OPINION

by **Prof. Ivan Ganchev Garvanov**

member of the Scientific Jury, appointed by Order of the Director of IICT No.
27/30.01.20206.

subject: Dissertation of **Iliyan Magdalenov Barzev**

on the topic "Research and analysis of the possibilities for detecting malware through machine
learning", presented for the acquisition of the educational and scientific degree
"DOCTOR" in the professional field 4.6 "Informatics and Computer Science"
under the doctoral program "Informatics", with scientific supervisor: Prof. Daniela
Ivanova Borisova

1. Information about the procedure

At the first meeting of the Scientific Jury, I was selected to write an opinion.
Under this procedure, I have received all documents in electronic format.

2. Relevance, purpose and tasks of the dissertation

The topic of the dissertation is extremely topical and of high scientific and
practical significance. The modern cyber environment is characterized by an
exponential growth of malware using advanced concealment techniques and attacks.
Traditional methods of protection are insufficient to effectively counter these threats.

The use of machine learning, ensemble models, and hybrid architectures is a
modern and science-based approach to building smart, adaptable, and scalable
cybersecurity systems. In this context, the dissertation is fully consistent with current
research trends and meets the real needs of the practice.

1

The aim of the dissertation research is to investigate and analyze the possibilities for detecting malware through machine learning, on the basis of which appropriate hybrid models, frameworks and applications can be proposed to obtain better results in malware detection. To achieve this objective, the following tasks have been formulated:

(1) to analyze various machine learning algorithms regarding their performance for malware detection purposes;

(2) to identify an appropriate virtual machine to be used in malware detection and classification tests;

3) to offer an improved static analysis approach to malware detection by optimizing feature extraction and combining various machine learning algorithms;

(4) to propose a framework for static malware classification using function optimization and ensemble learning;

(5) to propose a self-conscious classification of malware by routing models based on a system of trust for the selection and explainability of characteristics;

(6) propose an adaptive, trust-based framework for malware classification with feedback adjustments.

3. General characteristics of the dissertation

The submitted dissertation consists of 143 pages formatted in an introduction, three chapters, a conclusion, compulsions and a bibliography. To illustrate the results, 43 figures and 20 tables are attached. 157 literary sources were used.

4. Contributions

The dissertation contains contributions that I would classify as both scientific and scientifically applied in nature. The results of Ilian Barzev's research enriches an

existing scientific field with new knowledge. The contributions of the PhD student can be formulated as:

Virtual machine software selection models for experimental malware testing and detection are proposed.

An approach to malware detection by optimizing feature extraction by combining various machine learning algorithms has been proposed.

A malware classification framework that uses function optimization and ensemble learning has been proposed.

A classification of malware by routing models based on a trust system for the selection and explainability of characteristics is proposed.

An adaptable trust-based framework for malware classification with feedback adjustments has been proposed.

5. Abstract

The presented abstract reliably reflects the content of the dissertation and comply with the requirements of the Law on the Prevention of Corruption and Corruption and Corruption Act.

6. Assessment of compliance with minimum national requirements

The PhD student Ilian Barzev has tested parts of his dissertation in seven scientific publications, three of which have been accepted for publication as of the date of submission of the dissertation. Of the four published publications, all of them are indexed in Scopus and three of them are with SJR, which covers the minimum national requirements for the PhD in PF 4.6 Informatics and Computer Science.

I have not noticed plagiarism in the publications and the dissertation under this procedure.

7. Notes and recommendations

I allow myself to recommend Ilian Barzev to continue working and publishing the results he has obtained in editions indexed in Scopus and WoS.

8. Final due diligence

I believe that the presented dissertation meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Implementation of the Law on Academic Staff and the specific requirements of IICT-BAS. The achieved results give me grounds to give a positive assessment with full conviction and I recommend to the esteemed Scientific Jury to award the educational and scientific degree of "Doctor" to **Ilian Barzev** in the professional field - 4.6 "Informatics and Computer Science" under the doctoral program "Informatics".

16.02.2026

Sofia. Sofia

На основание

ЗЗЛД

4