ABSTRACT

The explanatory note comprises 191 pages, including 13 figures, 8 tables, 1 appendix, and 22 references.

Relevance of the topic. The work addresses the lack of a universal platform for competitions between artificial intelligence algorithms that simultaneously supports multiple programming languages, provides detailed metrics, and offers interactive visualization. The proposed solution aims to gamify both the educational process and research experiments by ensuring safe code execution via Docker containers and transparent reproduction of game scenarios.

Research aim. To develop a web platform for organizing tournaments between artificial intelligence algorithms with support for several programming languages and integrated visualization of the game process.

Object of study: software for organizing and conducting competitions between artificial intelligence algorithms for educational and research purposes.

Subject of study: methods and tools for implementing competitive platforms that support multilingual code execution and algorithm visualization.

To achieve the aim, the **following tasks** were formulated:

– investigate contemporary approaches to building competitive platforms, mechanisms for algorithm visualization, and methods for secure code execution;

– design a modular architecture that supports connecting multiple languages and new game engines through the GameEngine/BotExecutor interfaces;

– create a tournament management system with registration, launch, re-runs, and storage of replays;

– build a web interface with interactive visualization of game steps, legends, and metrics;

– conduct testing and document the results, including Swagger access to the API and monitoring of Docker containers.

Scientific novelty. Methods for gamifying the learning of algorithm development have been advanced: the proposed platform supports multilingual execution (Python, Java, with extensibility), team modes, and step-by-step replays with

detailed metric annotations, thereby expanding the toolkit for the practical study of artificial intelligence.

Practical significance. The developed system can be used in educational institutions for objective assessment of student solutions, in internal company hackathons, and in research laboratories for rapid creation of simulations and competitions between agents—while ensuring safe code execution and result visualization.

Relation to research programs, plans, and topics. The work was carried out at the Department of Informatics and Software (department/university name according to official records).

Approbation. The main results were presented at the VIII International Scientific and Practical Conference of Young Scientists and Students "Software Engineering and Advanced Information Technologies (SoftTech-2025)".

Publications. The research materials were published in the proceedings of SoftTech-2025 (section of the Department of Informatics and Software Engineering).

Keywords: COMPETITIVE PLATFORMS, ARTIFICIAL INTELLIGENCE, DOCKER-BASED ISOLATION, MODULAR ARCHITECTURE, VISUALIZATION.