stage involved a theoretical analysis of academic sources, enabling the identification of problematic aspects in the translation of literary works. This was followed by the selection of texts for analysis and their translation using three different machine translation systems. The next stage involved comparing the translated fragments with the original texts and identifying the key errors and shortcomings in each translation system. In the final stage, the results were synthesised, conclusions were drawn regarding the influence of translation quality on the *semantic accuracy* of literary texts, and future research areas were outlined, including the potential for enhancing translation algorithms through the integration of post-editing and the use of hybrid methods that combine automated and human elements in the translation process.

The analysis of literature enabled the systematisation of key approaches to evaluating machine translation quality and highlighted the major challenges encountered by researchers in this field. Studies by Yueh and Dongkwang (2020), Yang and Wang (2020) were examined, focusing on the analysis of *stylistic features*, the preservation of *cultural references*, and the impact of translation quality on the emotional perception of the text. These studies helped to define the main areas of inquiry and to establish criteria for evaluating *semantic accuracy*.

The selection of Russian and Albanian as target languages was motivated by both linguistic and methodological considerations. Russian represents a morphologically rich Slavic language with complex inflectional patterns and relatively extensive representation in machine translation training data, making it suitable for analysing how well current systems handle grammatical and stylistic complexity. Albanian, by contrast, is a less commonly studied Indo-European language with distinct syntactic and lexical features and more limited representation in large-scale parallel corpora. The inclusion of both languages enables a comparative examination of machine translation performance across language pairs with differing levels of resource availability, typological

distance from English, and degrees of technological support. This contrast allows for a more nuanced assessment of how translation quality and *semantic accuracy* are affected by language-specific characteristics.

It is important to note that the machine translation systems evaluated in this study are trained on large corpora that primarily reflect dominant cultural and linguistic norms. This can introduce bias in translation outputs, particularly affecting underrepresented languages, dialects, and culturally specific perspectives. For example, lexical and stylistic patterns common in widely spoken languages may be overrepresented, while minority language features may be underrepresented or inaccurately rendered. Recognising this limitation provides a theoretical context for understanding potential disparities in translation accuracy and highlights the need for future research to develop models that are more inclusive of diverse linguistic and cultural data.

A comparative analysis of translations was conducted by selecting literary works containing complex stylistic constructions, metaphorical expressions, and *culturally specific elements*, all of which present particular challenges for machine translation. The analysis included excerpts from Woolf's (1931) *The Waves* and Hesse's (1943) *The Glass Bead Game*. Both novels are characterised by experimental style, profound philosophical reflection, complex syntax, and multi-layered metaphorical language, which pose difficulties for automated translation systems. In addition to the aforementioned works, excerpts from Orwell's (1949) *1984* and Alighieri's (1989) *The Divine Comedy* were included. These texts were selected for their literary complexity, richness of meaning, and cultural specificity, all of which demand accurate translation to preserve the author's style and the original depth of content.

The translations of these excerpts were performed using three popular machine translation systems: Google Translate, DeepL, and OpenNMT. The selection of these systems was based on their popularity and the application of advanced technologies. Google Translate is widely used and processes large volumes of data, allowing for an evaluation of translation effectiveness across diverse contexts. DeepL is known for its ability to preserve contextual meaning and *stylistic features*, making it particularly suitable for literary translation. OpenNMT, as an open-source solution, offers flexibility in model configuration, enabling adaptation to specific tasks such as retaining cultural elements in translation. These systems were chosen to compare different approaches to machine translation and to evaluate their effectiveness within the context of literary texts.

This allowed for a comparison of the performance of statistical and neural translation algorithms and an examination of their capacity to preserve *semantic accuracy*. The evaluation is based on four main criteria: accuracy of content transmission, preservation of *stylistic devices*, contextual appropriateness, and correct rendering of *culturally specific elements*.

3. RESULTS

Machine translation remains one of the most pertinent issues in contemporary linguistics and computer science, as it plays a crucial role in the globalised world that demands fast and efficient translation across languages. Despite considerable advancements in the field, research indicates that maintaining *semantic accuracy*, particularly in the translation of literary texts, continues to pose challenges. Investigating the primary issues in machine translation requires attention to various aspects, including *stylistic features*, the preservation of *cultural references*, and the impact of translation quality on the emotional reception of a text.

A review of the academic literature, including the studies by Yuah and Dongkwang (2020), Y. Yang and Wang (2020), enables the systematisation of key approaches to evaluation of the quality of machine translation. These researchers emphasised the importance of accounting for cultural elements in translation, along with the stylistic and emotional nuances of a text, which present considerable difficulties for automated systems. The analysis demonstrated that the main challenges lie not only in the technical dimensions of translation algorithms but also in the complex task of accurately reproducing the stylistic and cultural characteristics of source texts.

This study demonstrates considerable variation in the quality of literary translation across different machine translation systems. The analysis of translated excerpts allows for an examination of content accuracy, the retention of “stylistic devices”, contextual relevance, and the correct rendering of *culturally specific elements*. The study discovered that content accuracy was relatively high across all three systems – Google Translate, DeepL, and OpenNMT. However, the quality of translation regarding complex *metaphors* and literary imagery varied. DeepL delivered the most accurate results, preserving the original meaning more consistently and minimising distortion of the author’s intent. Google Translate often relied on generalised constructions, resulting in partial loss of meaning, particularly in cases involving abstract concepts or polysemous terms. OpenNMT, despite employing neural networks, occasionally exhibited inaccuracies in conveying content nuances, which negatively affected semantic precision.

The preservation of *stylistic features* proved to be an even greater challenge for machine translation (Issakova et al. 2025). The literary works included in the corpus, particularly *The Waves* by V. Woolf and *The Glass Bead Game* by H. Hesse, are characterised by complex syntax and a high degree of metaphorical expression. None of the translation systems succeeded in fully maintaining the authors’ stylistic nuances, although DeepL produced relatively good results, demonstrating an enhanced ability to adapt syntactic constructions to the target language without significant loss of rhythm and intonation. Google Translate tended to simplify complex sentences and aimed to render a more natural-sounding output, which in many instances resulted in a loss of stylistic expressiveness. OpenNMT, in contrast, preserved complex

structures, but did so inconsistently, leading to occasional ambiguity in translation.

Contextual fidelity presented a distinct challenge. In works with a strong philosophical underpinning, such as *The Glass Bead Game* and *1984*, preserving authorial logic and coherence of expression was essential. In this respect, DeepL performed most effectively, as its algorithms demonstrated a stronger capacity to account for preceding sentences during the translation process. Google Translate, while producing relatively comprehensible text, frequently failed to maintain contextual coherence, particularly evident in longer paragraphs. OpenNMT, with its capacity for training on specialised corpora, yielded strong results in selected instances, although it did not achieve consistent contextual accuracy across all analysed excerpts.

The rendering of *culturally specific elements* proved the most problematic for all systems examined. Metaphorical expressions, idioms, and historical or *cultural references* were often distorted or lost in translation. This was particularly true in excerpts from Alighieri’s *Divine Comedy*, in which symbolic imagery and religious references are heavily context-dependent and rooted in historical tradition. The lowest degree of loss was observed in DeepL, which attempted to preserve meaning while maintaining a degree of equivalence, albeit without fully conveying cultural connotations. Google Translate frequently adapted the text to more generalised terminology, diminishing the cultural depth of the translation. OpenNMT, although offering a degree of flexibility, struggled with the interpretation of complex *metaphors* and culturally specific terms, leading to changes in semantic precision.

The study demonstrates that, despite advancements in neural networks, machine translation continues to exhibit limitations when applied to literary texts. The most accurate results in terms of content rendering and contextual preservation were achieved using DeepL, confirming the effectiveness of neural networks in the translation process. However, all systems under investigation demonstrated difficulties in conveying *stylistic features* and *cultural references*, indicating a pressing need for further refinement of machine translation algorithms.

For a more detailed analysis of the findings, examples of translated fragments from each selected literary work were examined. In V. Woolf’s *The Waves*, the author employs a unique literary style that blends poetic imagery, complex syntactic structures, and profound philosophical reflection. One such example is the following excerpt in Table 1.

All three systems largely convey the core meaning of the passage, although notable differences emerge in word choice and stylistic nuance. Google Translate offers a reasonably accurate rendering of the content, though it fails to preserve the subtle stylistic construction that is characteristic of V. Woolf. DeepL demonstrates the greatest accuracy in retaining the metaphor *a little piece*, more effectively conveying the original phrase’s essence. Google Translate employs a more generalised

Table 1: Comparison of machine translation outputs of V. Woolf's *The Waves*

System	Russian	Albanian	Original
Google Translate	“Я расскажу вам всё, что могу, о своей жизни. И когда я это говорю, я имею в виду лишь малую её часть. Ведь это всё, что мы можем дать. Малую часть. Тем, кто готов слушать”	“Do t'ju tregoj çfarë mund të bëj nga jeta ime. Dhe kur e them këtë, dua të them një copë të vogël të saj. Sepse kjo është e gjitha që mund të japim. Një copë të vogël. Për ata që duan të dëgjojnë”	“I will tell you what I can of my own life. And when I say that, I mean a little piece of it. For that is all we can give. A little piece. To those who care to listen”
DeepL	“Я расскажу вам все, что могу о своей жизни. И когда я говорю это, я имею в виду лишь небольшую ее часть. Потому что это все, что мы можем дать. Небольшую часть. Тем, кто хочет слушать”	“Unë do t'ju tregoj se çfarë mundem nga jeta ime. Dhe kur e them këtë, dua të them një pjesë të vogël të saj. Sepse kjo është gjithçka që mund të japim. Një copë e vogël. Atyre që kujdesen të dëgjojnë”	
OpenNMT	“Я расскажу вам, что могу о своей жизни. И когда я это говорю, я имею в виду лишь небольшую ее часть. Поскольку это все, что мы можем дать. Небольшую часть. Для тех, кто готов слушать”	“Unë do t'ju them se çfarë mundem për jetën time. Dhe kur e them këtë, dua të them një pjesë të vogël të saj. Sepse kjo është gjithçka që mund të japim. Një copë e vogël. Për ata që kujdesen të dëgjojnë”	

Source: compiled by authors.

Table 2: Comparison of translations of H. Hesse's *The Glass Bead Game*

System	Russian	Albanian	Original
Google Translate	“Игра была всем, и всё было игрой. Мир игры был не только отражением мира, но и его высшей формой”	“Loja ishte gjithçka, dhe gjithçka ishte loja. Bota e lojës nuk ishte vetëm një pasqyrim i botës, por edhe forma e saj më e lartë”	“The game was everything, and everything was the game. The world of the game was not only a reflection of the world but also its highest form”
DeepL	“Игра была всем, а все было игрой. Мир игры был не только отражением мира, но и его высшей формой”	“Loja ishte gjithçka, dhe gjithçka ishte loja. Bota e lojës nuk ishte vetëm një reflektim i botës, por edhe forma e saj më e lartë”	
OpenNMT	“Игра была всем, и все было игрой. Мир игры был не только отражением мира, но и его высшей формой”	“Loja ishte gjithçka, dhe gjithçka ishte loja. Bota e lojës nuk ishte vetëm një pasqyrim i botës, por edhe forma e saj më e lartë”	

Source: compiled by authors.

and stylistically simplified construction for a *little piece*, which appears less natural in contemporary Russian and Albanian literary usage. Given these observations, the comparison of translations produced by the three machine translation systems illustrates how each performs in terms of conveying the core content and preserving the *stylistic features* of the original text. Table 2 presents translations of an excerpt from H. Hesse's *The Glass Bead Game*.

In this instance, all translation systems convey the meaning and accuracy of the phrase equally well, which is crucial for preserving the philosophical intent of the work. However, even when the core meaning is retained, the stylistic expressiveness and depth of the phrase, achieved through the use of philosophical categories, remain somewhat limited across all three systems. G. Orwell's *1984* is a political novel replete with allegorical

imagery, *metaphors*, and *cultural references*. One such passage is presented in Table 3.

In this case, all three systems demonstrated a high level of accuracy in translation, which is particularly important, as this is one of the central passages of the novel that encapsulates the ideological foundations of G. Orwell's dystopian regime. Despite the accuracy, a certain depth of irony and brutality is lost, elements that are not easily conveyed through automatic translation, particularly when the broader narrative context is considered. In the context of translating classical literary works such as Alighieri's *Divine Comedy*, machine translation encounters challenges due to the complexity of the symbolism and the *cultural references*, which are difficult to render using automated systems. Table 4 presents a comparison of translations of this excerpt by three popular machine translation systems.

Table 3: Comparison of translations of a quotation from Orwell's 1984

System	Russian	Albanian	Original
Google Translate	"Война – это мир. Свобода – это рабство. Невежество – это сила"	"Lufta është paqe. Liria është skllavëri. Injoranca është forcë"	"War is peace. Freedom is slavery."
DeepL	"Война – это мир. Свобода – это рабство. Невежество – это сила"	"Lufta është paqe. Liria është skllavëri. Injoranca është forcë"	"Ignorance is strength"
OpenNMT	"Война – это мир. Свобода – это рабство. Невежество – это сила"	"Lufta është paqe. Liria është skllavëri. Injoranca është forcë"	

Source. compiled by authors.

Table 4: Comparison of translations of an excerpt from Alighieri's Divine Comedy

System	Russian	Albanian	Original
Google Translate	"На полпути нашего жизненного пути я оказался в темном лесу, ибо прямой путь был потерян"	"Në gjysmë të udhëtimit të jetës sonë, e gjeta veten brenda një pylli të errët, sepse shtegu i drejtë ishte humbur"	"Midway upon the journey of our life, I found myself within a forest dark, for the straightforward path had been lost"
DeepL	"На полпути нашей жизни я оказался в темном лесу, ибо прямой путь был утрачен"	"Në mes të rrugës së udhëtimit të jetës sonë, u gjenda brenda një pylli të errët, sepse rruga e drejtpërdrejtë kishte humbur"	
OpenNMT	"В середине путешествия нашей жизни я попал в темный лес, потому что прямой путь был утрачен"	"Në mes të rrugës së jetës sonë, e gjeta veten në një errësirë pylli, sepse rruga e drejtpërdrejtë kishte humbur"	

Source. compiled by authors.

This work by D. Alighieri, written in the thirteenth century, contains rich symbolism and *historical-cultural references* that are difficult to convey through machine translation. Although all three systems successfully communicate the core meaning of this famous passage, they do not accurately capture the spirit of the original. In Greek or Latin traditions, the term *journey* often carries a deeper meaning than a simple voyage, reflecting a profound existential search. This nuance is not fully conveyed by conventional translations, which exemplifies a recurring limitation in the machine translation of classical works.

A comparison of translations across different systems demonstrates that none of the machine translation tools is capable of fully conveying the stylistic expressiveness and cultural depth of literary texts. In cases involving complex philosophical or poetic works, machine translation can achieve only a basic level of accuracy, without capturing the subtleties that a human translator can provide. The most effective approach in such cases is the use of a hybrid model, where machine translation serves as a tool for initial rendering, and post-editing is employed to correct deficiencies, thereby preserving the author's intent and the stylistic integrity of the text. In line with the stated objectives, the findings of this study indicate a number of important conclusions regarding the challenges of machine translation of literary works, the effectiveness of current translation systems, and the potential strategies for improving their quality.

One of the central challenges in examining the loss of *semantic accuracy* in machine translation of literary

works lies in adequately conveying lexical ambiguity and preserving the *stylistic features* specific to an author's writing style. *metaphors*, *allegories*, and *artistic imagery*, which form part of an author's unique voice, are frequently misrepresented or omitted entirely in machine translation (Lytvyn et al. 2018; Dagnev 2023). Another issue concerns the incorrect interpretation of context, which can lead to distortion of meaning or complete loss of key phrases. This study analysed specific examples illustrating how machine translation failed to retain the subtle semantic nuances of the original text. For instance, in the translated excerpts from V. Woolf's *The Waves*, machine systems struggled to convey the imagery and rhythmic structure that characterise the work. Technical limitations and algorithmic shortcomings prevent these systems from achieving the desired level of semantic precision, which constitutes a serious flaw in the literary translation process.

The evaluation of outputs produced by systems such as Google Translate, DeepL, and OpenNMT enables an assessment of the capacity of each tool to preserve *semantic accuracy*, stylistic integrity, cultural specificity, and syntactic features of the source texts. DeepL delivered the most consistent results, benefiting from deep learning based on neural networks. It showed greater success in retaining context and conveyed more stylistic nuance than the other systems. Nonetheless, even DeepL struggled to accurately render *cultural references* and symbolic imagery, which are essential components in literary translation. Google Translate, while generally providing reasonably accurate results, demonstrated

clear limitations in the treatment of *complex metaphors* and *polysemous expressions*. OpenNMT consistently achieved high levels of syntactic accuracy, though it delivered less distinctive stylistic rendering and was less effective in conveying cultural undertones, which are vital for literary texts. These findings indicate that none of the evaluated systems fully meets the demands of preserving all levels of translational fidelity, particularly in relation to artistic and cultural elements.

Based on the results obtained, one of the most promising areas for improving machine translation lies in the integration of human post-editing and the use of hybrid models that combine automated and human efforts. Machines can be employed for the initial translation, after which human post-editing enables the restoration of lost semantic and stylistic nuances. This approach preserves content accuracy and conveys specific *cultural references* while maintaining the artistic value of the original text. In order to address the challenge of preserving *metaphors*, *allegories*, and other *stylistic constructions*, it is essential for the system to be configured for contextual understanding and to accommodate the diversity of stylistic approaches characteristic of literary works from different historical periods.

The application of machine translation in literary contexts requires ongoing refinement of algorithms and technologies (de Moraes, Fittipaldi 2024). Methods such as deep learning and artificial intelligence offer potential for advancement in this area, though it remains necessary to account for the unique features of literary texts, which often possess layered structures and deep cultural and emotional resonance. One possible path for improvement involves developing models that specialise in specific genres or literary styles, thereby enhancing translational accuracy for particular types of works.

Although modern machine translation systems demonstrate considerable success in rendering technical texts and achieve acceptable accuracy with simple constructions, they continue to face limitations in the literary domain. Machine translation cannot fully replace human translators, especially in cases involving complex literary works that include *polysemous expressions*, *metaphors*, and *culturally specific elements* (Dagnev, Chervenкова 2024; Papa 2025). However, with the advancement of hybrid approaches that combine artificial intelligence and human input, improvements in machine translation performance in this field can be reasonably expected.

Google Translate, while a widely accessible tool employing statistical methods, displayed considerable difficulties in handling *complex metaphors* and *culturally embedded content*. For instance, in the translated excerpt from V. Woolf's *The Waves*, the system failed to reproduce the rhythm and imagery intrinsic to the author's style. The metaphor *the shifting waves of time* was rendered literally, losing its deeper meaning and lyrical tone, both of which are essential to the narrative. Furthermore, the stylistic expressiveness that reflects V. Woolf's inner monologue technique and stream of consciousness was not preserved.

DeepL, employing more advanced neural networks, demonstrated superior performance in preserving *semantic accuracy*, particularly in syntactic constructions. However, the system was still unable to fully convey the cultural nuances that are an intrinsic part of literature subject to translation. In the case of the excerpt from H. Hesse's *The Glass Bead Game*, the system, although grammatically accurate in translating terms and phrases, failed to capture the philosophical concepts that H. Hesse skilfully integrates with cultural contexts. The high level of syntactic accuracy and contextual rendering did, nonetheless, help to avoid major errors in sentence structure, which constitutes a significant advantage for readers unfamiliar with the original.

OpenNMT, by contrast, produced solid results in translating simpler constructions and technical texts. However, when applied to literary works, the system frequently fell short in rendering complex stylistic choices. In particular, when translating emotionally charged passages from G. Orwell's *1984*, OpenNMT struggled to retain the stylistic emphasis characteristic of G. Orwell's clear and direct prose. As a result, certain key emotional and political undertones were diminished, which affected the overall perception of the text.

The analysis indicates that, while contemporary machine translation systems may be effective in translating technical texts or simplified literary styles, they exhibit considerable limitations in conveying deep and complex emotional, cultural, and philosophical contexts. This is especially apparent in the translation of metaphorical, allegorical expressions and *culturally specific elements* that are characteristic of many classical literary works. Moreover, based on the results obtained, none of the existing systems is capable of fully replacing the translator when it comes to preserving the full range of literary nuance. Translation, particularly in the literary domain, is not merely a mechanical transformation of text, but a process of conveying multifaceted emotional and cultural experience, which remains, for now, beyond the capacity of artificial intelligence (Tukhtarova et al. 2021; Siyidalieva et al. 2024).

Improving the quality of machine translation is achievable only through the integration of the human element into the translation process, which can compensate for the absence of cultural and emotional knowledge within automated systems. Hybrid methods that combine the capabilities of machine translation with post-editing by experienced translators represent a promising direction for enhancing the translation of literary texts. This approach not only preserves *semantic accuracy* but also conveys the artistic and emotional depth of the original work. It is essential to recognise that, although machine translation holds considerable potential for conveying the basic content of texts, its application within literary contexts requires a more profound understanding of the subtleties that constitute literary value.

In literature, every expression, word, and phrase carries a rich emotional, sociocultural, and historical context that cannot be conveyed through linear machine

translation algorithms alone (Hoff, Barboza 2025; Doszhan 2023). The language barrier becomes even more complex when a text includes specific *metaphors*, historical allusions, or *culturally embedded references*. An example of such complexity is found in Alighieri's *Divine Comedy*, in which the author employs intricate metaphorical structures and draws upon medieval Christian symbolism and the Italian realities of his time. These elements are difficult to convey accurately without a deep understanding of the cultural context and historical references. Machine translation is incapable of rendering these meanings correctly without post-editing, which requires the expertise of translators familiar with the cultural and national identities embedded within the text.

One potential pathway for the development of machine translation in the literary domain involves the implementation of contextual analysis methods. Contemporary neural networks must be trained to comprehend not only individual words or phrases but also their meanings within the broader context of the work. This advancement would enable translation systems to preserve the internal logic of a text, recognise narrative progression, and, crucially, avoid so-called *translation errors* caused by the automatic distortion of meaning.

Another important aspect involves the development of specialised translation models for literary works. Although there exists a considerable number of contemporary universal translation systems capable of processing various text types, tools specifically tailored to preserve *stylistic features* and emotional nuances are required for the translation of literary fiction. Such an approach contributes to reducing losses in the reproduction of imagery and emotional depth of the original.

Considerable progress has been made in the advancement of neural networks and machine translation algorithms, and it is anticipated that these technologies will continue to improve in the future. For instance, combining statistical methods with neural networks enables the maintenance of content accuracy, enhances adaptation to specialised lexical units, and improves the syntactic structure of the text. Despite these achievements, machine translation, as demonstrated by this study, remains only a partial solution, since it does not account for the multifaceted aspects of literary translation. The approach to post-editing proves to be particularly critical for achieving high-quality translations. The analysis indicates that employing automatic translation alongside post-editing by experienced translators can considerably enhance translation quality, as it allows correction of inaccuracies, preservation of literary style, and retention of cultural contexts. The hybrid method, which integrates automatic translation with human involvement, appears to be the most promising direction for attaining the best results in the translation of literary texts.

While machine translation already serves as a valuable tool in many fields, it exhibits limitations when addressing literary works that demand the preservation of emotional and stylistic depth. Further refinement of translation algorithms, coupled with the integration of

human post-editing, constitute essential steps towards ensuring high *semantic accuracy* and maintaining the artistic value of translations.

4. DISCUSSION

Key studies in this field highlight the importance of preserving the cultural, stylistic, and syntactic features of texts and evaluate the effectiveness of various machine translation methods, particularly neural networks. One considerable study is that of Yuah and Dongkwang (2020), which examined the impact of machine translation on the retention of *stylistic features* and cultural contexts in literary texts. They concluded that, although contemporary machine translation systems, including neural networks, can achieve high levels of accuracy in conveying content, they often fail to accurately preserve *culturally specific elements* and stylistic nuances. This aligns with the findings of the present study, which also identified challenges in translating *culturally specific elements*, particularly in the works of V. Woolf and H. Hesse. In the study by Beiler and Dewilde (2020), the authors analysed the issue of conveying *metaphors* in machine translation. The study discovered that many translation systems are unable to adequately render metaphorical expressions, which affects *semantic accuracy*.

The study by Tan et al. (2020) explored the impact of machine translation on the preservation of stylistic elements in literary texts. The authors concluded that contemporary algorithms often disregard *stylistic features*, resulting in a loss of artistic value. Cohen et al. (2022) investigated the issue of translating cultural realities in literary texts. They uncovered that, without appropriate adaptation of *culturally specific elements*, the reader's perception of the work can be distorted. The paper by Tiedemann and Scherrer (2017) evaluated the effectiveness of neural networks in translating literary works. The authors noted that neural networks considerably improved lexical accuracy, although issues remain in translating complex metaphorical constructions and profound philosophical concepts. This study corresponds with the present findings, as it also identified that preserving metaphorical expressions in texts such as *The Glass Bead Game* and *1984* remains a substantial challenge for machine translation. In this study, particular difficulties were identified in preserving the emotional depth of the text when translating excerpts from V. Woolf's *The Waves*, further confirming the importance of emotional accuracy in translation.

El Khattabi and Ouargani (2025) focused on the development of algorithms capable of generating text while preserving *semantic accuracy* and *stylistic features*, even when limited training data are available. The findings indicated that transformer-based models, such as BERT and GPT, demonstrated substantial improvements in text generation compared with conventional methods, offering greater precision and contextual adaptation in translation and generation tasks. These findings suggest that large language models (LLMs), owing to their ability to model long-range dependencies and contextual

coherence, may partially overcome limitations observed in traditional neural machine translation systems. In particular, LLMs exhibit improved handling of implicit meaning, discourse-level coherence, and stylistic variation, which are critical for literary translation.

In comparison with the present study, El Khattabi and Ouargani highlighted similar challenges. The researchers also emphasised the necessity of improving algorithms through contextual learning. However, unlike this study, the primary focus in the study by El Khattabi and Ouargani was on the technical development of models designed to operate on large corpora without distorting cultural and stylistic elements. Attention should also be given to a comparative study of different translation systems, including Google Translate, DeepL, and OpenNMT, conducted by Kelly and Hou (2022). The authors discovered that although neural network-based systems such as DeepL show substantial advantages in translation accuracy, they remain unable to convey subtle linguistic nuances and preserve the author's style. This confirms the observations made in the present study, which noted that none of the three evaluated systems succeeded in fully maintaining the stylistic and *semantic accuracy* of literary translations.

The study by Guerberof-Arenas and Toral (2020) analysed how contemporary machine translation systems, including neural networks, retain stylistic and cultural elements in literary texts. They observed that machine translation can achieve high levels of lexical accuracy but often fails to convey cultural realities and stylistic nuances, which are essential for literary translation. The findings of that study align with the conclusion reached, namely that conveying cultural elements remains a major challenge for machine translation of literary works. Rikters (2019) analysed the advantages of hybrid approaches that combine machine translation with human post-editing. They concluded that hybrid methods lead to higher translation quality, as human post-editing can correct errors that automated systems are unable to resolve. These findings support the conclusions of the present study, which also emphasises the importance of post-editing in achieving *semantic accuracy*.

Sebo and de Lucia (2024) compared machine translation systems, namely Google Translate, DeepL, and OpenNMT, in the context of literary translation. The findings indicated that, although neural network-based systems such as DeepL demonstrate notable advantages in translation accuracy, they still encounter limitations when translating literary texts, particularly in conveying subtle linguistic nuances. This aligns with the findings of the current study, which indicate that none of the three evaluated systems consistently maintains stylistic accuracy in all instances. Huangfu and Zhao (2014) explored the theoretical foundations of machine translation using parallel corpora to improve translation accuracy between Uzbek and English. The authors highlighted the importance of large data corpora in preserving *semantic accuracy* and *stylistic features*. In comparison with the

present study, the paper by Huangfu and Zhao focused on the technical aspects of machine translation, particularly the corpus-based approach to improving translation accuracy between two languages.

The study conducted by Mukhamadiyev et al. (2023) examined the use of the BERT model for unsupervised text classification, employing hierarchical clustering to automatically classify dissertation manuscripts. The results demonstrated that BERT improves classification accuracy in such tasks, enabling efficient automatic grouping of texts based on content. Compared with the findings of the current study, Mukhamadiyev et al.'s study concentrated on text classification and the application of machine learning for structured text processing, aiming to enhance models for text analysis and classification.

In the study by Hirschberg and Manning (2015), the authors explored recent advances in natural language processing, including the latest methods for automatic text analysis, entity extraction, semantic relationship identification, and translation. Their findings showed that the development of new algorithms significantly improves the effectiveness and accuracy of natural language processing systems. Cai and Lapata (2019) proposed a novel approach to semantic role labelling without relying on conventional parsing methods. They employed techniques that ensure accurate identification of semantic roles in text based on contextual understanding. This improved the precision of interpreting word and phrase meanings in complex contexts. The study was technically focused, particularly on the accurate detection of semantic roles in sentences.

This study confirms that contemporary machine translation systems, including Google Translate, DeepL, and OpenNMT, have made substantial progress in preserving the general meaning of literary texts. However, substantial losses still occur in the transmission of *stylistic features*, *culturally specific elements*, and syntactic structure. The analysis of translated texts demonstrated that neural networks are more effective in conveying context and syntax, yet complex *metaphors*, symbolism, and "stylistic devices" remain challenging for automated systems. Despite overall improvements in translation quality, none of the systems examined fully retained the artistic integrity of the texts, highlighting the need for the integration of post-editing and hybrid translation methods.

Thus, the studies reviewed indicate that the primary challenges in machine translation of literary works stem from the inadequate reproduction of cultural, emotional, and stylistic aspects of the text. The findings of this study align with those of the cited researchers, who also highlight issues with translating *metaphors*, emotional depth, and *culturally specific elements*. In response to these challenges, many researchers advocate for the integration of hybrid approaches that combine machine translation with human post-editing. According to the conclusions of this study, such methods represent the most effective solution for improving the quality of literary translation.

5. CONCLUSIONS

The study demonstrated that the three analysed machine translation systems – Google Translate, DeepL, and OpenNMT – have substantial limitations in preserving *semantic accuracy* in literary texts, despite advancements in neural networks and statistical methods, has substantial limitations in preserving *semantic accuracy* in literary texts. These limitations primarily concern the accurate rendering of stylistic, cultural, and emotional aspects of the source material, which are particularly important for maintaining the author's original intent. The comparative analysis of three machine translation systems – Google Translate, DeepL and OpenNMT – demonstrated that each possesses distinct strengths and weaknesses. However, none were able to fully reproduce the depth of the original text, especially in the case of *metaphors* and *culturally specific elements*. Machine translation proved more effective in texts with linear, less complex constructions, yet considerable challenges emerged when translating intricate syntactic structures and ambiguous metaphorical expressions. DeepL produced the most accurate results among the three systems, though it still fell short in conveying the full semantic fidelity of complex literary texts. This highlights that, despite the rapid development of artificial intelligence and neural network technologies, machine translation remains a tool with limited capabilities in the realm of literary translation. The analysis also indicated that all three systems performed more successfully when translating informative texts, where the context was clearer and the semantic load less variable.

Special attention should be paid to the impact of contextual recognition on translation quality. For example, OpenNMT, as an open-source system, demonstrates potential when configured for a specific language pair, but its effectiveness largely depends on the quality of the learning package. Google Translate, in turn, although it provides speed and general clarity, often simplifies complex language constructions, which leads to a loss of stylistic expressiveness.

Thus, the findings of the study confirm that none of the analysed systems can function as a self-sufficient tool for the translation of literary texts without the involvement of a professional translator. Additionally, one limitation of this study is the absence of back-translation, which could have provided an extra check on the reliability of machine translations. The results indicate that more effective literary translation outcomes require the implementation of hybrid approaches that combine machine translation with human post-editing. This integration would address the most substantial issues related to translation accuracy, particularly in the context of complex cultural and stylistic nuances. The study also highlighted the importance of developing specialised algorithms tailored to literary translation, which would account for the subtleties of language and culture. Future research should focus on the design and refinement of hybrid translation systems that integrate

automated translation with post-editing, alongside the exploration of the impact of emerging technologies, such as artificial intelligence and unsupervised learning, on the *semantic accuracy* of literary translations. Further investigations may concentrate on the advancement of deep learning algorithms that accommodate the *stylistic features* of literary genres and the development of effective post-editing methodologies that integrate automated and human input.

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