

STATEMENT REPORT

under the procedure for acquisition of the educational and scientific degree “Doctor”

by candidate Dafinka Savova Miteva,

of the PhD Thesis entitled: “*Big Data Visualization*”,

In the Scientific field: 4. Natural Sciences, Mathematics and Informatics

Professional field: 4.6. Informatics and Computer Sciences

Doctoral program “Information Technologies (Information and Communication

Technologies)”, Department „Information Technologies”,

Faculty of Mathematics and Informatics (FMI), Sofia University “St. Kl. Ohridski” (SU),

The statement report has been prepared by: prof. Pavel Hristov Boytchev, PhD, FMI, SU, as a member of the scientific jury for the defence of this PhD thesis according to Order № RD-38-153 / 03.04.2023 of the Rector of the Sofia University.

1. General characteristics of the dissertation thesis and the presented materials

A complete set of 37 documents covering the requirements for conducting a dissertation defence is provided for review. All documents are available in electronic format since 03.04.2023.

The dissertation of Dafinka Miteva has a total volume of 157 pages, the main part of which is 148 pages. The dissertation includes introduction, 7 chapters, conclusion, author reference, bibliography of 105 sources and 6 appendices. The dissertation has 102 figures, 9 tables and a list of used terms and abbreviations.

The layout and formatting of text, tables and figures is excellent and consistent. The style of language is academic, but comprehensible, avoiding the artificial complication of phrases. All other documents in the set (references, declarations, publications, etc.) are well and accurately prepared covering the required level of detail.

2. Personal impressions of the candidate

In my teaching and research activities at FMI, SU, I often come into contact with Dafinka Miteva in her role as head of the Sector “Electronic and Distance Learning” at the Laboratory “Information Services”. In all these contacts, she has proven herself as a specialist and willing to solve problems related to the use of ICT in student education. In the context of her participation in the doctoral program and the corresponding preparation of the dissertation, I

have had access to the early versions of the dissertation text. The preliminary recommendations have been carefully considered and reflected in the final version of the dissertation.

3. Content analysis of the scientific and applied achievements of the candidate, contained in the presented PhD thesis and the publications to it, included in the procedure

The dissertation of Dafinka Miteva is about the learning analytics in learning management systems and is focused on their visualization methods. Metrics, methods, platforms, and different types of visualizations are explored in order to create a prototype of a system for learning analytics. The use of ICT in education generates a large volume of collateral data. Their adequate systematization and analysis lead to a better understanding of the educational process and provides guidelines for its optimization both on behalf of teaching practices and on behalf of the students themselves.

The topic of the dissertation is significant because it addresses the use of generated collateral data that learning systems collect, but do not provide appropriate tools of analysing individual and aggregated data. The topic is also contemporary, because the concept of learning analytics as a way of measuring and analysing data for the goal to optimize learning was introduced only ten years ago.

Chapter 1 contains an overview of the scientific literature on the topic of the dissertation. Chapters 2 and 3 describe experiments with learning analytics and methods for visualization of data from learning systems. For working with large volumes of data and their visualization, studies were conducted with experts and are described in Chapter 4. The prototype of a model is described in the next three chapters: Chapter 5 proposes prototype's architecture, Chapter 6 presents its creation, and Chapter 7 describes the testing of the prototype.

The dissertation enumerates 7 research contributions related to Chapters 1 to 4. Additional 3 applied research contributions are described for Chapters 5 to 7. The contributions are well identified, original and are applicable in learning management systems.

4. Approbation of the results

The results of the dissertation are presented in 6 published papers - 5 in English and 1 in Bulgarian. Two papers are indexed in Web of Knowledge (WoS) and 3 are indexed in Scopus. One of the papers is in a publication with SJR 0.280 (2017) in Q2 in the Computer Science (miscellaneous) section. The candidate is the first author of all papers and her supervisor is a co-author. There are declarations of equal contribution of authors of all papers. The submitted materials describe 4 citations from papers indexed in WoS and Scopus.

The scientific works meet the minimum national requirements (under Art. 2b, para. 2 and 3 of ADASRB) and respectively to the additional requirements of Sofia University "St. Kliment Ohridski" for acquiring the educational and scientific degree "Doctor" in scientific field 4 and

professional field 4.6. The results do not repeat the applicant's previous results. No plagiarism has been legally established – the maximum permissible limits of three similarity criteria are 50%, 5% and 20%, and the dissertation scores 4.27%, 1.58% and 4.33%. No attempts to manipulate the text have been detected.

5. Qualities of the abstract

The abstract has a total of 39 pages and reflects correctly at a sufficient degree of completeness the structure, the content and the results of the dissertation work. The bibliography includes only the sources cited in the abstract.

6. Critical notes and recommendations

There are no notes or recommendations for the dissertation work. Although it is beyond its topic, there is a recommendation for future development of the system, which is currently at the prototype level – i.e. to analyse the impact of generative artificial intelligence systems (such as ChatGPT) in learning, and the new data that can be included in learning analytics. This may require changes to the visualizations used and the analytics available.

7. Conclusion

Having become acquainted with the PhD thesis presented in the procedure and the accompanying scientific papers and on the basis of the analysis of their importance and the scientific and applied contributions contained therein, **I confirm** that the presented PhD thesis and the scientific publications to it, as well as the quality and originality of the results and achievements presented in them, meet the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Rules for its Implementation and the corresponding Rules at the Sofia University “St. Kliment Ohridski” (FMI-SU) for acquisition by the candidate of educational and scientific degree “Doctor” in the Scientific field “4. Natural Sciences, Mathematics and Informatics”, Professional field “4.6. Informatics and Computer Sciences”. In particular, the candidate meets the minimal national requirements in the professional field and no plagiarism has been detected in the scientific papers submitted for the competition.

Based on the above, **I strongly recommend** the scientific jury to award Dafinka Savova Miteva, the educational and scientific degree “Doctor” in the Scientific field “4. Natural Sciences, Mathematics and Informatics”, Professional field “4.6. Informatics and Computer Sciences”.

Date: 29.V.2023

Signature:

Pavel Boytchev, prof, PhD