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Innovative Machine Learning in Contemporary Philology: Science and Practice in the SHIVA World

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Abstract. The article explores the features of the application of machine learning technologies in modern philological science and practice in the conditions of the SHIVA-world. The main directions of using machine learning methods in corpus linguistics, computational semantics, stylometry, digital textology, discourse analysis, machine translation and intelligent educational technologies are considered. It is substantiated that the integration of computational methods with traditional philological approaches forms a new research paradigm that ensures increased efficiency of the analysis of linguistic and literary phenomena while maintaining the leading role of philological interpretation of the results.

Keywords: machine learning; artificial intelligence; SHIVA-world; philological science; digital philology; natural language processing; corpus linguistics; computational semantics; stylometrics; digital textology; machine translation.

Introduction. The current stage of development of world civilization is characterized by the rapid complication of the information space, exponential growth of data volumes, acceleration of technological innovations and deep digital transformation of practically all spheres of social activity [1]. If the VUCA concept

reflected the world as a changeable, uncertain, complex and ambiguous system, and the BANI concept focused on its fragility, anxiety, nonlinearity and incomprehensibility, then the SHIVA-world concept considers the modern global environment as a dynamic self-organized system, functioning of management, variability of development scenarios and constant adaptation to new challenges. In such conditions, artificial intelligence and machine learning technologies [2] acquire special importance, capable of processing extremely large amounts of information, identifying hidden patterns and supporting decision-making [3]. Philological science is also undergoing a qualitative transformation. Traditional methods of analyzing literary works, language processes, text corpora, and communicative practices are gradually being supplemented by computational approaches based on Natural Language Processing (NLP), statistical text analysis, deep learning, and intellectual modeling of linguistic phenomena = as a result, a new research paradigm is being formed, within which machine learning acts not only as a tool for automating individual operations, but also as an independent methodological means of obtaining new scientific knowledge [4]. In the conditions of the SHIVA world, there is a growing need to develop intelligent philological systems capable of analyzing multimillion-dollar text collections, identifying evolutionary trends in language development [5], predicting changes in language norms, investigating the features of artistic style, and providing a qualitatively new level of scientific interpretation of texts -- this determines the relevance of researching the possibilities of machine learning in modern philological science and practice.

The Main Part. Machine learning is one of the dynamically developing areas of artificial intelligence, based on the creation of mathematical models capable of independently detecting patterns in data without rigid algorithmic programming. Unlike classical information technologies, oriented towards the execution of predetermined sequences of actions, machine learning systems form their own models of data representation, adapting to new operating conditions and gradually improving the quality of decisions made.

For philological science, this feature is of great importance. The modern language environment is characterized by extremely high dynamics of development, the constant emergence of new lexical units, the transformation of semantic structures, changes in communicative practices and the rapid growth of the volume of digital texts. Traditional research methods no longer allow for the effective analysis of such large-scale information arrays, while machine learning provides the ability to intelligently process millions of documents simultaneously.

One of the most important areas of application of machine learning is corpus linguistics of the new generation. Modern algorithms are capable of automatically performing morphological, syntactic, semantic and pragmatic analysis of texts,

identifying stable language constructions, investigating the frequency of use of lexical units, determining the features of the functioning of grammatical categories and modeling the processes of development of national languages. The use of such technologies significantly expands the empirical base of philological research and increases the objectivity of the results obtained.

Machine learning plays a special role in the development of computer semantics. Deep learning algorithms allow you to form multidimensional semantic representations of words and expressions, take into account the context of their use, identify hidden semantic connections between different concepts and model complex conceptual structures of language. This opens up new opportunities for studying the evolution of word meanings, the formation of terminological systems, interlingual correspondences and culturally determined features of communication.

Stylometric analysis is also a significant direction. Modern machine learning models are able to identify individual features of the author's style, determine the probable author of anonymous works, detect signs of collective authorship, detect textual borrowings, and analyze the dynamics of the creative evolution of writers. Such studies find application not only in literary studies, but also in forensic linguistics, historical philology, digital textology, and expert activities.

In the conditions of the SHIVA-world, the importance of intellectual discourse analysis is significantly increasing. Machine learning allows us to study the features of political, media, scientific and business communication, automatically determine the emotional coloring of texts, identify dominant thematic areas, analyze the value orientations of different social groups and track changes in public sentiment in real time. Thanks to this, philology has the opportunity to study language processes not only at the level of individual texts, but also on the scale of the global information space.

Digital textology is becoming an important direction of development. Machine learning algorithms are able to automatically compare different editions of works, reconstruct lost fragments of texts, detect scribes' errors, analyze the history of the formation of literary monuments and establish relationships between numerous manuscript sources. The use of such technologies significantly increases the efficiency of research on historical heritage and contributes to the preservation of cultural memory.

The practical significance of machine learning is most clearly manifested in the field of translation. Modern neural models have significantly improved the quality of automatic translation due to the ability to take into account a wide context, features of the syntactic organization of sentences, idiomatic constructions and stylistic characteristics of the text. Despite the need for professional post-editing, intelligent translation systems are becoming an important tool for international scientific, educational and cultural communication.

Intelligent systems for automatic summarization, annotation, thematic classification of documents, search for scientific information and analysis of large

volumes of publications are becoming widespread. For philological researchers, this means a significant reduction in the time for processing sources and the ability to focus on the meaningful interpretation of research results.

A special place in modern philological practice is occupied by large language models that are able to generate texts of various genres, perform stylistic adaptation, perform automatic editing, explain language structures and support the educational process. However, their use requires a critical approach, since generative models can create factual errors, reproduce statistical biases of educational corpora, and form convincing but unreliable conclusions. Therefore, the results of artificial intelligence should be considered as an object of professional expert review, and not as a final scientific result.

In the conditions of the SHIVA-world, a new model of interaction between humans and intelligent technologies is gradually taking shape. If previously digital tools performed mainly auxiliary functions, modern machine learning systems are becoming full-fledged cognitive partners of the researcher. They provide intellectual support for analysis, help to identify hidden patterns, form hypotheses, and significantly expand the research capabilities of the philologist. At the same time, it is the person who retains the decisive role in the interpretation of linguistic phenomena, cultural understanding of the text, assessment of the artistic value of works, and the formation of scientific conclusions.

Thus, machine learning transforms not only applied technologies for processing text information, but also the methodology of philological research itself. There is a transition from the analysis of limited samples to the study of global digital corpora, from predominantly qualitative methods to the integration of qualitative and quantitative analysis, from static description of language processes to dynamic modeling and prediction. It is this integration of humanitarian knowledge and intellectual technologies that is becoming one of the key characteristics of the development of philology in the conditions of the SHIVA world.

Conclusions. The analysis shows that machine learning is becoming one of the key factors in the modernization of modern philological science and practice. In the conditions of the SHIVA-world, its importance goes far beyond the automation of individual research procedures, since intelligent algorithms provide processing of extremely large arrays of text information, detection of hidden language patterns, modeling of language development processes and support for making scientific decisions.

The most promising areas of application of machine learning are corpus linguistics, computer semantics, stylometry, author attribution, discourse analysis, digital textology, intelligent translation, automatic summarization and educational technologies. At the same time, the importance of large language models as universal tools to support the research and professional activities of a philologist is growing.

At the same time, the effective use of machine learning involves maintaining the leading role of a person in interpreting results, critically evaluating conclusions,

culturally understanding texts and ensuring the scientific reliability of research. Therefore, the further development of philological science will not be associated with the replacement of traditional humanitarian methods with intellectual technologies, but with the formation of a hybrid research model that combines the advantages of artificial intelligence and professional philological expertise [6]. It is such an integration that can ensure the sustainable development of philological science and practice in the conditions of a dynamic, intellectualized and highly uncertain SHIVA-world.

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