

OPINION

**by Prof. Dr. Radoslav Dakov Yoshinov,
of the dissertation of prof. Dr. Daniela Ananieva Orozova,
on the topic: "Application of data science in the virtual educational space",
submitted for the acquisition of the scientific degree "Doctor of Science"**

The dissertation of prof. Dr. Daniela Ananieva Orozova, for acquiring the scientific degree "Doctor of Science" in scientific field 4. "Natural sciences, mathematics and informatics", professional field 4.6. "Informatics and Computer Science", on the topic "Application of Data Science in the Virtual Educational Space" was presented at a meeting of the Intelligent Systems Department of ICT-BAS on 11.09.2023, at which a decision was made to direct the dissertation for defense.

By Order No 253 / 02.10.2023 of the Director of the Institute of Information and Communication Technologies - BAS, I am included in the Scientific Jury for the protection of this dissertation.

As a member of the scientific jury, I have received a dissertation, an abstract to it and all the necessary administrative documents under the procedure. At the first meeting of the scientific jury on 03.10.2023 I was selected to write an opinion.

When writing the opinion on the dissertation, I have adhered to the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and its Implementing Regulations.

Prof. Dr. Daniela Ananieva Orozova has defended a dissertation on "Intelligent databases and training systems", for which she was awarded the educational and scientific degree "Doctor", with Diploma No 27403 of 16.07.2001 of the Higher Attestation Commission.

According to the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation (Decree No 202 of 10.09.2010, its amendments and supplements SG. No. 15 of 19.02.2019), it is set: According to Article 12(4) of the LAW on the Development of the Academic Staff in the Republic of Bulgaria, the Dissertation under paragraph 2 must contain theoretical generalizations and solutions to major scientific or scientifically applied problems that correspond to modern achievements and represent a significant and original contribution to science. The report presented by Prof. Dr. Daniela Ananieva Orozova shows that it meets the minimum national requirements

under Art. 2b, para. 2 and 3, as well as the requirements of Art. 12 para. 3 of the Law on Combating Organized Crime (RASRB).

The publications on the submitted dissertation are new and do not coincide with the publications in the previous competitions for the educational and scientific degree "Doctor", as well as in the content of the dissertation for the educational and scientific degree "Doctor", i.e. the requirements of Art. 12 para. 5 are met..

The aim of the study is theoretical generalizations of the processes of observation and analysis of data from the dynamic interaction of objects in a learning environment and the creation of methods and models for solving scientific or scientifically applied problems in the virtual educational space.

To achieve the goal, **four scientific tasks** have been formulated :

1. Analysis of the application of means for extracting knowledge from data in learning spaces and searching for solutions for personalization of e-learning and distance learning.

2. Creating methods for assessing and forecasting the knowledge, skills and competences of learners in the virtual educational space.

3. Creation of models as a result of theoretical generalizations of the processes of observation and analysis of the activities of the learners related to Big Data Analytics, Data Mining, , Web metrics, aggregated networks, machine learning and fuzzy logic. ,

4. Introduction of basic modules and tools of data science for solutions to scientific problems in training.

The presented dissertation on "Application of Data Science in the Virtual Educational Space" for acquiring the degree "Doctor of Science" has a volume of 190 pages, includes 49 figures and a bibliography of 220 literary sources. The text is organized in an introduction, five chapters and a conclusion.

The abstract in a volume of 60 pages (presented in Bulgarian and English) meets in volume and content the requirements for accurate, complete and concise reflection of the dissertation.

The scientific publications on the topic of the dissertation are 41 publications:

- 15 publications are in journal articles or series;

- 26 publications are from conference papers.

- 17 publications are in editions with SJR, 3 of them are in editions with

IF. According to the rules of IICT-BAS: "candidates for acquiring the degree of Doctor of Science must have at least 15 publications with IF/SJR

- all publications are in English and are issued after 2014 (after holding the academic position "Professor" in 2012).

- 1 textbook "Knowledge Representation in Artificial Intelligence Systems" has been published.

A list of 66 citations of 22 publications from the list on the topic of the dissertation, in the scientific bases Web of Science and Scopus, is presented. The leader of IICT-BAS requires 50 such citations.

. Thesis contributions

The re-reference for the contributions to the dissertation paper is given on pages 168 and 169. The contributions are scientific and scientifically applied in nature and can be summarized in both groups: enrichment of an existing scientific field with new knowledge and application of scientific achievements in practice:

I accept the formulated contributions of the dissertation, and I believe that they enrich the existing scientific field with new knowledge.

I have the following remark: The purpose of the dissertation is not clearly defined.

After getting acquainted with the dissertation paper presented and its publications and the contributions contained therein, I accept that the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria (RASRB) and its Implementing Regulations, as well as the Regulations on the Specific Conditions for Acquiring Academic Degrees and Occupying Academic Positions at the Institute of Information Communication Technologies – BAS. Expressing my positive assessment of the materials presented under the procedure, I recommend to the honourable the Scientific Jury to award the scientific degree "**D octor of Sciences**" to **prof. Dr. Daniela Ananieva Orozova**, in professional field 4.6. "Informatics and Computer Science", scientific field 4. "Natural Sciences, Mathematics and Informatics".

24.10.2023

Sofia

НА ОСНОВАНИЕ
ЗЗЛА