

## OPINION

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PF 4.6 "Informatics and Computer Science"

### About:

Competition for an **associate professor** in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.6 "Informatics and Computer Science", scientific specialty "Informatics", announced by IICT-BAS in State Gazette No. 97 of 15.11.2024 for the needs of the section "Modeling and Optimization"

### 1. Information about the contest

The competition was announced in the State Gazette, issue 97 of 15.11.2024 for the needs of the "Modeling and Optimization" section of IICT-BAS. According to order No. 9/10.01.2025 of the Director of IICT-BAS, I have been appointed to be a member of the scientific jury under the announced procedure and according to the minutes of the first meeting of the Scientific Jury held on 16.01.2025, I have been appointed to prepare a statement. Under this procedure, I have received all documents in electronic format.

### 2. Information about the candidate in the competition

The only candidate to participate in the competition was Senior Assistant Professor Dr. Kristina Ivanova Dineva. She obtained a Bachelor's degree at the University of Economics - Varna in 2014 and a Master's degree at the New Bulgarian University in 2016. With diploma No. 001323 dated 05.01.2021, issued by IICT-

BAS, she was awarded the Doctor's degree. She is fluent in English and Spanish. She has serious computer skills. She has work experience at IICT-BAS as a Senior Assistant Professor - three years and three months.

### **3. Fulfillment of the requirements for occupying the academic position**

The candidate, PhD Kristina Ivanova Dineva, has submitted 17 scientific publications for participation in the competition. To meet the requirements of indicator B, the candidate has submitted three scientific publications with IF, 2 of which are with Q1 and one with Q2. Under indicator G, 14 scientific publications have been submitted, 1 of which is with IF and Q1, 10 articles are with SJR and 3 are indexed in SCOPUS. Indicators from group D are covered by a provided reference for 48 citations of 2 scientific publications. For indicators from group E, 3 participations in national research projects, 1 participation in international projects and 1 leadership of a national scientific project have been applied.

The submitted scientific works have not been used by the candidate in previous procedures for acquiring the "doctor".

Reference from Scopus, Web of Science, Google Scholar and ResearchGate as of 30.01.2025. shows the following scientometric indicators:

Scopus: H-index 8, articles 26, citations 191

Web of Science: H-index 4, articles 7, citations 88

Google Scholar: H-index 10, Citations: 318

The candidate PhD Kristina Ivanova Dineva meets the minimum national requirements for "Associate Professor" in Area 4. Natural Sciences, Mathematics and Informatics, PF 4.6 Informatics and Computer Science, as shown in the table below:



<b>A group of metrics</b>	<b>Content</b>	<b>Assoc. Professor</b>	<b>Presented by the candidate in the competition</b>
<b>A</b>	Indicator 1	50	<b>50</b>
	Indicator 2	--	---
<b>B</b>	Indicators 3 or 4	100	<b>210</b>
<b>G</b>	Sum of indicators from 5 to 10	200	<b>429</b>
<b>D</b>	Sum of points in indicator 11	100	<b>384</b>
<b>E</b>	Sum of the indicators from 12 to the end	0	<b>0</b>
<b>Total:</b>		550	<b>1073</b>

#### **4. Description of the presented scientific works**

The publications submitted for the competition are in the field of informatics and computer sciences, examining various aspects such as research, development and application of methods and processes for collecting, storing, analyzing, processing and evaluating data through the use of various computer technologies.

Publications B-1, B-2 and D-2 are dedicated to research in the field of cloud technologies, integration of IoT devices, machine learning and digital twins for smart agriculture. They consider the construction and implementation of effective approaches for developing scalable cloud infrastructures that provide reliable data management, real-time visualization and effective process optimization.

Publications B-3, D-1, D-5, D0-1, D0-2 and D0-3 are dedicated to the development and implementation of architectures for IoT systems. These

publications combine theoretical frameworks and practical approaches for implementing sustainable and scalable IoT solutions in smart agriculture. Their main goal is to offer solutions for data management, real-time parameter monitoring.

Publications G0, G-3, G-4, G-6, G-7, G-8, G-9 and G-10 explore both the theoretical foundations and practical implementation of various machine learning algorithms, their structure and suitable application areas. They focus on key data preparation approaches required for effective model training, such as data cleaning, normalization and feature extraction. In addition, the publications demonstrate methods for testing and validating the results, aimed at detecting and minimizing problems such as overfitting. Special attention is paid to optimization techniques that not only improve the accuracy and performance of the algorithms, but also adapt them to the specific requirements of various practical applications.

### **5. Synthesized evaluation of the main scientific and scientific-applied contributions of the candidate**

The candidate's contributions are of a scientific and applied nature, and are in the areas of: cloud technologies and infrastructures; machine learning and artificial intelligence; methods and processes for collecting, analyzing, processing and modeling data.

The scientific contributions are:

A comprehensive architecture of an intelligent monitoring system has been developed and implemented, which offers a mechanism for streaming heterogeneous data from IoT devices.

A strategy for monitoring and classifying the health status of dairy cows has been proposed, which integrates heterogeneous data from different sources.

A model of an extensible IoT architecture has been proposed for working with different communication protocols, allowing centralized device management and big



data processing capabilities.

A set of methods for collecting, organizing and grouping data from heterogeneous sources on the Internet according to predefined rules and user requirements has been developed.

A methodology for analyzing behavioral patterns of cows using IoT devices with an accelerometer and gyroscope, combined with signal processing techniques, has been proposed.

The scientific and applied achievements are:

A proprietary approach for integrating IoT devices into external systems has been proposed.

A cloud-based user interface has been developed in a client application, which provides tabular and graphical visualization of results obtained from machine learning models.

A multi-sensor system has been developed that allows simultaneous measurement of multiple pollutants and environmental factors, providing a comprehensive and detailed picture of air quality in livestock barns.

A scalable cloud architecture has been implemented for an intelligent animal monitoring system, following the Agile methodology and including monitoring of the environment, health, growth, behavior, reproduction, emotional state and stress levels of animals.

A solution has been developed for modeling and simulations of digital twins for smart agriculture in a cloud environment.

Properties have been systematized and areas of application of machine learning methods enriched with ensemble methods for amplification, ordering and packaging have been established.

## **6. Main criticisms and recommendations**

I would like to recommend that Senior Asst. Prof. Dr. Kristina Dineva publish her scientific results in a monographic work. I also recommend that she be a scientific supervisor of doctoral students in the future in order to pass on her rich scientific experience to the next generation of Bulgarian researchers.

### **7. Personal impressions of the candidate**

I do not know PhD Kristina Ivanova Dineva, but I am impressed by the scientific results she has obtained and the places where they have been published. I have no joint publications with Dr. Dineva.

### **8. Conclusion**

Based on the outstanding scientific results and contributions of the candidate, I believe that all the requirements and criteria of the Law on the Development of the Academic Staff of the Republic of Bulgaria, the Regulations for its Application and the specific criteria of IICT-BAS have been met and I give a completely convinced positive assessment for the election of PhD Kristina Ivanova Dineva for the academic position "Associate Professor" in the professional field 4.6 Informatics and Computer Sciences.

I propose to the esteemed Scientific Jury to support the candidate and vote on a proposal to the Scientific Council of IICT-BAS to PhD Kristina Ivanova Dineva for the academic position "Associate Professor" in the professional field 4.6 Informatics and Computer Sciences, (Informatics) for the needs of the "Modeling and Optimization" section of IICT-BAS.

30.01.2025

Sofia

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