1. Topic
Platform For Automated Verification Of Programming Test Tasks Fulfilment

2. Research Questions
- How can automated tools improve the efficiency and accuracy of code evaluation in educational and corporate settings?
- What security measures are essential for ensuring the safe execution of user-submitted code fragments?
- What features must be included in the first version of the platform to adequately serve the educational sector?

3. Working hypothesis
An automated, extensible platform for code evaluation can significantly improve the efficiency and accuracy of grading and assessment procedures. This platform will also incorporate adequate security measures to mitigate risks associated with executing user-submitted code.

4. Roadmap
The project will unfold in several interconnected phases to ensure a comprehensive understanding and robust implementation of the automated platform for code assessment. Initially, the focus will be on a comparative study of existing platforms like HackerRank, LeetCode, and CodeChef. This step aims to analyse their methodologies for automated code assessment and to identify best practices and potential areas for innovation.

Following this, a Minimum Viable Product (MVP) will be developed. The MVP will include basic but essential features such as the ability to create tasks, add test data, and conduct plagiarism checks on submitted code. This phase will serve as the basis for initial user testing, which will predominantly occur in educational settings. For the purposes of this study, ITMO University will act as the main test site, providing valuable data on the system's efficiency and accuracy.

Upon the completion of the user testing, data analysis will commence. This will involve computing quantitative metrics such as time saved, efficiency gains, and accuracy improvements. Qualitative feedback from educators and students will also be analysed to make informed decisions for future development.

The findings from the data analysis will then guide the refinement of the platform. New features will be incorporated based on the feedback and the platform's performance. For example, the number of supported programming languages may be expanded and different algorithms for issuing assignments could be integrated.

5. Work Cited

Working on the project will require a number of studies in various fields, primarily the study of modern approaches to automating the process of testing programming skills. To do this, the methods and practices of leading platforms such as HackerRank, LeetCode, CodeChef and a number of others were studied. Based on the collected information, a concept was built that best meets the needs of the educational process [1]. Another important area of research will be the search for optimal solutions to security problems. The solution is based on the need to run and test many code fragments downloaded by users. The code is executed in docker containers, and a separate image is created for each job. In this connection, security issues come to the forefront, as the system does not know in advance what the code fragment loaded for testing will do [2].

Also, when creating a task for each of the options and programming languages it will be possible to specify the main libraries used, which significantly speeds up the testing of tasks. For each task it will be possible to select available programming languages - for example Java or Python. The extensibility of the solution is that the number of programming languages can be increased as needed. The code testing will also use plagiarism checking, which will show the percentage of originality [3].

6. Keywords

Automated assessment; code evaluation; distance learning; programming training; skills assessment.

References

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