OPINION

by Assoc. Prof. Delyana Dimcheva Dimova, PhD; Agricultural University - Plovdiv

of a dissertation for awarding educational and scientific degree “Doctor”(Ph.D)

in the Area of Higher Education: 4. Natural sciences, Mathematics and Informatics
Professional Field: 4.6 Informatics and Computer Science
Doctoral Program: Informatics

Author: Ivan Marianov Ivanov

Topic: A Model and System for Automated Generation and Verification of Test Questions Using Artificial Intelligence

Scientific supervisors: Prof. Stanka Ivanova Hadzhikoleva, PhD; University of Plovdiv "Paisii Hilendarski" and Prof. Georgi Petrov Dimitrov, PhD, University of Library Studies and Information Technologies, Sofia.

1. General presentation of the procedure and the PhD student

By order No. RD-22-1413/17.07.2026 of the Rector of the University of Plovdiv “Paisii Hilendarski”, I was appointed as a member of the scientific jury in a procedure for the defense of the dissertation work on „ A Model and System for Automated Generation and Verification of Test Questions Using Artificial Intelligence” for obtaining the educational and scientific degree "Doctor" in the area of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.6 Informatics and Computer Science, doctoral program Informatics. The author of the dissertation is Ivan Marianov Ivanov - a full-time PhD student at the Department of Computer Informatics, with scientific supervisors Prof. Stanka Hadzhikoleva, PhD; University of Plovdiv “Paisii Hilendarski” and Prof. Georgi Dimitrov, PhD, University of Library Studies and Information Technologies, Sofia. The set of materials presented by Ivan Ivanov is in accordance with Article 36 (1) of the Regulations for Development of the Academic Staff of Plovdiv University "Paisii Hilendarski".

PhD student Ivan Ivanov received a Master's degree at the Faculty of Mathematics and Informatics at the University of Plovdiv “Paisii Hilendarski”. He speaks English.

2. Relevance of the topic

Artificial intelligence is entering education and is being used in various activities related to teaching, assessment, and managing the learning process. Technologies based on large language models and generative artificial intelligence are developing rapidly, offering new possibilities for the automated creation of educational content, support for teachers, and the personalization of learning. In this context, the issue under consideration in the current dissertation is topical, because it presents the development of an intelligent electronic testing platform that integrates the capabilities of generative artificial intelligence into a unified environment for creating, verifying,

managing, and assessing test content. In order to achieve the main objective, five tasks have been formulated in this dissertation.

3. Knowledge on the problem

PhD student Ivan Ivanov has studied the researched problem in details. The list of used references is up-to-date. A significant part of them covers the period from 2020 to 2026.

4. Research methodology

The dissertation research was carried out according to the following scheme: a study of existing electronic testing systems and identify the main functional and non-functional requirements for an intelligent electronic testing system; development of a conceptual model and architecture of an intelligent electronic testing platform, including mechanisms for the automated generation and verification of test questions through large language models; development of a module for automated adaptive assessment of learners, based on modern psychometric approaches and artificial intelligence; implementation of a software prototype based on the proposed model and conducting experimental studies to evaluate the quality and applicability of the developed solution.

The methodology applied by PhD student Ivan Ivanov is suitable for the purpose of the dissertation research.

5. Characteristics and evaluation of the dissertation and the contributions

The dissertation consists of 144 pages, divided into an introduction, four chapters, a conclusion, a list of used references, a list of publications related to the topic, and one appendix illustrating the creation of questions by one generative model and their verification by a second one. The list of used references includes 89 sources.

Chapter 1 presents an in-depth study of the possibilities for using artificial intelligence in education and the application of generative language models and chatbots in electronic testing. Chapter 2 proposes a conceptual model of an intelligent electronic testing system. The main user roles and functionalities, the platform architecture, the mechanisms for generating and verifying test questions through generative artificial intelligence, as well as some use cases, are presented. Chapter 3 presents the implementation of the proposed platform, the technologies used, the system structure, and the main software modules. The mechanisms for integration with large language models, the management of test content, and the implemented tools for automated assessment are described. Chapter 4 presents the results of the experimental studies conducted and the evaluation of the developed solution. The quality of the generated questions, the effectiveness of the verification mechanisms, and the applicability of the platform in a real educational environment are analyzed. The Conclusion provides an overview of the work carried out and the results achieved in relation to the defined tasks. The prospects for the future development of the conducted research are outlined.

The main contributions of the dissertation can be characterised as scientific, scientific-applied, and applied. The scientific contributions of the dissertation research are: a conceptual framework of an intelligent electronic testing platform based on generative artificial intelligence has been created and an approach for multi-model verification of test questions through the use of independent AI models has been proposed. Scientific-applied contributions are: a model of an intelligent platform for the automated generation of test questions through the use of generative language models and parameterized prompts has been developed, as well as a mechanism for automated quality assessment of generated questions through independent AI verification has been proposed. The applied contributions of the dissertation research are the following: a software prototype of an intelligent electronic testing platform has been implemented, including functionalities for the automated generation, verification, and management of test questions; experimental studies have been conducted, proving the applicability of the developed solution.

6. Assessment of the publications and personal contribution of the PhD student

PhD student Ivan Ivanov has presented 6 publications related to the topic of the dissertation work. One of these publications is indexed in Web of Science with IF=2,5 (Q2) and in Scopus with SJR=0.52 (Q2). Two other publications are indexed in SCOPUS. These three publications bring the author a total of 96 points. Thus, the requirement for acquiring the educational and scientific degree "doctor" for a minimum of 30 points from group "G" in professional field 4.6 Informatics and computer science is fulfilled. Five of the indicated works are presented in conference proceedings. All publications are co-authored. The doctoral student has participated in three scientific research projects. The presented citations are more than 30.

7. Abstract

The abstract is made according to the requirements and fully reflects the content, the main results and contributions of the dissertation work.

8. Recommendations for future use of dissertation contributions and results

I would recommend the PhD student Ivan Ivanov to present independent publications of his future research related to the considered dissertation topic.

CONCLUSION

The dissertation contains scientific, scientific-applied and applied results, which represent an original contribution to science, and meets all the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its application, and the corresponding Regulations of the University of Plovdiv „Paisii Hilendarski”.

The dissertation shows that the PhD student Ivan Ivanov has in-depth theoretical knowledge and professional skills in scientific specialty Informatics, demonstrating qualities and skills for independent conduct of scientific research.

Due to the above, I confidently give my positive assessment of the research presented by the above-reviewed dissertation, abstract, results and contributions, and I propose the highly respectable Scientific Jury to award the educational and scientific degree "Doctor" to Ivan Marianov Ivanov in the area of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.6 Informatics and Computer Science, doctoral program Informatics.

24.08. 2026 **The opinion worked out by**: .....

(Assoc. Prof. Delyana Dimova, PhD)