UDC (004.8+004.92)::81`32

Innovative IT technologies of computational linguistics

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***Abstract**. Innovative IT technologies significantly increase the efficiency of data processing and intellectualize business processes. These technologies, including artificial intelligence and machine learning, have transformed modern philology, automating text analysis and providing new opportunities for research. They have also radically changed computational linguistics, allowing the automation of natural language processing (NLP). This has led to the emergence of multilingual models, intelligent chatbots, voice assistants and systems for analyzing large amounts of text. Thus, innovative IT technologies are the basis for the digital transformation of society and play a strategic role in the development of new generation information systems.*
***Keywords:** innovative IT, intelligent IT, philology, computational linguistics.*

Introduction.

Innovative IT technologies are modern information technologies based on new approaches, methods and solutions that significantly increase the efficiency of data processing, storage, transmission and analysis, and ensure the intellectualization of business processes [1]. In the context of digital transformation and global competition (and so possible uncertainties, conflicts and the risks [2]), innovative IT technologies are becoming a key factor in sustainable development [3]. Their implementation allows solving problems of increasing productivity, automating processes and optimizing resources. Such technologies include: knowledge-based [4] & data-driven [5] intelligent DSS; artificial intelligence (AI) [6], [7]; and machine learning (ML) [8], [9] – for big data analysis, forecasting and intelligent automation; blockchain – to ensure transparency and security of transactions; the Internet of Things (IoT) – to integrate physical objects into digital ecosystems; cloud technologies and edge computing – for distributed data processing; next-generation cybersecurity – to protect against growing threats; robotics and RPA – to optimize routine operations; augmented and virtual reality technologies (AR/VR) – for interactive interaction.

The Main Part.

Modern philology is undergoing a transformation caused by digitalization and the introduction of innovative IT technologies. If previously philological research was predominantly text-centric and based on traditional methods of analysis, today automated information processing systems, artificial intelligence and big data play a key role.

Innovative IT technologies allow not only to speed up the processing and analysis of text arrays, but also to go beyond classical approaches, providing: automatic morphological, syntactic and semantic markup of texts; computer modeling of

language processes; analysis of huge data corpora (Big Data) to identify patterns in language and literature; use of artificial intelligence methods for stylistic analysis, automatic translation, text tonality and text generation.

Thus, innovative IT technologies are becoming an integral tool of philological research, ensuring the integration of humanitarian knowledge and the digital environment.

In turn, computational linguistics is one of the key disciplines shaping the modern information economy. It integrates linguistics, computer science and artificial intelligence to analyze, process and generate text and speech information in natural languages.

In recent years, this area has undergone radical changes due to the development of innovative IT technologies based on machine learning methods, neural networks, big data and cloud computing.

The main goal of introducing innovative technologies is to automate natural language processing (NLP), increase the accuracy of speech recognition, improve the quality of machine translation and create intelligent systems for human-computer interaction.

Technological advances such as deep learning, transformer models, and generative artificial intelligence (Generative AI) have radically changed approaches to language analysis. Today, the following are actively developing:

- multilingual models capable of processing dozens of languages in one algorithm;
- intelligent chatbots and voice assistants for business and education;
- systems for automatic annotation and analysis of large arrays of texts for science, medicine and law.

Thus, innovative IT technologies in computational linguistics are becoming the foundation for the digitalization of society, providing intellectual support for communication, data analysis and automatic decision-making.

Conclusions.

1. The modern information environment is characterized by highly dynamic configurations, global competition and rapid technological progress. In these conditions, innovative information technologies (IT) are becoming a key tool for ensuring the efficiency of processes in the economy, science, education and public administration.

Innovative IT is a set of advanced methods, systems and software solutions that introduce new approaches to processing, storing, analyzing and transmitting information. Among them, a special place is occupied by intelligent technologies, including artificial intelligence, machine learning, neural network models, expert systems and hybrid platforms that can independently analyze data, predict events, make decisions and learn from experience.

The use of such technologies allows:

- to automate routine and complex processes;
- to increase the accuracy of analysis of large volumes of information (Big Data);
- to ensure the adaptability and flexibility of systems in conditions of uncertainty;
- to create new products, services and business models;
- to integrate various branches of knowledge and technologies to improve the efficiency of organizations.

Modern intelligent information technologies are actively used in various fields: from automation of production and business analytics to digital philology, computer linguistics, medicine and educational platforms. Their use opens up new opportunities for research, management, forecasting and decision-making based on data, which makes them an integral element of the innovative economy. Thus, innovative (including intelligent) information technologies form the basis for the digital transformation of society, ensuring sustainable development, increased efficiency and competitiveness of organizations in the context of global instability and dynamic changes.

2. Innovative IT technologies in modern philology play a key role in the modernization of science, opening up opportunities for:

- comprehensive analysis of texts using machine learning algorithms and statistical models;
- automation of linguistic and literary studies, which reduces time and human resources;
- creation of intelligent systems for translation, speech recognition, stylistic analysis and author attribution;
- development of adaptive educational solutions that improve the quality of philological training.

In the near future, the following is expected to develop: hybrid technologies combining neural network and symbolic methods; multimodal models capable of analyzing not only text, but also visual and auditory components of communication; ethical standards and transparency of algorithms in the humanitarian sphere.

Thus, the synthesis of philology and innovative IT technologies forms a new type of humanitarian knowledge, which is focused on digital analytics, process automation and expansion of research capabilities.

3. Further analysis shows that innovative IT technologies in computational linguistics play a strategic role in the development of new generation information systems. Their application allows:

- to automate complex linguistic tasks – from syntactic analysis to generation of meaningful texts;
- to provide multilingual communication without barriers due to high-precision neural translation systems;
- to improve interaction between humans and artificial intelligence through voice interfaces, intelligent assistants and natural language processing systems;
- to increase the efficiency of scientific research and business processes due to intelligent analysis of large volumes of text data.

Further development will be associated with the strengthening of hybrid [10] technologies (neural network [11] and symbolic (rule-based, for example) [12] methods), the use of multimodal models capable of working with text, images and sound simultaneously, as well as ensuring the ethical transparency of artificial intelligence systems.

Thus, innovations in computer linguistics not only transform the IT industry, but also create conditions for the formation of a new generation of digital services focused on adaptability, personalization and intelligent information processing.

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