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REVIEW
by Prof. Dr. Asya Georgieva Stoyanova-Doycheva
Faculty of Mathematics and Informatics,
Plovdiv University "Paisii Hilendarski"

on the dissertation thesis for the awarding of the educational and scientific degree "Doctor"

in the field of higher education:
4. Natural Sciences, Mathematics, and Informatics

professional field:
4.6. Informatics and Computer Science

doctoral program:
Informatics

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Author: *Tsvetomira Ivanova Kazashka*

Title: *Development of an Ontology of Bulgarian Dance Folklore*

Scientific Supervisors:
Prof. Dr. Stanimir Nedialkov Stoyanov, Faculty of Mathematics and Informatics, Plovdiv University "Paisii Hilendarski"
and
Prof. Dr. Daniela Kirilova Djeneva, Academy of Music, Dance and Arts "Prof. Asen Diamandiev" - Plovdiv.

1. General Description of the Submitted Materials

By Order No. РД-22-487 dated February 21, 2025, issued by the Rector of Plovdiv University "Paisii Hilendarski" (PU), I was appointed as a member of the scientific jury for the procedure of defending the dissertation thesis titled "Development of an Ontology of Bulgarian Dance Folklore". This dissertation is submitted for the awarding of the educational and scientific degree "Doctor" in the field 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 Tsvetomira Ivanova Kazashka, a full-time doctoral student in the Department of Computer Systems at PU, under the supervision of Prof. Dr. Stanimir Nedialkov Stoyanov from the Faculty of Mathematics and Informatics (FMI) at PU and Prof. Dr. Daniela Kirilova Djeneva from the Academy of Music, Dance and Fine Arts "Prof. Asen Diamandiev" - Plovdiv.

The materials submitted by Tsvetomira Ivanova Kazashka on an electronic storage device comply with Article 36 (1) of the Regulations for the Development of the Academic Staff at PU and include the following documents:

- Application to the Rector of PU for initiating the dissertation defense procedure;

- Curriculum Vitae in European format;

- Protocol from the Departmental Council, related to the report on the readiness for initiating the procedure, along with a preliminary discussion of the dissertation and the opinions of the scientific supervisors;

- Dissertation thesis;

- Abstract – in both Bulgarian and English;

- List of scientific publications related to the dissertation;

- Reference for meeting the minimum national requirements for acquiring the PhD degree;

- Copies of scientific publications;

- Declaration of originality and authenticity of the submitted documents.

The doctoral student has submitted two scientific publications related to the dissertation topic.

2. Brief Biographical Data of the Doctoral Student

Tsvetomira Ivanova Kazashka completed her bachelor's degree in the period 2009 – 2013 in Information Physics and Communications at Plovdiv University "Paisii Hilendarski", obtaining the qualification of Engineer-Physicist. She continued her education with a master's degree in Investment Management in Telecommunications at the same university from 2013 to 2015. In 2021 – 2022, she completed a second master's degree in Library, Information, and Cultural Management at University of Library Studies and Information Technologies (ULSIT). From 2019 to 2024, she was a doctoral student at Plovdiv University "Paisii Hilendarski", affiliated with the Department of Computer Systems at the Faculty of Mathematics and Informatics (FMI).

Her professional career began in 2010 – 2012 as a technical secretary at Plovdiv University "Paisii Hilendarski". From 2019 to 2020, she worked as an administrative specialist with control functions at Academy of Music, Dance and Fine Arts "Prof. Asen Diamandiev" – Plovdiv. Between 2020 and 2023, she held the position of expert in administrative services at the same institution. In 2022 – 2023, she was the head of the Library Department, and since 2023, she has been both a lecturer and the head of the same department. She teaches courses such as: "Presentations and Digital Technologies", "Digital Marketing and Advertising", "Bibliotherapy".

Tsvetomira Kazashka actively participates in scientific and cultural events, including European Researchers' Night from 2010 to 2023. She is also the local contact person for EURAXESS at Academy of Music, Dance and Fine Arts "Prof. Asen Diamandiev" – Plovdiv, and a member of the Bulgarian Library and Information Association.

3. Relevance of the Topic and Appropriateness of the Objectives and Task

The dissertation topic is focused on the development of semantic models in the field of Bulgarian dance folklore. Given the increasing digitalization of cultural heritage and the integration of artificial intelligence in various domains, the creation of structured, standardized, and machine-readable models for representing cultural practices is of paramount importance. Semantic modeling enables the preservation, analysis, and utilization of knowledge about Bulgarian dances in various intelligent systems, thereby supporting scientific research, education, and the promotion of Bulgarian intangible cultural heritage.

The main objective of the dissertation is to develop an ontological model for Bulgarian folk dances, ensuring a formal semantic representation of knowledge that can be integrated into a network of cultural heritage ontologies. This will enable the creation of an intelligent platform for analysis, categorization, and recommendations in the field of dance folklore. This objective aligns fully with modern trends in the digitalization of cultural heritage and the application of semantic technologies for the structured representation of knowledge.

4. Understanding of the Problem

Tsvetomira Kazashka demonstrates in-depth knowledge of the researched problem, as evidenced by the extensive bibliographic reference list in her dissertation, which includes 114 sources. In Chapter 2, "Scientific Review", she provides a detailed analysis of existing ontologies, semantic models, and ontology modeling languages. She explores the principles of ontology modeling within the context of the Semantic Web and their application in various fields, with a particular focus on their role in the digitalization of cultural and historical heritage.

The doctoral candidate places a strong emphasis on the specifics of Bulgarian dance folklore and the necessity of its semantic modeling, analyzing different folklore regions, dance style characteristics, and associated cultural elements. To develop the ontology of Bulgarian dance folklore, she utilizes a wide range of sources, including ethnographic studies, audiovisual materials, and works by renowned choreographers.

A key aspect of her research is the analysis of dance works by Prof. Kiril Djenev, which ensures the authenticity and scientific validity of the proposed model. To guarantee the accuracy and reliability of the collected data, the doctoral candidate has conducted detailed validation through consultations with folklore experts, as well as through a review of documents and materials related to Bulgarian intangible cultural heritage.

The knowledge modeling structure used in her research follows the Virtual Physical Space (ViPS) concept, which has already been successfully applied to the digitalization of various aspects of cultural and historical heritage.

All these factors indicate that Tsvetomira Kazashka has a profound understanding of the research field, applies well-established methodological approaches, and works on a relevant and significant problem. The semantic modeling of Bulgarian dance folklore provides new opportunities for its preservation, analysis, and promotion in the digital space, making it a key tool in the efforts to digitalize intangible cultural heritage.

5. Research Methodology

The research methodology follows the defined objective. The process begins with an analysis of Bulgarian dance folklore, examining its regional and stylistic characteristics. Next, international ontological standards and semantic modeling methods are reviewed to determine their applicability in the description of traditional dances.

In the subsequent stage, a hierarchical knowledge model is structured, defining key classes and their relationships. Finally, in the concluding phase, the architecture and implementation of a prototype ontology for Bulgarian folk dances is presented, detailing the tools and validation methods used.

The developed model ensures a semantic representation of knowledge and has the potential to be integrated into digital platforms for further analysis, classification, and dissemination of Bulgarian dance heritage.

6. Characteristics and Evaluation of the Dissertation

Tsvetomira Kazashka's dissertation consists of 142 pages, including 52 figures, 15 tables, and 114 references. It incorporates scientific publications from the fields of informatics, computer science, and the arts. In addition to the main text, the dissertation includes five appendices,

featuring a list of figures, tables, publications, projects, and additional visual materials, bringing the total volume to 155 pages.

The dissertation is structured into an introduction, four chapters, a conclusion, and a bibliography:

The ***introduction*** presents the research problem, along with the objectives and tasks of the dissertation.

Chapter One provides a theoretical analysis of the current state of research, discussing the relevance of the topic, formulated objectives, hypotheses, and the methodology for achieving the research results.

Chapter Two offers a scientific review on the creation of an ontology of Bulgarian dance folklore, covering key concepts such as ontology, semantic models, the Semantic Web, ontology languages, and cultural object cataloging standards. A particular focus is placed on the Virtual Physical Space (ViPS) concept, which introduces new methods for interaction with physical and digital objects.

Chapter Three analyzes Bulgarian dance folklore and its characteristics, examining different folklore regions and methods for dance classification. The chapter also presents a qualification framework matrix, which serves as the foundation for building the ontology. Additionally, it includes a study of ten works by Kiril Djenev, which have been incorporated into the model.

Chapter Four is the core part of the dissertation, focusing on the development of the hierarchical structure of Bulgarian dance folklore and the creation of the ontology prototype. It describes the visualization methods for representing dances and presents the ontological model's metric data.

The ***conclusion*** summarizes the findings of the dissertation, highlighting its scientific and practical contributions and outlining directions for future research. It systematizes the results and emphasizes the potential integration of the developed ontology into larger digital platforms for cultural heritage preservation.

The dissertation demonstrates scientific contribution and practical applicability in the digitalization of Bulgarian folklore. The developed ontology provides a scientifically grounded classification and structuring of folk dances in a digital format, facilitating their preservation, analysis, and utilization in intelligent systems and educational platforms.

7. Contributions and Significance of Research for Science and Practice

The contributions of Tsvetomira Kazashka's dissertation are both scientific-applied and practical. The research defines four key results, which align with the set objectives and tasks:

1. Study and analysis of Bulgarian dance folklore – A comprehensive examination of Bulgarian folk dances has been conducted, analyzing folklore regions and stylistic characteristics. Classification frameworks have been proposed to systematize the dances and structure the information within an ontological model.
2. Development of a prototype ontology for Bulgarian dance folklore – A semantic model has been designed, following established ontology modeling methods. The model defines key classes, relationships, and properties that describe folk dance as an art form.
3. Implementation of the ontology prototype – Modern ontology languages and standards have been applied to develop a digital model of the dances. The project is based on the Virtual Physical Space (ViPS) concept, ensuring integration capabilities with other cultural heritage ontologies.
4. Integration and application of the ontology – The model has been verified using a reasoner, an analysis of its metric characteristics has been conducted, and SPARQL query examples have been created. The project has potential applications in educational platforms, digital archives, and cultural heritage promotion systems.

Each of these tasks corresponds to the developments in different chapters of the dissertation, demonstrating the achievement of the research goal. Additionally, the study contributes to modern digitalization technologies and the structured representation of cultural data, providing a foundation for future expansions and integrations into larger projects for the preservation and analysis of intangible cultural heritage.

I consider that the achieved results comply with the regulatory requirement to constitute an "original scientific contribution" (Article 27(1) of the Regulations for the Development of Academic Staff in the Republic of Bulgaria).

8. Evaluation of Publications Related to the Dissertation

The author has submitted a list of two publications in international conference proceedings. Both publications are in English and co-authored. One publication is indexed in Web of Science and SCOPUS and the other publication is indexed in SCOPUS. This meets the minimum national requirements set by the Regulations for the Implementation of the Law on the

Development of Academic Staff in Bulgaria, which mandates at least 30 points in group G indicators. The doctoral candidate exceeds this requirement, having accumulated 36 points. All tasks and corresponding results from the dissertation are reflected in the two publications. Additionally, the dissertation appendices include information on the doctoral candidate's participation in projects, which consist of 3 international projects, 7 national projects and 3 internal projects at the Academy of Music, Dance, and Fine Arts "Prof. Asen Diamandiev" – Plovdiv. However, a formal confirmation document from the organization related to the candidate's project participation has not been included in the competition documentation.

9. Personal Contribution of the Doctoral Candidate

I have no doubts regarding the personal contribution of Tsvetomira Kazashka to the dissertation research conducted and the achievement of the corresponding scientific-applied and practical results. According to the legally established procedures, I have not identified any plagiarism in the dissertation.

10. Abstract

The abstract is submitted in accordance with the requirements in both Bulgarian and English. It consists of 32 pages and meets the volume and content requirements for an accurate, complete, and concise reflection of the dissertation.

11. Questions and Recommendations

I have the following questions for the doctoral candidate:

1. The dissertation develops a classification framework for Bulgarian dance folklore. My question is: Is the categorization based on international standards for dance terminology, or is it entirely built on national ethnographic research?
2. The ontology covers Bulgarian dance folklore, but it is not entirely clear whether it could be adapted to include other folklore traditions. Does the model have potential for expansion to incorporate dance practices from other cultures, or is it strictly specific to Bulgarian tradition?
3. The dissertation proposes an ontological model, but to what extent is it compatible with existing ontologies for intangible cultural heritage? Have existing ontologies in related fields, such as music, folk costumes, or folklore rituals, been studied for potential integration with the developed system?

4. The ontology development was done manually, but have methods for automated knowledge extraction been considered? For example, could machine learning or NLP (natural language processing) be used to populate and expand the ontology with new data?

5. The dissertation examines how the ontology can be used for analysis and preservation of folklore knowledge, but are there specific scenarios for its real-world application? For instance, is there a plan for integration into museums, educational platforms, or interactive tourism applications?

6. The developed ontology is presented through semantic modeling, but could it be used in an interactive visualization environment? For example, could dance movements or rhythms be represented through animation or graphic modeling to make the knowledge more accessible and interactive for users?

7. Every semantic model has its limitations. What are the main limitations of the developed ontology? For example, are there challenges related to representing variations in dances that are characteristic of different regions?

Despite these remarks, which do not affect the quality of the presented dissertation, I must emphasize that the dissertation topic is highly relevant, and the results achieved deserve high recognition. The doctoral candidate has demonstrated in-depth knowledge in the field and the ability to conduct independent scientific research.

12. Personal Impressions

I know Tsvetomira Kazashka as a doctoral student in the Department of Computer Systems at the Faculty of Mathematics and Informatics (FMI) of Plovdiv University. I can affirm that she has diligently and responsibly fulfilled her tasks related to her dissertation research.

Conclusion

The dissertation contains scientific-applied and practical results, which represent an original contribution to science and meet all the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation, and the corresponding regulations of Plovdiv University "Paisii Hilendarski". The submitted materials and dissertation result fully comply with the minimum national requirements outlined in the Regulations for the Implementation of the Law on the Development of Academic Staff in the Republic of Bulgaria.

Based on the above, I confidently provide a positive evaluation of the conducted research, as presented in the reviewed dissertation, abstract, achieved results, and contributions. I recommend that the honorable scientific jury awards the educational and scientific degree "Doctor" to Tsvetomira Ivanova Kazashka in the field of higher education 4. Natural Sciences, Mathematics, and Informatics, professional field 4.6. Informatics and Computer Science, doctoral program Informatics.

10.03.2025

Reviewer: ....

Prof. Dr. Asya Stoyanova-Doycheva