

Short review

of the thesis of Prof. Dr. Daniela Ananieva Orozova
“Application of data science in the virtual educational space”,
presented for awarding the scientific degree “doctor of science”
in Professional area 4.6 Informatics and computer science

by Prof. Dr. Maria Nisheva-Pavlova – Faculty of Mathematics and Informatics,
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Pursuant to Order 253/02.10.2023 of the Director of the Institute of Information and Communication Technologies I am nominated as a member of the scientific jury for the defense of the submitted thesis in professional area 4.6 Informatics and computer science, entitled “Application of data science in the virtual educational space”.

1. General characteristics of the dissertation and the presented materials

The dissertation contains 190 pages of text and includes an introduction, five chapters, conclusion, and a list of references.

In addition to the dissertation on the procedure, the following are also presented:

- abstracts in Bulgarian and English;
- a European-style CV;
- copy of diploma for educational and scientific degree “doctor”;
- list and copies of the candidate’s publications by dissertation results;
- reference for noticed citations of the candidate’s publications on dissertation results;
- certificate of fulfillment of the minimum requirements of the IICT for obtaining the scientific degree “doctor of science” in the professional field Informatics and computer science;
- full list of the candidate’s publications;
- reference for noticed citations of the candidate’s publications.

2. Applicant data

Prof. Daniela Orozova has Master’s degree in Informatics, acquired at the Faculty of Mathematics and Informatics of Sofia University St. Kliment Ohridski. In 2001, she defended her

PhD thesis entitled “Intelligent databases and tutoring systems”. She worked consequently at Sofia University as a senior assistant professor; at Burgas Free University as a senior assistant professor, chief assistant professor, associate professor and full professor, and from April 2022 he holds the academic position of “professor” at Trakia University – Stara Zagora. She worked on a second employment contract in institutes of the Bulgarian Academy of Sciences.

I have known Prof. Orozova since the time of her graduate study and her work at the Faculty of Mathematics and Informatics of Sofia University as well as in connection with our joint participation in two international projects.

3. Relevance of the research area and significance of the research problem

The dissertation is dedicated to research related to modeling the processes of retrieval and analysis of data from the interaction of objects with different roles in the so-called virtual educational space, and creation of new methods for solving scientific and applied problems in e-learning environment. The field of research in the dissertation is complex and topical, and its topicality is determined by the wide applicability and the significance of the expected results.

The goal of the dissertation and the tasks for achieving this goal, which the author formulates, are determined on the basis of an appropriately presented analysis of the achievements and open questions in the chosen field. The goal is significant and the tasks fully correspond to the goal.

4. Analysis of the content, results and contributions of the doctoral thesis

The dissertation consists of 190 pages of text and includes an introduction, five chapters, conclusion, and a list of references.

The introduction presents the field, the purpose and the tasks of research.

The first chapter is devoted to an analysis of the notion of a virtual educational space in the context of the concepts of the so-called big data and Internet of Things.

Chapter 2 discusses the current state of research and open questions in the chosen field.

In the third chapter, methods and techniques for analysis of data in the virtual educational space are proposed and analyzed.

The fourth chapter examines formal models of work processes and components of a virtual educational space based on generalized networks.

Chapter 5 proposes solutions to open scientific and applied problems in education based on the research and analyzes of the author of the dissertation in an educational environment.

The conclusion contains a summary of the obtained results and a formulation of ideas for continuing research in the field. References for contributions of the dissertation and the author's publications on the dissertation results are included as well.

The main scientific contributions of the doctoral thesis of Prof. Daniela Orozova may be summarized as follows:

- Methods have been developed for evaluating and predicting the knowledge, skills and competences of students in the virtual educational space.
- Models of hierarchical multicomponent assessment of high- and low-order thinking skills were created.
- A method is proposed for evaluating the degree of use of web-accessible resources by students when analyzing their behavior in an e-learning environment.
- A model of the student in an e-learning environment was created, which takes into account factors of competence, emotional factors and factors of impact of the social environment.
- A model of information flows during data processing in self-assessment in higher education was developed.

The main scientific applied contribution of the dissertation is the creation of software tools for analysis of sound frequencies and their conversion into colors in order to assist hearing impaired users.

The dissertation makes an excellent impression with the scope and depth of the presentation. The achieved results are original and significant and fully correspond to the defined goal.

5. Publications on the doctoral thesis. Reflection on the works of other authors

The author of the dissertation has more than 200 scientific publications, which are cited in more than 310 publications of other authors.

The results obtained in the dissertation are presented in a total of 41 scientific papers published in journals or books of conference proceedings, referenced and indexed in WoS and/or

Scopus. A total of 17 (therefore, not less than 15) of these papers are in issues with SJR, with 3 of them also in journals with IF.

All the publications were issued after the last procedure under the Act on Development of the Academic Staff in the Republic of Bulgaria, in which the author of the dissertation participated. Two of them are single-authored and the others are co-authored. I suppose that all co-authors contribute equally to each of the collective publications.

Data is presented for 66 citations of publications on the results of the dissertation in works of other authors, published in editions, referenced and indexed in WoS and/or Scopus.

In this way, the author of the dissertation accumulates a total of 640 points by group of indicators “Г” and 396 points by group of indicators “Д” and therefore fulfills and significantly exceeds the requirements of Art. 3 of the Regulations on the specific conditions for the acquisition of scientific degrees and for the occupation of academic positions at IICT – BAS for the acquisition of the scientific degree “doctor of science” in professional area 4.6 Informatics and computer science.

6. Abstract

The abstract meets all the requirements for its preparation and fully and accurately presents the topic, purpose, content, achieved results and contributions of the dissertation.

7. Critical Remarks and Recommendations

In general, the dissertation is designed carefully and correctly. The presentation is competent and sufficiently thorough. I have no significant critical comments to its content.

8. Summary

Summing up, I consider that the dissertation of Prof. Daniela Orozova fully satisfies and significantly exceeds the requirements of the national regulations and the specific conditions and requirements of the Institute of Information and Communication Technologies. Its author has achieved significant research results that make an original contribution to the chosen field of study. My assessment of the dissertation, the abstract and the scientific contributions of their author, Prof. Daniela Orozova, is **positive**.

Therefore, I advise the honorable scientific jury to award to Prof. Daniela Ananieva Orozova the scientific degree “doctor of science” in professional area 4.6 Informatics and Computer Science.

Sofia, November 9, 2023

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