

## **REVIEW**

**by Alexander Iliev Iliev, Associate Professor at the Institute of Mathematics and Informatics,  
BAS**

by competition for the academic position of "Associate Professor"  
in the field of higher education: 4. Natural sciences, mathematics and informatics  
professional direction: 4.6. Informatics and Computer Science  
scientific specialty: Informatics

By Order No. 513/20.10.2023 of the Director of IMI-BAN, I have been designated as a member of the scientific jury for a competition announced in the State Gazette no. 69 of 11.08.2023 for the needs of the SOFTIS Section at IMI-BAN.

**Only one candidate** submitted documents for participation in the announced  
competition: **Dr. Galina Dimitrova Momcheva,**

### **1. General description of the applicant and submitted materials**

Dr. Galina Dimitrova Momcheva submitted the following materials for participation in the competition:

- application for admission to the competition,
- European-style professional curriculum vitae,
- diploma for completed higher education - master's degree,
- diploma for acquired educational and scientific degree "doctor",
- general list of publications,
- list of publications for participation in the contest,
- summaries of the publications for participation in the competition in Bulgarian and English,
- copies of works for participation in the competition,
- general list of citations,
- list of citations for participation in the competition,
- state newspaper with the competition announcement,
- professional experience,
- reference for other scientific and research activities (scientific and applied activity, educational activity),

- sample reference to fulfill the minimum national requirements under Art. 2b, paragraphs 2 and 3, and the requirements under Art. 2b, para. 5 of Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), as well as the minimum requirements of the Institute of Mathematics and Informatics - BAS (Appendix 2.2),
- model declaration (Appendix 3.2).

Dr. Galina Dimitrova Momcheva has more than 10 years of professional experience as head of the "Computer Sciences" department, Varna Free University "Chernorizets Hrabar". Currently, Dr. Galina Dimitrova Momcheva works as a mathematician at IMI-BAN.

She received her PhD in 2010, holds a number of prestigious awards, qualifications and memberships in scientific organizations, and was the supervisor of 3 PhD students, one of whom successfully defended in 2021.

Dr. Galina Dimitrova Momcheva submits for participation in the competition 1 monograph and 15 publications, all of which are referenced and indexed in world-renowned databases with scientific information.

## 2. General characteristics of the candidate's scientific works

The quantitative indicators of the criteria for occupying the academic position of "Associate Professor" - *generally according to the ZRASRB and more specifically according to the Regulations for the conditions and procedures for acquiring scientific degrees and for occupying academic positions in the Institute of Mathematics and Informatics - BAS, art. 2 , Table 1, Area 4. Natural sciences, mathematics and informatics*, are the following:

- 1 monograph **with a total number of points 100** (if 100 is required) in **group B**;
- 1 book and 15 publications have **a total number of 293 points** (with a requirement for 220) **in group D**;
- 19 citations have **a total number of 111 points** in **group D** (with 70 required);
- **total number of points 227 in group E** (with 20 required), certified by: participation in 4 scientific or educational projects.
- The quantitative indicators of the criteria for occupying the academic position "associate professor" have been met.

The criterion under Art. 3, para. 1, item 2 of *the Regulations for the conditions and procedure for acquiring scientific degrees and for holding academic positions at the Institute of Mathematics and Informatics - BAS*, namely "candidate must have at least 5 publications in IF or SJR journals". To participate in the competition, the candidate Dr. Galina Dimitrova Momcheva submitted 6 publications in publications with IF or SJR, namely articles with numbers: 1, 3, 4, 5, 6, 8.

No plagiarism was found in the scientific works submitted for the competition.

### **3. Scientific and scientific-applied achievements of the candidate contained in the materials for participation in the competition**

Scientific works are related to studies of systems, methods and means of presentation and management of digital cultural and educational resources and present substantial scientific and scientific-applied contributions.

Selected **contributions** may be submitted as follows:

1. **Fuzzy U-Net Neural Network Design for Image Segmentation:** The article presents extension on the standard one U-Net architecture, such as integrates calculations with fuzzy multiples for improvement on the quality on the segmentation on biomedical images.
2. **Fuzzy U-Net Neural Network Architecture Optimization for Image Segmentation:** Cont. on the previous work, this paper explores the optimization on modifications U-Net model, like uses Grid search and Keras tuner for better architecture at segmentation on cellular kernels.
3. **Sentiment Detection with FedMD: Federated Learning via Model Distillation:** Introduces the algorithm FedMD for processing on natural language, focusing everything on heterogeneity on the data and the personalized training on models through distillation on models.
4. **Hyperparameter Adjustment in Regression Neural Networks for Predicting Support Case Durations:** Investigates various text encoding techniques for transforming text values into numerical values, aiding regression neural network models.
5. **Sustainability of Research-based Ecosystem:** Studies sustainability on science-based entrepreneurial ecosystem BioMed-Varna, focusing everything on the interdisciplinary research in the field on biomedical analysis on images and computer sciences.
6. **Feasibility of Haralick's Texture Features for Classification of Chromogenic In-situ Hybridization Images:** Provides pilot evidence for the utility of secondaries textural features in the analysis of high-resolution images of whole tissue sections.
7. **Gabor Features for the Classification and Evaluation of Chromogenic In-Situ Hybridization Images:** Research the unsupervised one classification based \_ on features generated \_ through Gabor energy filters, contributing to the semantic segmentation and the functional analysis in expression on genes.
8. **Text and Source Readability-A Step to Cognition:** Reviews the connection between readability on study text and the corresponding output code with a purpose development on objective methodology for assessment on readability on the educational content.
9. **Application of Process Mining Approach to the Developmental Process of the Roundworm C. elegans:** Shows the application of techniques in the study of biological processes, such as uses data for unicellular temporally Genovese expression of C. elegans.
10. **Survey of Information Technology Undergraduate Degree Programs in Canada:** Reviews the bachelor's programs by informative technology in Canada, analyzing the current one condition and study plans.

11. **Vendor Cybersecurity Risk Assessment in an Autonomous Mobility Ecosystem:** Emphasizes on the importance on the assessment on cyber security at the providers in the context on sustainability on infrastructure in ecosystems on the autonomous mobility and smart cities.
12. **Voronoi Diagrams and Perlin Noise for Simulation of Irregular Artifacts in Microscope Scans:** Offers method for simulation on irregular artifacts in microscopic scans with a purpose training of neural networks for their removal.
13. **Advanced Image Processing Techniques for the Detection and Monitoring of TV Datacenter Systems:** Reviews new ones algorithms and technologies for processing on images for improvement on the delivery on data and discovery on errors in centers for data on television systems.
14. **Multi-Activation Dendritic Neural Network (MA-DNN) Working Example of Dendritic-Based Artificial Neural Network:** Represents models on artificial neurons using \_ dendrites , like an alternative on the model on perceptron , and demonstrates comparable or better ones results .
15. **Utilizing Autoencoders for Analysis and Classification of Microscopic In Situ Hybridization Images:** Offers working process on deeply training using \_ autoencoders for detection and classification on areas in microscopic images which \_ helps on the experts and reveals additional models.

Most of the scientific works presented are in line with the candidacy for this position. Most are indexed in Scopus and cited more than once.

Dr. Galina Dimitrova Momcheva has participated in numerous international scientific projects. This shows that she is a recognizable scholar on the subject. This is also confirmed by the number of citations of her publications.

#### **4. Teaching activity, work on projects and other activities**

In the educational and pedagogical activity, the candidate developed a lecture activity at the Varna Free University "Chernorizets Hrabar". He reports at a number of international and national scientific forums.

The candidate has participated in 13 national or international scientific projects.

#### **5 . Critical notes and recommendations**

The candidate's scientific works on the subject of the competition cover a wide range of research and interdisciplinary applications. Article 10 has no SJR but is indexed in Scopus. Her points drop from 20 to 12. Project No. BG05M20P001-2.016-0025 was used twice in Group E, and I chose the one with more points for the candidate. Also, in Exhibit table 2.2, the exact data on the SJR of the

articles they have are not submitted. However, the applicant has the necessary points for the competition.

## **6. Conclusion**

After the analysis of the materials and scientific works presented in the competition, **I confirm that the scientific achievements of Dr. Galina Dimitrova Momcheva satisfy the requirements of ADASRB, RIADASRB, and the Regulations on the Conditions and Procedure for the Acquisition of Scientific Degrees and for Holding Academic Positions in BAS and IMI-BAS.**

No plagiarism was found in the scientific papers submitted to the competition.

**I give my positive assessment of the application.**

**I hereby recommend to the Scientific jury to propose to the Scientific Council of IMI-BAS to select Dr. Galina Dimitrova Momcheva for the academic position “Associate Professor” in scientific fields 4. Natural Sciences, Mathematics and Informatics, professional field: 4.6. Informatics and Computer Sciences, Scientific specialty: Informatics (Systems, methods and tools for presentation and management of digital cultural and educational resources).**

08/12/2023

**Reviewer:**

Assoc. Prof. Dr. Alexander Iliev