

# OPINION

by Prof. Dimitar Nedelchev Karastoyanov, PhD  
from the Institute of Information and Communication Technologies,  
at the Bulgarian Academy of Sciences, on the Thesis for awarding educational and  
scientific degree PhD, in Scientific sphere 5. Technical sciences under the Professional  
area 5.2 Electrical engineering, Electronics and Automation, PhD program 02.21.10.  
Application of the principles and methods of cybernetics in various fields of science  
(technical, medical, biocidebenetics, legal, etc.)

Author of the PhD Thesis: **Bistra Yulianova Zaharieva**  
PhD Thesis Title: "Intelligent methods for analysis of rehabilitee processes"

In accordance with Order No. 257 from 28.12.2018 of the Director of the Institute of Information and Communication Technologies, at the Bulgarian Academy of Sciences, I have been appointed as a member of the Scientific Jury regarding the PhD thesis of Bistra Yulianova Zaharieva for awarding the educational and scientific degree "Doctor of Philosophy" (PhD).

Bistra Yulianova Zaharieva is a PhD student at the Institute of Information and Communication Technologies in the Department of Intelligent Systems. By decision of the Scientifically Council of the Institute of Information and Communication Technologies (Protocol No. 9 from 19.12.2018) she has been directed to PhD thesis defense. Her scientific advisor is the Head of the Department - Prof. Lyubka Atanassova Doukovska, PhD, DSc.

The dissertation work has a volume of 148 pages. Structured in introduction, four chapters, conclusion, contributions of dissertation, declaration of results originality, list of publications on the dissertation and list of 155 literary sources.

The goal of dissertation thesis is by means of intelligent systems to develop highly efficient intelligent methods for the analysis of rehabilitation processes. In order to achieve this goal, the following tasks have been formulated:

1. Systematize existing intelligent methods for analysis of rehabilitation processes;
2. To propose a methodology for the analysis of rehabilitation processes for patients with socially significant diseases;
3. Develop generalized networking models of rehabilitation processes for patients with musculo-skeletal complaints and for patients with fractures in the proximal part of the shoulder bone;
4. Implement intelligent methods of analysis of rehabilitation processes for patients with ankylosing spondyloarthritis - Behterev's disease, in order to achieve higher efficiency of the rehabilitation processes;
5. Apply intelligent methods of analysis of rehabilitation processes for patients with chronic degenerative disease of the knee joint - Gonarthrosis, to achieve higher efficiency of the rehabilitation processes;
6. Systematize the legal aspects of using data related to the physical state of patients in the hospital environment.

The achieved original results in the dissertation are presented in three international conferences - 21st International Conference on Intuitionistic Fuzzy Sets - ICIFS 2017, Burgas, Bulgaria, 13th International Workshop on Intuitionistic Fuzzy Sets - IWIFS 2017, Banská Bystrica, Slovakia, 9th IEEE International Conference on Intelligent Systems - IS 2018, Madeira Island, Portugal and in one national - Scientific session "Biomedicine and Quality of Life - Young in Science", organized by the Institute of Biophysics and Biomedical Engineering - BAS, 2016, Sofia, Bulgaria.

I believe that the goal set, the tasks formulated and the results achieved reflect the topicality and significance of the presented dissertation work.

There are six publications submitted on the dissertation. The quality of the presented works have been proven, as those have been published in five referral journals, two of with SJR and in the IEEE international conference proceedings in Portugal. I accept the contributions made by the PhD student as they have scientifically applied and application character.

I know about three quotes on the works presented so far.

The PhD abstract is consisting of 30 pages. It reflects the essence and content of the dissertation, including the purpose, subject, object and tasks of dissertation research and the ways of their realization.

In order to form the final evaluation of the dissertation, the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and its Implementation Rules are to be taken into account, according to which I have the following remarks and recommendations:

1. In the documents received as a member of the Scientific Jury, there is no evidence of the educational component of the PhD degree, such as examination reports, individual plans, etc.

2. The PhD student should direct her efforts to increase her contributions to reputable international publications.

In conclusion, I accept that the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and the specific requirements in the Act's Institutional Regulation are fulfilled. After my introduction to the dissertation thesis and its publications, an analysis of their significance and the contributions they make, I give my positive assessment and I recommend to the Honorable Jury to award the educational and scientific degree "Doctor of Philosophy" (PhD) to Bistra Yulianova Zaharieva in in Scientific sphere 5. Technical sciences under the Professional area 5.2 Electrical engineering, Electronics and Automation, PhD program 02.21.10. Application of the principles and methods of cybernetics in various fields of science (technical, medical, biocidebenetics, legal, etc.).

28.01.2019  
Sofia

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