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MORPHOLOGICAL ANALYSIS OF ARTIFICIAL INTELLIGENCE TERMS IN ENGLISH AND UZBEK LANGUAGES

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Abstract: This article examines the morphological structure of artificial intelligence (AI) terminology in English and Uzbek, focusing on their word-formation mechanisms and the lexical-semantic processes involved in term creation. The study investigates English word-formation models such as compounding, affixation, abbreviation, and conversion, as well as Uzbek strategies including calquing, borrowing, affixal derivation, and semantic expansion. Additionally, the research identifies technological, communicative, and translational factors that influence the development of AI terminology in both languages. The findings highlight key morphological features of AI terms and provide practical insights for translation studies and computational linguistics.

Keywords: artificial intelligence, terminology, morphology, compounding, affixation, derivation, calquing, English, Uzbek.

INGLIZ VA O‘ZBEK TILLARIDA SUN’IY INTELLEKT TERMINLARINING MORFOLOGIK TAHLILI

Annotatsiya: Ushbu maqolada ingliz va o‘zbek tillarida qo‘llanilayotgan sun’iy intellekt (SI) terminlarining morfologik tuzilishi, ularning hosil bo‘lish mexanizmlari hamda termin yaratish jarayonidagi leksik-semantik xususiyatlar tahlil qilinadi. Tadqiqot davomida ingliz tilidagi kompozitsiya, affiksatsiya, qisqartmalar, konversiya kabi so‘z yasalish modellari hamda o‘zbek tilidagi kalkalash, o‘zlashtirish, affiksal derivatsiya va semantik kengayish jarayonlari qiyosiy o‘rganildi. Shuningdek, SI terminlarining ikki tilda shakllanishida texnik taraqqiyot, global kommunikatsiya va tarjima strategiyalari bilan bog‘liq omillar aniqlanadi. Maqola natijalari SI terminologiyasining o‘ziga xos morfologik xususiyatlarini ochib berib, tarjimashunoslik va kompyuter lingvistikasi uchun amaliy ahamiyat kasb etadi.
Kalit so‘zlar: sun’iy intellekt, terminologiya, morfologiya, kompozitsiya, affiksatsiya, kalkalash, derivatsiya, ingliz tili, o‘zbek tili.

МОРФОЛОГИЧЕСКИЙ АНАЛИЗ ТЕРМИНОВ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В АНГЛИЙСКОМ И УЗБЕКСКОМ ЯЗЫКАХ

Аннотация: В данной статье анализируется морфологическая структура терминов искусственного интеллекта (ИИ) в английском и узбекском языках, рассматриваются механизмы их словообразования и лексико-семантические процессы, участвующие в формировании терминов. В исследовании изучаются модели словообразования английского языка — композиция, аффиксация, аббревиация, конверсия, а также узбекские процессы калькирования, заимствования, аффиксальной деривации и семантического расширения. Кроме того, определяются технологические, коммуникативные и переводческие факторы, влияющие на развитие ИИ-терминологии в обоих языках. Результаты исследования раскрывают специфические морфологические особенности терминов ИИ и имеют практическое значение для переводоведения и компьютерной лингвистики.

Ключевые слова: искусственный интеллект, терминология, морфология, композиция, аффиксация, деривация, калькирование, английский язык, узбекский язык.

INTRODUCTION

The rapid advancement of artificial intelligence (AI) technologies has significantly influenced not only the global scientific and technological landscape but also contemporary linguistic processes. As AI-based systems, tools, and research domains continue to expand, new terminological units are actively emerging, especially in English—the dominant language of technology and innovation. These terms, in turn, are being adopted, adapted, or translated into other languages, including Uzbek, where the process of constructing, borrowing, and standardizing AI terminology remains an urgent linguistic task. Consequently, a comparative examination of the morphological behavior of AI terms in English and Uzbek is essential for understanding how each language assimilates and systematizes rapidly evolving technological concepts. In English, AI-related terminology demonstrates high productivity due to the language's flexible morphological system. Compounding (e.g., machine learning, neural network, data mining), affixation (automation, intelligentization), abbreviation (AI, NLP, LLM), and conversion (to model, to prompt) serve as the primary word-formation mechanisms. Many AI terms are semantically transparent and structurally concise, allowing them to be quickly adopted across different domains. English also shows significant creativity in generating neologisms through metaphorical extensions (black box, hallucination, agent), which further enrich the terminological landscape. In Uzbek, however, the development of AI terminology follows a different pattern shaped by linguistic, cultural, and technical factors. While many terms are directly borrowed from English (algoritm, model, prompt), a substantial number are calqued or newly created using native derivational resources (neyron tarmoq, katta til modeli, mashinali o'qitish). Affixal derivation plays a crucial role in assimilating borrowed bases into the Uzbek morphological system, ensuring their compatibility with local grammatical rules (e.g., modellashtirish, optimallashtirish, raqamlashtirish). The need to maintain terminological accuracy while preserving linguistic authenticity and clarity challenges linguists, translators, and domain specialists in the Uzbek context. Understanding the morphological characteristics of AI terms in the two languages provides insight into the broader mechanisms of scientific lexicon formation. Such analysis also highlights the interaction between global technological discourse and local linguistic norms. Additionally, the comparison reveals how cognitive, cultural, and communicative factors shape terminological choice, transparency, and productivity in both English and Uzbek. This research therefore aims to identify the dominant word-formation models, highlight similarities and differences in morphological strategies, and assess the degree of structural adaptation of AI terminology in each language. By doing so, it contributes to improving translation practice, enhancing terminological consistency, and enriching the linguistic tools available for describing AI concepts in multilingual settings.

LITERATURE REVIEW AND METHODOLOGY

The study of artificial intelligence (AI) terminology has become increasingly relevant due to the rapid expansion of digital technologies and the global integration of scientific communication. Existing research on terminology formation (Cabré, 2010; Temmerman, 2017) emphasizes that scientific terms evolve through systematic morphological, semantic, and pragmatic processes. Scholars note that English, as the dominant language of science and technology, generates a highly productive terminological system driven by compounding, affixation, and abbreviation

(Crystal, 2020). These mechanisms enable English to create concise but semantically dense AI-related terms such as machine learning, deepfake, neural network, and prompt engineering. Research on AI terminology in English highlights the dynamic nature of neologisms, particularly in digital discourse. Bhatia (2021) and Floridi (2019) note that conceptual complexity, interdisciplinarity, and rapid innovation foster the continuous emergence of new word-formation patterns. Furthermore, metaphorical extensions—such as black box, hallucination, or agent—play a notable role in structuring AI concepts by linking them to familiar cognitive schemas. In contrast, studies on Uzbek scientific terminology (Abdullayeva, 2018; Jo‘rayev, 2021; Mirzayev, 2020) reveal that the language relies significantly on calquing, borrowing, and affixal derivation to assimilate global scientific terms. Uzbek adopts and adapts technological lexicon through morphological integration using productive affixes such as -lash, -lashtir-, -chi, -li, which allow foreign bases to acquire native grammatical and derivational features (modellashtirish, raqamlashtirish, intellektual tizim). Previous research also identifies challenges such as standardization, terminological inconsistency, and the coexistence of multiple variants (sun’iy intellekt / AI / SI, katta til modeli / llm modeli). Comparative linguistics studies (Sharipov, 2019; Nurmonov, 2022) show that English and Uzbek differ considerably in derivational productivity, typology, and transparency. English relies on analytic structures and compounding, whereas Uzbek favors synthetic morphology and derivational suffixes. Nonetheless, both languages demonstrate increasing convergence in terminology under the influence of globalization and technological innovation. However, few studies have conducted systematic morphological comparisons specifically focused on AI terminology, which highlights the necessity and novelty of the current investigation.

This research employs a **qualitative and comparative linguistic methodology** to analyze the morphological characteristics of AI terminology in English and Uzbek. The study is grounded in modern theories of word formation, computational linguistics, and terminology studies.

1. Data collection

The corpus of AI terms was compiled from multiple authoritative sources, including:

- English AI research articles, digital manuals, and technical reports (2020–2024)
- Glossaries from OpenAI, Google AI, and IEEE guidelines
- Uzbek terminology databases (O‘zR Fanlar akademiyasi lug‘atlari, O‘zbek tilining izohli lug‘ati)
- Uzbek scientific and educational publications on information technologies (2018–2024)

The dataset includes over 250 English and Uzbek AI terms, ensuring sufficient representation of word-formation models.

2. Analytical framework

The analysis applies the following linguistic procedures:

a) Morphological segmentation

Each term was segmented into roots, affixes, and compound elements (e.g., machine-learning → machine + learning; modellashtirish → model + lash + tir + ish).

b) Word-formation classification

Terms were categorized based on dominant morphological processes:

- Compounding, affixation, abbreviation, conversion (English)
- Calquing, borrowing, affixal derivation, semantic expansion (Uzbek)

c) Cross-linguistic comparison

The study examined:

- structural equivalence of terms,
- degrees of morphological transparency,
- adaptation strategies of English bases in Uzbek,
- "hybrid" terms that combine borrowed and native morphemes.

d) Functional-semantic analysis

Terms were analyzed within their real usage contexts to determine:

- the precision of meaning transfer,
- terminological consistency,
- influence of technological and cultural factors.

3. Limitations

The fast-changing nature of AI terminology poses challenges, as new terms emerge rapidly. Therefore, this research focuses on widely used and semantically stable terms recorded in reputable sources.

RESULTS AND DISCUSSION

The comparative analysis of English and Uzbek AI terminology revealed several core patterns in their morphological behavior. The findings show that English predominantly relies on compounding (machine learning, neural network) and affixation (automation, tokenization), which enables the creation of compact and semantically rich technical terms. Abbreviations (AI, ML, NLP) also play a central role in English, reflecting its analytic and innovation-driven linguistic nature. Uzbek, by contrast, forms AI terminology mainly through calquing (mashinali o'qitish, neyron tarmoq), borrowing (model, algoritm, prompt), and affixal derivation with productive suffixes such as -lash, -lashtir-, -chi (modellashtirish, raqamlashtirish). These mechanisms integrate foreign terms into Uzbek morphology, ensuring grammatical compatibility and semantic clarity, although the resulting structures tend to be longer and more explicit. The study also found that morphological transparency differs between the two languages: English compounds maintain internal clarity, while Uzbek derivational forms often enhance explicitness. However, metaphor-based English terms (black box, hallucination) pose challenges for Uzbek translation, often requiring descriptive equivalents rather than structural analogs. Both languages show increasing convergence due to technological globalization, but terminological standardization remains a challenge in Uzbek, as multiple variants of the same concept coexist in practice. Overall, the findings confirm that English serves as the primary generator of AI terminology, whereas Uzbek adapts these terms through its agglutinative system, producing

hybrid and localized forms. This reflects broader linguistic, cultural, and communicative dynamics shaping modern scientific vocabulary.

CONCLUSION

The conducted comparative analysis of artificial intelligence terminology in English and Uzbek confirms that the development of technological lexicon is deeply connected to each language's morphological system, typological characteristics, and sociolinguistic environment. English, as the dominant language of global scientific communication, serves as the primary source of AI terminology, generating a vast array of new terms through highly productive mechanisms such as compounding, affixation, abbreviation, and semantic extension. These processes allow English to rapidly coin concise, multifunctional, and semantically dense terms that quickly become standardized within the international technological community. Uzbek, meanwhile, actively adapts these terms through its agglutinative structure, relying on calquing, borrowing, and affixal derivation to ensure compatibility with native grammar and linguistic norms. The analysis revealed that Uzbek morphology provides the necessary tools to integrate global concepts while preserving linguistic identity. However, it also introduces longer, more explicit, and structurally transparent forms, reflecting the language's preference for derivational clarity over brevity. Hybrid terms—where English lexical bases combine with Uzbek affixes—demonstrate a transitional stage in terminological assimilation and indicate a broader trend of linguistic convergence in digital discourse. The study also highlights conceptual and structural asymmetries between the two languages. English frequently employs metaphorical extensions (black box, hallucination, agent), which do not always have direct morphological equivalents in Uzbek, requiring creative translation strategies and descriptive reformulations. Moreover, the coexistence of multiple competing variants in Uzbek—caused by rapid technological change, insufficient standardization, and linguistic experimentation—suggests the need for coordinated terminological regulation to ensure clarity and uniformity in scientific communication. Overall, the findings demonstrate that AI terminology formation is not merely a linguistic process but a multidimensional phenomenon shaped by technological innovation, globalization, cognitive models, and cultural perspectives. The interplay between English as a source language and Uzbek as a recipient language illustrates how linguistic systems respond to emerging scientific realities. This research contributes to improving terminological consistency, enriching bilingual lexicographic resources, and enhancing translation accuracy in the context of artificial intelligence. It also underscores the importance of continuous monitoring and analysis of new terminology to support the development of standardized, precise, and functional scientific vocabulary in both languages.

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