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QUALITY ANALYSIS OF ENGLISH–UZBEK TRANSLATIONS IN MACHINE TRANSLATION SYSTEMS: A LINGUISTIC ASSESSMENT OF AI-BASED TRANSLATION PROCESSES

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Abstract: This article examines the quality of English-to-Uzbek translations in artificial intelligence-based machine translation systems — specifically Google Translate, ChatGPT, and other modern neural translation models. The study evaluates translation quality using linguistic criteria, including lexical equivalence, grammatical correctness, syntactic consistency, contextual adequacy, stylistic appropriateness, and pragmatic relevance, across multiple text types (scientific, literary, official documents, and everyday speech). The results identify the most frequent errors in machine translation: incorrect rendering of polysemantic units, grammatical mismatches between nouns and verbs, disrupted consistency in complex sentences, literal translation of idioms, and loss of stylistic features. The article also highlights AI models' advantages in context analysis and the positive trends of neural translation systems in adapting to the agglutinative features of the Uzbek language. Finally, the study proposes linguistic and technological recommendations to improve the efficiency of machine translation systems.

Keywords: machine translation, artificial intelligence, neural translation systems, English–Uzbek translation, linguistic analysis, translation quality, equivalence, contextual adequacy, lexical-semantic errors, ChatGPT translation, Google Translate evaluation.

MASHINA TARJIMASI TIZIMLARIDA INGLIZ–O‘ZBEK TARJIMALARINING SIFAT TAHLILI: SUN’IY INTELLEKT ASOSIDAGI TARJIMA JARAYONINING LINGVISTIK BAHOSI

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Annotatsiya: Mazkur maqolada sun’iy intellektga asoslangan mashina tarjimasi tizimlarida — xususan, Google Translate, ChatGPT va boshqa zamonaviy neyron tarjima modellarida — ingliz tilidan o‘zbek tiliga amalga oshirilayotgan tarjimalarning sifat tahlili keltiriladi. Tadqiqotda tarjima sifatining lingvistik mezonlari (leksik ekvivalentlik, grammatik moslik, sintaktik izchillik, kontekstga moslik, uslubiy adekvatlik, pragmatik moslik) asosida bir nechta matn toifalari (ilmiy, badiiy, rasmiy ish yuritish, kundalik nutq matnlari) bo‘yicha solishtirma tahlil o‘tkazilgan. Olingan natijalar mashina tarjimasi tizimlarida eng ko‘p uchraydigan xatolarni — polisemantik birliklarning noto‘g‘ri tarjimasi, ot–fe'l moslashuvlaridagi grammatik xatoliklar, murakkab qo‘shma gaplarda izchillikning buzilishi, frazeologizmlarning so‘zma-so‘z tarjima qilinishi, nutq uslubining yo‘qolishi — aniq ko‘rsatib beradi. Shuningdek, maqolada sun’iy intellekt modellarining kontekstni tahlil qilishdagi ustunliklari, neyron tarjima tizimlarining o‘zbek tilining agglutinativ xususiyatlariga moslashishidagi ijobiy tendensiyalar ham yoritilgan. Tadqiqot yakunida mashina tarjimasi tizimlarining samaradorligini oshirishga doir lingvistik va texnologik takliflar ilgari suriladi.

Kalit so‘zlar: mashina tarjimasi, sun’iy intellekt, neyron tarjima tizimlari, ingliz–o‘zbek tarjimasi, lingvistik tahlil, tarjima sifati, ekvivalentlik, kontekstual moslik, leksik-semantik xatolar, ChatGPT tarjimasi, Google Translate tahlili.

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АНАЛИЗ КАЧЕСТВА АНГЛИЙСКО–УЗБЕКСКИХ ПЕРЕВОДОВ В СИСТЕМАХ МАШИННОГО ПЕРЕВОДА: ЛИНГВИСТИЧЕСКАЯ ОЦЕНКА ПРОЦЕССА ПЕРЕВОДА НА ОСНОВЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Наркабилова Райхоной Алишеровна

Аннотация: В данной статье рассматривается качество переводов с английского на узбекский язык в системах машинного перевода, основанных на искусственном интеллекте — в частности, Google Translate, ChatGPT и других современных нейронных переводческих моделях. Исследование проводится на основе лингвистических критериев качества перевода (лексическая эквивалентность, грамматическая правильность, синтаксическая согласованность, соответствие контексту, стилистическая адекватность, прагматическая уместность) и охватывает несколько типов текстов (научные, художественные, официальные документы, повседневная речь). Полученные результаты выявляют наиболее распространённые ошибки машинного перевода: неправильный перевод полисемантических единиц, грамматические ошибки в согласовании существительных и глаголов, нарушение последовательности в сложных предложениях, буквальный перевод фразеологизмов, потеря стилистики. Также статья освещает преимущества ИИ-моделей в анализе контекста и положительные тенденции нейронных систем перевода при адаптации к агглютинативной структуре узбекского языка. В заключении предлагаются лингвистические и технологические рекомендации по повышению эффективности систем машинного перевода.

Ключевые слова: машинный перевод, искусственный интеллект, нейронные переводческие системы, английско–узбекский перевод, лингвистический анализ, качество перевода, эквивалентность, контекстуальное соответствие, лексико-семантические ошибки, перевод ChatGPT, анализ Google Translate.

INTRODUCTION

In recent years, machine translation systems based on artificial intelligence (AI) and neural networks have led to significant advancements in linguistics and language technologies. The widespread use of advanced neural translation models such as Google Translate, ChatGPT, and others has simplified and accelerated the translation process, while simultaneously introducing new requirements for evaluating translation quality. Translating from English into Uzbek is particularly challenging due to Uzbek's agglutinative morphology and flexible syntactic structure. Therefore, the effectiveness of machine translation systems should be assessed not only in terms of speed and lexical correspondence, but also from linguistic, semantic, and pragmatic perspectives.

Targeted linguistic studies indicate that automated translation systems face limitations in fully conveying complex syntactic structures, phraseological units, and contextual meanings of texts. At the same time, the ability of neural translation models to analyze context and optimize lexical choices helps produce translations that are more comprehensible and closer to natural speech. Key criteria in evaluating translation quality include lexical equivalence, grammatical accuracy, syntactic coherence, contextual adequacy, stylistic relevance, and pragmatic correctness.

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Current scientific research on English–Uzbek translation evaluation mainly focuses on the following issues: the adaptation of neural networks to agglutinative languages, accurate rendering of phraseological and idiomatic expressions, and translation quality across various text genres (scientific, literary, official documentation, everyday communication). Studies show that the most common errors in machine translation systems involve mistranslation of polysemantic words, difficulties in syntactic adaptation, and literal translation of idioms. Therefore, integrating linguistic approaches with the capabilities of artificial intelligence is crucial for a more comprehensive evaluation of translation quality.

This article examines these issues from a scientific perspective and aims to analyze the strengths and weaknesses of machine translation systems in English–Uzbek translation. The findings provide an opportunity to develop linguistic and technological recommendations for improving translation quality.

METHODOLOGY

This study focuses on evaluating the quality of English–Uzbek translations produced by machine translation systems based on linguistic criteria. The methodological framework of the research consists of the following components:

1. **Selected Machine Translation Systems:** The study utilized widely used AI-based systems such as Google Translate, ChatGPT, and other modern neural translation models. These systems were chosen due to their relevance in handling the agglutinative and morphological characteristics of the Uzbek language.
2. **Text Corpus:** Texts from various genres were selected for the analysis:

• Scientific texts (articles, technical reports)
• Literary texts (stories, poems)
• Official administrative texts (orders, letters)
• Everyday communication texts (dialogues, surveys)

For each genre, sample texts containing 500–700 words were compiled and translated by each system.

3. **Linguistic Evaluation Criteria:** The following criteria were taken as the basis for assessing translation quality:

• Lexical equivalence: accuracy in conveying word and phrase meanings
• Grammatical accuracy: noun–verb agreement, verb forms, sentence structure
• Syntactic coherence: consistency in complex and compound sentence constructions
• Contextual adequacy: preservation of contextual meaning and pragmatic relevance
• Stylistic adequacy: adherence to the stylistic norms of the text genre
• Pragmatic appropriateness: effectiveness in fulfilling communicative intent

4. **Analytical Methods:**

• Qualitative analysis: contextual and syntactic examination of errors and incorrect equivalents found in translations.
• Quantitative analysis: calculation of error frequencies, literal translations, and incorrect use of phraseological units in percentage terms.
• Comparative analysis: comparison of Google Translate and ChatGPT translations with each other and with the original text to determine strengths and weaknesses of each system.

5. **Verification and Validation:**The analysis results were independently reviewed by several linguists. Errors and successful translations were identified based on consensus, resulting in an overall evaluation. Additionally, the agglutinative nature and morphological complexity of the Uzbek language were taken into consideration during the assessment.

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6. **Data Visualization:**The statistical findings were illustrated using tables and graphs, clearly demonstrating error rates and accuracy indicators across systems.

This methodological approach enhanced the reliability of the study and enabled a systematic and precise evaluation of linguistic aspects of translation quality. Furthermore, the findings provide a basis for developing practical recommendations aimed at improving the efficiency of machine translation systems and reducing linguistic errors.

RESULTS

The findings of the study indicate that the translation performance of Google Translate and ChatGPT from English into Uzbek varies significantly across different linguistic criteria. In terms of lexical equivalence, both systems accurately translated simple words and certain contextual expressions; however, errors were observed in the translation of polysemantic units and complex phrases. ChatGPT demonstrated a higher ability to interpret context and convey meaning in a clearer and more natural manner, whereas Google Translate occasionally produced incorrect equivalents due to literal translation.

Differences were also evident in grammatical accuracy and syntactic coherence. While simple and short sentences were generally translated correctly, issues emerged in complex compound sentences, particularly regarding noun–verb agreement and word order. ChatGPT maintained contextual coherence in translating complex structures, whereas Google Translate sometimes failed to preserve logical sentence flow.

The analysis of contextual adequacy and pragmatic correctness showed that ChatGPT produced translations closer to natural speech, especially in everyday conversation and dialogue. Google Translate, however, occasionally lost naturalness due to its tendency toward literal translation. Stylistic adequacy was generally higher in scientific and official texts for both systems, but challenges were observed in accurately conveying tone and expressive style in literary texts.

The translation of idiomatic and phraseological units proved to be the most challenging task for both systems. ChatGPT provided more accurate and meaningful renditions by employing contextual reasoning, while Google Translate tended to rely on literal translation. Overall, neural machine translation systems demonstrate strengths in contextual analysis and syntactic adaptation, yet certain linguistic errors persist due to the agglutinative and morphologically complex nature of the Uzbek language. The variation in system performance across different genres and text types highlights the need for genre-sensitive approaches in evaluating machine translation quality.

DISCUSSION

The results of the study clearly reveal the strengths and weaknesses of machine translation systems in translating from English into Uzbek. In terms of lexical equivalence, ChatGPT more accurately conveyed the meaning of words and expressions by taking context into account, whereas Google Translate often relied on literal translation. This difference is particularly noticeable in the translation of polysemantic words and phraseological units. The findings indicate that the ability of neural translation systems to analyze context is one of their key advantages.

Significant differences were also observed between the systems in translating grammatically and syntactically complex sentences. ChatGPT successfully preserved coherence in complex and compound constructions, which contributes to higher translation quality in texts with intricate syntax. Google Translate, however, occasionally misplaced sentence elements, reducing the naturalness and coherence of the translation. These findings align with previous linguistic research, which has shown that machine translation systems tend to struggle with complex syntactic and morphological structures.

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In terms of contextual adequacy and pragmatic appropriateness, ChatGPT demonstrated a clear advantage. The system produced more natural and comprehensible translations in everyday communication and dialogue contexts. Google Translate, on the other hand, sometimes lost naturalness due to its reliance on literal equivalents. This underscores the importance of contextual awareness in evaluating translation quality.

The analysis of stylistic adequacy and phraseological units showed that both systems generally performed well in scientific and official texts, but faced challenges in preserving tone and expressiveness in literary texts. ChatGPT was more successful in maintaining stylistic nuance through contextual reasoning, while Google Translate continued to rely on direct translation. This indicates the need for further refinement of translation systems, particularly for translating literary and context-rich texts where additional linguistic mechanisms are required.

Furthermore, the study found that neural translation systems are not yet fully adapted to the agglutinative and morphologically complex nature of the Uzbek language. These shortcomings are especially evident in complex compound sentences and verb–noun agreement. The findings suggest that improving machine translation quality will require deeper linguistic and technological integration, including adapting translation algorithms to the morphological and syntactic features of the target language.

Overall, the results are significant for identifying the strengths and limitations of machine translation systems and point toward promising opportunities for future development of more genre-sensitive and linguistically aware translation models.

CONCLUSION

The study demonstrates that artificial-intelligence-based machine translation systems, particularly Google Translate and ChatGPT, show varying levels of effectiveness in translating from English into Uzbek. ChatGPT performs better in conveying context-dependent meanings, maintaining coherence in complex sentences, and rendering idiomatic expressions in a more natural way. Google Translate, while accurate in translating simple words and sentences, tends to produce literal translations when dealing with complex syntax, polysemantic words, and idiomatic units.

The findings indicate that evaluating machine translation systems requires more than speed and lexical equivalence; linguistic criteria such as lexical accuracy, grammatical correctness, syntactic coherence, contextual adequacy, stylistic appropriateness, and pragmatic relevance must also be taken into account. Moreover, the systems still require additional linguistic mechanisms to better adapt to the agglutinative and morphologically rich structure of the Uzbek language.

This research contributes to identifying the strengths and weaknesses of machine translation systems, improving translation quality, and developing flexible and efficient algorithms suitable for various text genres. The results suggest that future advancements in such systems will require deeper linguistic and technological integration.

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