

OPINION

by **Prof. Maria Petkova Hristova, PhD**

of a doctoral dissertation for awarding educational and scientific degree Doctor (PhD)

Field of Higher Education: 4. Natural Sciences, Mathematics and Informatics

Professional field: 4.6. Informatics and Computer Science

Doctoral Programme: Informatics

Author: **Sebiha Ahmedova Madanska**

Subject: **SEMANTIC MODELLING OF THE BULGARIAN CULTURAL
AND HISTORICAL HERITAGE**

General description of the submitted materials and the PhD student

The opinion is prepared in accordance with order No. RD-21-200 of 26.01.2023 of the Rector of Paisii Hilendarski University of Plovdiv, by which I was appointed as a member of the scientific jury for providing the defense of dissertation procedure on topic: “*Semantic Modeling of the Bulgarian Cultural and Historical Heritage*” for awarding a Ph.D degree in professional field: 4.6. Informatics and Computer Science. Author of the dissertation is Sebiha Ahmedova Madanska, a full-time PhD student at the Department of Computer Systems, with scientific supervisor Prof. Dr. Stanimir Stoyanov, PhD. The submitted set of materials is in accordance with Art. 36 (1) of the Regulations for the Academic Staff Development of Paisii Hilendarski University of Plovdiv.

Sebiha Madanska holds a Bachelor's degree in “Information Technology, Mathematics and Educational Management” and a Master's degree in “Software Technologies with specialization in Artificial Intelligence Systems” from Paisii Hilendarski University of Plovdiv. Since 2019 she has been working as a Visiting Assistant Professor at PU, and since November 2022 she has been an Assistant Professor. She has also worked as a database system software expert. She is a member of John Atanasoff SAI. She has participated in one research project funded by the Scientific Research Fund at the Ministry of Education.

Relevance of the problem developed in the dissertation in scientific and applied aspect

The main focus of the dissertation is on the semantic modeling of the cultural and historical heritage of Bulgaria, with a focus on the houses from Bulgarian National Revival period. The aim of the dissertation is formulated as: building a unified ontology model with standardized data based on semantic representation for its subsequent integration into a network of ontologies for CHI under the name Cultural and Historical Heritage Ontology Network (CHH-OntoNet) and use for the purpose of an intelligent tourist guide.

Undoubtedly, the topic of this dissertation is relevant in computer science today and will remain so in the future, having in mind the increasing use of increasingly popular semantic models for representing knowledge in particular area. The significance of the topic is also determined by the fact that some Renaissance houses will leave only a digital trace of the past and this requires new approaches to the digitization of Bulgaria's cultural heritage. With their knowledge structuring capabilities, the semantic models that are subject of this dissertation are a suitable method of realizing these goals in various fields - informatics, architecture and construction, tourism, education, etc.

Knowledge of the problem, style and language

The clearly defined aim of the dissertation, the well-reasoned and concretely formulated four main tasks to achieve the aim, the literature review, analysis and conclusions testify to a very good knowledge of the doctoral candidate in the theoretical and applied aspect of the contemporary achievements in the problem area, subject of the research. From the dissertation and its bibliography, containing 277 literature and internet sources, it can be concluded that the doctoral candidate has thoroughly and carefully researched the resources available. The rules of proper language and scientific writing style for research papers have been observed. The text of the dissertation is clear, precise and analytical.

Research methodology

The methodology used to achieve the dissertation aim is adequate and appropriately chosen. The scientific methods applied are appropriate for a scientific research with an applied focus: research, comparative analysis, synthesis, generalization, realization, critical analysis of results. They contribute to achieving the main goal and fulfillment of the set research tasks, which is proved by the presented results.

Characteristics and evaluation of the thesis and contributions

The dissertation is 158 pages long and consists of an introduction, four chapters, a conclusion, a list of the scientific works on the dissertation, a list of papers presented at scientific conferences, a bibliography, a complete list of publications of the doctoral candidate. The graphical part of the work consists of 97 figures and 3 tables.

In the introduction the relevance of the topic is discussed, the aim and the tasks for its achievement are defined. A detailed review and analysis of the research problem is presented in Chapter 2, where the basic concepts of the problem area are defined. Chapter 3 is devoted to the approach to the semantic modelling of the field of interest chosen by the PhD student, based on the international standard for cataloguing cultural objects, as well as a formal model for describing the ontological modules of the project. Chapter 4 describes the semantic modelling in the context of the thesis and the development of the ontologies on the topic. Chapter 5 tackles the task of integrating the ontologies into one, for the purpose of testing them and possible application in different fields. A comparative analysis of Renaissance is made. The conclusion summarizes the results and achievements of the thesis.

A good impression leaves the finalization of each chapter, where the main conclusions, generalizations and analyses are synthesized, as well as Table 3, showing connections between the results, objectives, structure of the dissertation and the publications made.

The PhD student has pointed out some possibilities for future development of the considered model. I believe these directions for future work are correctly presented and achievable.

The results achieved in the dissertation are original and correspond to the set aim and objectives. I accept the main 4 contributions of the work summarized at the end of the dissertation, which, in my opinion, can be systematized as scientific and applied. They can be attributed to the categories of enrichment of existing scientific knowledge and scientific achievements in practice, as well as creation of new and modification of existing methods, approaches, models and algorithms for solving the problems set in the dissertation. I believe that the aim of the PhD has been achieved.

Assessment of dissertation publications and personal contribution of the PhD student

Sebiha Madanska has submitted four dissertation publications, 2 of which are individual. Three publications are indexed in SCOPUS and Web of Science (2 in Digital Presentation and Preservation of Cultural and Scientific Heritage and one in International Conference on Higher Education Advances (HEAd'22), Valencia, Spain), one publication is in the journal Cultural and Historical Heritage: Preservation, Presentation, Digitalization (KIN Journal). I accept that the results of this dissertation are well presented to the scientific community. I have no doubts that the dissertation and the results obtained are personal work of the doctoral candidate.

A note of one citation found has been submitted.

The minimum national requirements for obtaining a PhD degree in 4.6 Computer Science and Computer Engineering have been met, as well as the specific FMI requirements adopted in conjunction with Plovdiv University Regulations for the implementation of the Law for the Development of Academic Staff in the Republic of Bulgaria, according to which at least 30 points must be covered in indicator group D, and the PhD student has 54 points.

Abstract

The abstract complies in length and content with the requirements of the Law on PhD dissertation and the Regulations of Paisii Hilendarski University.

Critical remarks and recommendations

Although there is no established mandatory standard and rules for bibliographic citation of literature used in a dissertation, the method chosen here, in my opinion, makes it difficult for the reader. This remark does not detract much from the good impression of the dissertation presented.

I recommend the doctoral student to continue the research she has started, as the topic is highly applicable and has broad prospects for development.

CONCLUSION

The dissertation contains scientific and applied results that represent an original contribution to science and meet the requirements of the Law for Development of Academic Staff in Republic of Bulgaria, the Regulations for the Implementation of the Law for the Development of Academic Staff of Paisii Hilendarski University of Plovdiv.

I believe that the PhD student Sebiha Madanska is an erudite young scientist who possesses in-depth theoretical knowledge of the specialty "Informatics" and abilities for independent scientific research. All this gives me confidence to give a completely positive evaluation of the dissertation. I propose the honorable scientific jury to award the educational and scientific degree "Doctor" to Sebiha Ahmedova Madanska in the field of higher education: 4. Natural Sciences, Mathematics and Informatics, professional field 4.6 Informatics and Computer Science, doctoral programme "Informatics".

3.03.2023

Sofia

Prepared the opinion:

/Prof. Dr. Maria Hristova