

OPINION

from professor Daniela Borissova, D.Sc.
member of the Scientific jury appointed by the Director of the Institute of Information and
Communication Technologies at the Bulgarian Academy of Sciences
by order No 277 from 06 of November of 2024

About: PhD Dissertation by Edjola Kristaq Naka on the topic "Optimization Algorithms for Data Management", submitted for the award of the educational and scientific degree "Doctor" in the doctoral program "Informatics", professional field 4.6. "Informatics and Computer Sciences", scientific field 4. "Natural Sciences, Mathematics and Informatics"

At the first meeting of the scientific jury, held on November 8, 2024, I was assigned to prepare a statement on the procedure, for which I received all the necessary documents.

ACTUALITY

The data industry generates about 2.5 quintillion bytes of data per day, most of which are sources from official government statistics, the Internet, social media, digital photos, communication environments, IoT and other business and service providers. On the other hand, the increase in life expectancy is associated with an increase in neurological disorders such as Alzheimer's and other dementias, stroke and Parkinson's. This requires global health policies to not only focus on survival, but also to minimize health loss due to disability. The management and study of such data pose significant challenges in terms of both storage and processing, as well as confidentiality. Proper understanding and analysis of this data are essential for decision-making, which is a prerequisite for searching and researching effective optimization algorithms and methods for reducing and selecting the most prominent features from the generated data. Therefore, the use of machine learning classifiers with a focus on improving the efficiency and execution time of Parkinson's prediction algorithms is a current research direction.

KNOWLEDGE OF THE RESEARCH PROBLEM

From the overview made, as well as from the published results on the topic of the dissertation, it can be established that the doctoral student is well aware of the nature of the researched issues. Additional evidence of this is the bibliography, containing 287 citing sources.

ANALYTICAL CHARACTERISTICS

The dissertation work of Edjola Kristaq Naka has a total volume of 165 pages, including 25 figures, 33 tables and 287 cited sources. It is structured as follows: introduction, 3 chapters, conclusion - summary of the results obtained, contributions, list of publications on the topic of the dissertation research, noted citations of the publications, declaration of originality of the results, bibliography and lists of the tables and figures used. On page 52 the goal of the dissertation research is defined, for the implementation of which 7 tasks are formulated.

Chapter 1 presents general concepts and definitions for the use of optimization methods and algorithms in various key areas of data management, with a focus on the problem of feature selection. The concepts of metaheuristic optimization algorithms, their application in feature selection, and the role of machine learning classifiers in feature selection are summarized. Practical progress in improving metaheuristics, developing hybrid metaheuristics, and combining them with other feature selection techniques for Parkinson's disease prediction are presented.

Chapter 2 describes the proposed new metaheuristic algorithms, methods and improvements that are used for feature selection in Parkinson's prediction. The volleyball Premier League algorithm is the main metaheuristic algorithm on the basis of which the proposed metaheuristic algorithms are implemented. Due to the fact that this algorithm has not been used for similar purposes as feature selection, modification and adaptation are necessary for this purpose.

Chapter 3 presents the results of experiments conducted to confirm the applicability of proposed algorithms, methods, and improvements described in Chapter 2.

ABSTRACT AND AUTHOR REFERENCE

The presented abstract faithfully reflects the content of the dissertation work and complies with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASPB) and Regulations for its implementation. From the presented declaration of originality, as well as from the publications on the topic of the dissertation, it can be determined that the described results are the author's personal work. It should also be noted that in all 7 publications the doctoral student is the first author. In addition, it should be noted that the report from the check on the Strikeplagiarism.com platform showed that the similarity coefficient is less than 15%, which proves the originality of the described results of the conducted research.

ASSESSMENT OF COMPLIANCE WITH THE MINIMUM NATIONAL REQUIREMENTS AND WITH THE ADDITIONAL REQUIREMENTS UNDER ART. 1A, AL. 2 OF THE REGULATIONS FOR IMPLEMENTATION OF LDASPB

A total of 7 publications on the topic of the dissertation are presented, 1 of which is in an IF edition, 3 and the rest are in editions that are referenced and indexed in world-renowned databases of scientific information (AMC, Scopus, Web of Science, IEEE). The doctoral

student is an independent author of 4 of the publications, and in the rest she is the first author. Therefore, according to the Regulations for implementation of LDASPB, the presented publications on the topic of the dissertation research have the equivalent of 96 points, which is 3 times more than both the minimum national requirements and the specific requirements of IICT-BAS of 30 points for acquiring the educational and scientific degree "Doctor".

CONTRIBUTIONS

I accept the contributions formulated by the doctoral student, evaluating them as scientific and applied contributions leading to the enrichment of existing knowledge.

CRITICAL COMMENTS AND RECOMMENDATIONS

I have no critical remarks. I personally know Edjola Kristaq Naka during her studies at IICT-BAS, who has proven herself to be a motivated and active scientist in the field of informatics and computer science.

FINAL COMPREHENSIVE EVALUATION

The results obtained on the topic of the dissertation research convincingly show that Edjola Kristaq Naka possesses the necessary theoretical knowledge and practical skills in the field of informatics and computer sciences, as well as proven abilities for independent scientific research. The presented dissertation work meets the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, as well as the Regulations on the Specific Conditions for Acquiring Scientific Degrees and for Holding Academic Positions at the Institute of Information and Communication Technologies at Bulgarian Academy of Sciences. **The results obtained on the topic of the dissertation research give me sufficient reason to give a categorically positive assessment of the presented dissertation work and I propose to the esteemed Scientific Jury to award Edjola Kristaq Naka the educational and scientific degree of "doctor" in the doctoral program "Informatics", prof. field "Informatics and Computer Sciences".**

06 January 2025

Member of the

