OPINION

by Prof. Desislava Ivanova Paneva-Marinova, PhD

Institute of Mathematics and Informatics, Bulgarian Academy of Sciences

on the Dissertation for awarding educational and scientific degree "**doctor**" (PhD),

in the Area of Higher Education 4. Natural Sciences, Mathematics and Informatics,

Professional Field 4.6. Informatics and Computer Sciences

PhD Program „Informatics"

Author: Gergana Petkova Mateeva

Topic: Modeling and Optimization of Communication Strategies in Information Process Management

Scientific supervisor: Prof. Tatyana Atanasova, PhD, Institute of Information and Communication Technologies, Bulgarian Academy of Sciences

1. General presentation of the procedure and the PhD student

In accordance with Order № 265 from 31.10.2025 of the Director of the Institute of Information and Communication Technologies, Bulgarian Academy of Sciences (IICT-BAS) I have been appointed as a member of the Scientific Jury to provide the procedure for the defense of a dissertation titled "Modeling and Optimization of Communication Strategies in Information Process Management" Gergana Petkova Mateeva for awarding the educational and scientific degree "doctor" in the Area of Higher Education 4. Natural Sciences, Mathematics and Informatics, the Professional Field 4.6. Informatics and Computer Sciences of the PhD Program "Informatics". The author is a PhD student at the Department "Modelling and optimization" at IICT-BAS, with scientific supervisor Prof. Tatyana Atanasova, PhD, IICT-BAS.

The presented Opinion is made in accordance with the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Rules for its implementation and the Rules on the Specific Conditions for Acquiring Science Degrees and Holding Academic Positions in IICT-BAS.

The presented by Gergana Petkova Mateeva set of materials is in accordance with Article 6 (1) of the Rules on the Specific Conditions for Acquiring Science Degrees and Holding Academic Positions in IICT-BAS.

2. Relevance of the topic

The dissertation presents the results of research related to the use of information and communication technologies (ICT) for providing information and managing information processes. In par-

ticular, it examines the combination of ICT technologies with other techniques and methods for heuristic optimization and artificial intelligence-driven approaches to optimizing strategies in information process management. The study proposes models and methods for optimizing communication strategies in distributed digital environments with limited resources. The development is topical and of great scientific and applied interest.

3. Knowledge of the problem

The realization of the dissertation goal requires in-depth theoretical knowledge and practical skills in the field of study. It is evident from the dissertation and the materials presented that the PhD student has a solid theoretical background into modern technologies required to achieve the research objectives. She demonstrates good knowledge of the research object and performs clearly formulated the tasks leading to specific results. The research is presented competently and with well-founded analyses and inferences.

4. Characteristics and evaluation of the dissertation and contributions

The dissertation of Gergana Mateeva contains 135 pages presented by a table of contents, a abbreviations and glossary of terms used in the dissertation, an introduction, a structure of the dissertation, three chapters, a conclusion - a summary of the results obtained, guidelines for future development, list of author's publications on the topic of the dissertation, list of noted citations, participation in research projects, declaration of originality of the results, bibliography of 135 references in English.

The **aim and objectives** of the study are presented at the end of Chapter 1, "Contemporary Trends in the Development of Communication Strategies for Information Process Management", which is a natural conclusion to the extended review of the current state and contemporary trends in the development of communication strategies for information process management.

Chapter 2 focuses on presenting the proposed heuristic methods, specifically a DNA-inspired modification of genetic algorithms and adaptive approximation of target functions for optimizing communication strategies in information process management.

Chapter 3 describes models that enable the effective application of the developed heuristic methods on heterogeneous mobile and IoT devices in distributed digital environments with limited resources. Technical and architectural aspects of information flow management are discussed with detailed implementation.

The **Conclusion** presents a summary of the results obtained and outlines directions for future research and development.

The dissertation is clear and concise. The problem area is competently and critically analyzed. The models, methods, and approaches developed are presented in detail.

The following scientific and applied contributions can be highlighted:

- The proposed approaches for improving the efficiency of genetic algorithms in network environments;

- The developed architectural model for the practical implementation of computationally intensive optimization algorithms on heterogeneous mobile and IoT devices with limited resources;

- The created applied model for intelligent monitoring and data processing in the field of smart agriculture, validated in a real research project.

5. Assessment of publications and personal contribution of the PhD student

The author's list of publications on the topic of the thesis includes 7 titles, 6 of which are currently indexed in Scopus and/or Web of Science. All publications are in proceedings of international conferences. All publications are in English. In six publications Gergana Mateeva is first author. All publications are co-authored. There are 22 citations.

Having read the dissertation and the submitted materials, I believe that the formulated scientific and applied results are the personal work of the PhD student. The PhD student is the first author in most of the publications.

6. Abstract

The abstract is 45 pages long and correctly reflects the structure of the dissertation, the results obtained and the conclusions drawn from the study. The requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Rules for its implementation and the Rules on the Specific Conditions for Acquiring Science Degrees and Holding Academic Positions in IICT-BAS have been met.

7. Remarks and questions

I have some remarks that are not critical: The list of literary sources contains some with incomplete data (see 61, 66, 72, *etc.*). It is recommended that the PhD student publish her scientific results in scientific journals.
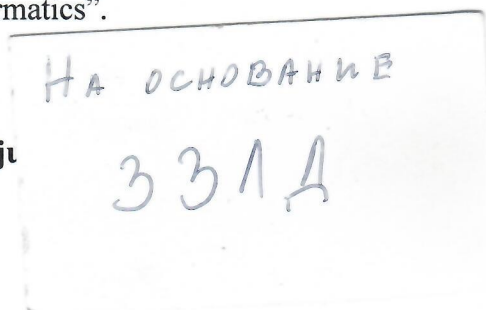
CONCLUSIONS

The dissertation *contains scientific and applied results, which represent an original contribution to science* and *meet all the requirements* of the Law for the Development of Academic Staff in the Republic of Bulgaria, the Rules for its Implementation and the Rules on the Specific Conditions for Acquiring Science Degrees and Holding Academic Positions in IICT-BAS.

The dissertation shows that the PhD student Gergana Petkova Mateeva **possesses** in-depth theoretical knowledge and professional skills in the scientific specialty "Informatics", **demonstrating** qualities and skills for independent scientific research.

Due to the above, I give my *positive evaluation* for the conducted research, presented in the dissertation, abstract, achieved results and contributions, and *I propose the honorable Scientific jury to award educational and scientific degree "doctor"* to Gergana Petkova Mateeva in the Area of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.6. Informatics and Computer Sciences, PhD Program "Informatics".

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На основание

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