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Knowledge-Based Information Technologies in Contemporary Literary Studies Amid Conditions of Dynamic Uncertainty, Turbulence and Systemic Risks (Shiva and Warmi Perspectives)

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Abstract. The article explores the features and specifics of the application of Knowledge-Based IT in modern literary studies in the context of the dynamics of uncertainty, turbulence and systemic risks. The possibilities of ontologies, knowledge graphs, expert systems and hybrid intelligent technologies for structuring and analyzing literary knowledge are revealed. The prospects of integrating KB-IT, NLP, machine learning and large language models within the framework of SHIVA and WARMI concepts of the external environment are substantiated.

Keywords: digital philology; knowledge-based IT; literary studies; digital literary studies; digital humanities; artificial intelligence; knowledge graphs; ontologies; semantic analysis; machine learning; NLP; large language models; literary studies; SHIVA; WARMI; uncertainty; turbulence; systemic risks.

Introduction.

Modern philology is developing in conditions of fundamental environmental complexity [1], which is characterized by the dynamics of uncertainty, acceleration of changes, information overload, technological turbulence and increased systemic risks [2]. These processes directly affect not only the practice of communication and language analysis, but also literary studies as a branch of humanities knowledge focused on the study of the literary text, literary processes, authorial strategies, intertextual connections and cultural dynamics. In the conditions of SHIVA and WARMI concepts of the external environment, traditional methods of literary research require supplementation with intelligent information

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technologies capable of working with large arrays of heterogeneous data, revealing hidden patterns and supporting research decision-making in conditions of incompleteness and variability of information.

Of particular importance in this context is Knowledge-Based IT (KB-IT) – a class of intelligent information technologies [3], in which the central resource is not only an array of data, but also structured knowledge: concepts, categories, rules, semantic relations, subject models, expert assessments and logical dependencies [4]. This is especially important for literary studies [5], since a literary text is a complex multi-level object in which meaning is formed through the interaction of linguistic, plot, compositional, stylistic, cultural, historical and intertextual components [6]. Therefore, simple quantitative analysis of the text is not enough: technologies are needed that can take into account the context, semantics, knowledge of the literary process and expert interpretations [7].

The relevance of the application of Knowledge-Based IT in modern literary studies is also due to the transition from a predominantly text-centric research model to an integrated digital model [8], which combines methods of Digital Humanities, artificial intelligence, natural language processing, ontological modeling, semantic networks, expert systems and intelligent analysis. Unlike technologies focused mainly on processing large amounts of information, KB-IT allows you to formalize and use knowledge about literary objects and the relationships between them, creating a basis for intelligent search, classification, interpretation and prediction [9].

So, the purpose of the article is to systematically identify the features and specifics of Knowledge-Based IT in modern literary studies, taking into account the dynamics of uncertainty, turbulence and systemic risks of the external environment, which is conceptualized using SHIVA and WARMI approaches. To achieve the goal, it is necessary to determine the specifics of knowledge as an intellectual resource of literary research, reveal the functional capabilities of KB-IT, establish their difference from predominantly data-driven technologies, determine the directions of application in literary studies, and substantiate the prospects for their development in an unstable external environment.

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Main Part.

Knowledge-Based IT as the intellectual basis of digital literary studies. Knowledge-Based IT (KB-IT) is an intelligent information technology in which data processing is carried out on the basis of structured knowledge: concepts, categories, rules, semantic relationships, expert assessments and subject models. This is especially important for literary studies, since a literary text is a complex multi-level object, the content of which is determined by the interaction of linguistic, semantic, stylistic, cultural, historical and intertextual components. KB-IT allows you to move from simple processing of digital texts to intelligent processing of literary knowledge. Their technological basis is knowledge bases, ontologies, semantic networks, knowledge graphs, expert systems, inference rules and hybrid models of artificial intelligence.

The specifics of literary knowledge as an object of intellectualization. Literary knowledge is characterized by multilevel, contextuality, interpretative ambiguity and a significant share of expert knowledge. The same text can be studied simultaneously at the lexical, semantic, stylistic, plot, narratological, intertextual and historical-cultural levels. Therefore, KB-IT should provide a representation of different types of knowledge and the connections between them. A particular complexity is created by the multitude of interpretations: an intellectual system should not replace the literary scholar with a single automatically generated conclusion, but should provide a space for reasoned interpretations. A hybrid representation of formalized and partially formalized expert knowledge also becomes essential.

Knowledge-Based IT and the transition from data-driven to knowledge-driven literary studies. Traditional digital technologies mainly provide storage, search and statistical processing of texts. The data-driven approach allows for the identification of quantitative patterns, but does not in itself explain their literary significance. KB-IT forms an additional knowledge-driven level that connects the results of automatic analysis with literary categories, semantic models and expert knowledge. The most promising is their combination with machine learning and NLP, in which algorithms detect patterns in large arrays of texts, and knowledge-based components provide their semantic interpretation. Thus, a cycle is formed: data → analysis → detection of patterns → comparison with knowledge → interpretation → replenishment of

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the knowledge base.

Main areas of application of KB-IT in literary studies.

One of the key areas is the ontological modeling of the literary subject area, which includes authors, works, genres, characters, motifs, themes, literary movements, artistic techniques and cultural and historical contexts. An important role is played by graphs of literary knowledge, which allow representing works and objects related to them in the form of a network of semantic relations. This creates opportunities for identifying intertextual connections, literary influences, thematic intersections and the dynamics of the literary process. Also promising are intelligent semantic search, automated genre and stylistic classification, analysis of motifs and intertextuality, reconstruction of authorial strategies and intellectual support of scientific search. KB-IT can help literary scholars in forming samples, searching for sources, systematizing research and building conceptual maps.

Specificity of KB-IT in the conditions of SHIVA-concept of the external environment. Within the framework of SHIVA-concept, the external environment is characterized by high uncertainty, fragmentation, acceleration of changes and the need for constant adaptation. Therefore, literary knowledge should be considered as a dynamic system, and not as a static information repository. KB-IT should ensure constant updating of knowledge, take into account new research, terminological changes and alternative interpretations. Of particular importance are working with incomplete and contradictory knowledge, fixing the origin of information and distinguishing facts and interpretations. The most important principle becomes human-in-the-loop: an intellectual system expands the research capabilities of a literary scholar, but does not replace his critical thinking and interpretative competence.

Specificity of KB-IT in the conditions of WARMI-concept of the environment. WARMI-concept emphasizes the interaction of uncertainty, turbulence and systemic risks, which increase the instability of the modern information environment. For literary studies, this is the need to create not only intelligent, but also stable, adaptive and understandable information systems. The main risks include incomplete corpora, errors in the source data, algorithmic elimination, knowledge obsolescence, incorrect interpretation of the text and excessive dependence of the researcher on automatic

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recommendations. Therefore, KB-IT should ensure the transparency of sources, clarity of results, the possibility of audit and critical review.

Hybrid architecture of Knowledge-Based IT in literary studies. Promising KB-IT can include several interconnected levels: digital sources and corpora; NLP and machine learning; knowledge layer with ontologies, thesauri and knowledge graphs; mechanisms for semantic search and logical inference; user level of interaction with the literary scholar. A special perspective is the integration of KB-IT with large language models. With a specialized knowledge base, LLM can act as an intelligent interface for searching, comparing, and interpreting information, and the knowledge layer can provide subject-specific relevance and verifiability of results. Thus, a hybrid intelligent research environment [10] that combines KB-IT, NLP, machine learning, knowledge graphs, LLM, and human expertise becomes promising.

Main advantages and limitations of KB-IT application. The main advantages of KB-IT include the systematization of various literary knowledge, intelligent semantic search, identification of hidden connections, support for intertextual analysis, integration of various sources, and increased reproducibility of research procedures. At the same time, there are limitations associated with the difficulties of formalizing artistic meaning, ambiguity, metaphoricity, irony, and cultural conditioning of the text. Excessive formalization can simplify complex interpretations or impose a predetermined system of categories. Therefore, it is advisable to evaluate the effectiveness of KB-IT not by the level of automation, but by the ability to expand the intellectual capabilities of a literary scholar, while preserving the interpretive nature of humanitarian knowledge.

Conclusions.

Knowledge-Based IT forms a promising intellectual basis for digital literary studies, as it allows to move from the predominant processing of digital data to the structuring, integration and intelligent use of literary knowledge. Their fundamental specificity lies in the combination of data, semantic models, expert knowledge, inference rules and intelligent algorithms.

Unlike data-driven technologies, which are focused on identifying statistical patterns, KB-IT provides the ability to take into account the subject context, semantic

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relationships, literary categories and expert interpretations. This makes them especially significant for the analysis of literary texts as complex multi-level objects, the meaning of which is reduced to a set of statistical indicators.

It has been established that the most promising direction is the hybridization of Knowledge-Based IT, machine learning, NLP, knowledge graphs and large language models. Such integration allows combining the ability of algorithms to process large arrays of texts with the ability of knowledge-based systems to ensure semantic structuring, clarity and subject-matter relevance of results.

In the case of SHIVA and WARMI environmental concepts, the dynamism, adaptability, stability and clarity of KB-IT acquire special importance. Literary knowledge bases should be considered not as static repositories, but as dynamic systems capable of being updated, taking into account alternative interpretations, recording the origin of knowledge and adapting to changes in the research space.

The human-AI-knowledge collaboration model becomes promising, in which artificial intelligence performs the functions of searching, structuring, comparing and generating research hypotheses, and the literary scholar conceptualizes the problem, critically verifies and interprets the results. This approach allows preserving the fundamental principle of humanitarian research – the plurality and argumentation of interpretations – while significantly expanding its technological capabilities.

Thus, Knowledge-Based IT in modern literary studies should be considered not simply as a set of digital tools, but as a new intellectual infrastructure of philological knowledge, ensuring the transition to semantically-oriented, hybrid and adaptive digital literary studies. In the conditions of dynamics of uncertainty, turbulence and systemic risks, it is the ability to integrate knowledge, data, algorithms and human expertise that becomes one of the key factors for the sustainable development of modern literary studies.

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