

OPINION

by **Prof. Dr. Plamena Ventseslavova Zlateva**

*Professor in professional field 4.6. Informatics and Computer Sciences,
scientific specialty Informatics*

Department of Informatics, University of National and World Economy

of a dissertation for the acquisition of the educational and scientific degree "**Doctor**"
in professional field 4.6 *Informatics and Computer Sciences*,
doctoral program "*Informatics*",

with author **Iliyan Magdalenov Barzev**

on the title "***Research and analysis of the possibilities for detection of
malware through machine learning***"

1. General information about the procedure and submitted documents

By Order №: 27/30.01.2026 of the Director of IICT-BAS on the basis of Art. 4, para. 2 of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and by a decision of the Scientific Council of IICT (Protocol No.1/28.01.2026) in connection with the procedure for acquiring the educational and scientific degree (ESD) "**Doctor**" in professional field 4.6 "Informatics and Computer Sciences", doctoral program "Informatics", by **Iliyan Magdalenov Barzev** with a dissertation on the topic "*Research and analysis of the possibilities for detection of malware through machine learning*" I am appointed as a member of the Scientific Jury.

By Decision of the First Meeting of the Scientific Jury on 03.02.2026, I am selected to prepare an Opinion on the submitted dissertation.

Iliyan Barzev was finished from full-time doctoral studies with the right to defend his thesis, effective from 01.01.2026 by Order №: 332/22.12.2025 of the Director of IICT-BAS on the basis of Art. 24, para. 4 of the Regulations for the Implementation of the Act on the Development of the Academic Staff in the Republic of Bulgaria (RIADASRB) and by decision of the Scientific Council of IICT (Protocol №: 10/19.12.2025) based on a decision of the department "Information Processes and Decision Support Systems" dated 15.12.2025.

The doctoral student's scientific supervisor is **Prof. Dr. Daniela Borissova**

The opinion was prepared in accordance with the requirements of Art. 6 (3) of the ADASRB, Art. 27 (1) and (2) of the RIADASRB and the Regulations for the Specific Conditions at IICT-BAS for the Implementation of the ADASRB and RIADASRB.

The doctoral student Iliyan Barzev has submitted the following materials: Dissertation, Abstract of the dissertation in Bulgarian and English; Copies of the publications (4 copies) on the dissertation; Declaration of originality of the results;

References for fulfilling the minimum national requirements and the requirements of ICT-BAS for acquiring the ESD "Doctor" in professional field 4.6 "Informatics and Computer Sciences"; Report on similarity from the verification of the dissertation with a licensed system (StrikaPlagiarism) and other documents.

2. General characteristics of the submitted dissertation

The dissertation of Iliyan Barzev is developed in a volume of 143 pages and includes abbreviations used, introduction, three chapters, conclusion (summary of the results obtained), contributions (scientific and scientific-applied), author's publications on the dissertation, list of noted citations of the publications, declaration of originality of the results, bibliography. The literature used contains 155 sources, all of which are in English.

The dissertation is a scientific study that examines current problems for the modern information society related to protection from malware and justifies the need for the use of intelligent, adaptive and scalable approaches that can respond to the dynamics of modern cyberattacks.

The aim of the dissertation is to research and analyse of the possibilities for detection of malware through machine learning, based on which to propose suitable hybrid models, frameworks and applications for obtaining better results in detecting malicious software.

The formulated six tasks are directly related to the successful achievement of the aim. The methodology and tools of the study are appropriately selected and used correctly.

3. Evaluation of the contributions to the dissertation

In the dissertation, based on thorough research, five contributions have been correctly formulated, corresponding to the aim and tasks. Despite the fact that the contributions are not divided into scientific and scientific-applied, I consider the first two contributions to be scientific:

1) Two mathematical models are proposed, through which a selection of software for a suitable virtual machine can be made for the purposes of experimental testing for malware detection.

2) An improved approach for static analysis for malware detection is proposed by optimizing feature extraction by combining different machine learning algorithms. Tests conducted with the proposed hybrid algorithms show better performance.

I consider the remaining three contributions (3, 4, and 5) as scientific and applied.

I highly appreciate the degree of personal participation of the doctoral student Iliyan Barzev in achieving the five contributions.

4. Evaluation of the dissertation publications and the fulfillment of the requirements for the acquisition of the degree "Doctor" under PF 4.6

On the topic of the dissertation, Iliyan Barzev has provided 4 publications, which reflect the obtained research results and contributions. The publications are co-authored with the scientific supervisor, and 2 are also with other scientists. The doctoral student is the first author in three publications and the second author in one.

The presented list with 8 citations of three of the publications on the dissertation makes an extremely good impression. The four publications and eight citations show a good dissemination of the obtained results among interested specialists on the problems and solutions in the dissertation.

The four publications are in editions that are referenced and indexed in the world-famous scientific information database *Scopus* (3 are in quartile Q4).

According to the minimum national requirements, the three publications in quartile Q4 provide 90 points (3 x 10x3), and the other publication - 18 points (1 x 6x3). The total number of points obtained is 108 and leads to the fulfillment of the minimum national requirements of 30 points under "Group of indicators G" (Indicator G 7) for the ESD "Doctor" in PN 4.6. "Informatics and computer sciences".

According to the minimum requirements of IICT-BAS, the three publications in quartile Q4 provide 60 points (3 x 10x2), and the other publication - 12 points (6x2). The 72 points obtained fulfill the minimum requirements of IICT (30 points).

5. Evaluation of the dissertation abstract

The abstract meets the requirements by fully reflecting the content of the dissertation, the results obtained and contributions.

6. Critical remarks and recommendations

Essentially, I have no critical remarks or specific recommendations.

7. Conclusion

In conclusion, I declare that the presented dissertation with title "*Research and analysis of the possibilities for detection of malware through machine learning*" satisfies the requirements for the acquisition of the educational and scientific degree "Doctor" of the ADASRB, RIADASRB and the Regulations for the specific conditions at IICT-BAS for the implementation of the ADASRB and RIADASRB.

I give **positive conclusion** and strongly recommend that the Honorable Scientific Jury vote for the award of the educational and scientific degree "Doctor" to **Iliyan Magdalenov Barzev** in the professional field 4.6 "Informatics and Computer Science", doctoral program "Informatics".

06.03.2026
Sofia

Member of the Scientific

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