

REVIEW

by Prof. DSc **Ivan Nikolov Landjev**, New Bulgarian University

in the competition for the scientific position of “**professor**” in New Bulgarian University

Scientific Field: **4. Natural Sciences, Mathematics and Informatics**,

Professional Field: **4.5. Mathematics**

announced in “**Darzhaven vestnik**” No **28/02.04.2024**

Candidate: **Assoc. Prof. Dr. Dimitar Vladislavov Atanasov**

I. Fulfillment of the minimal national requirements and the requirements of the New Bulgarian University

The candidate has defended successfully a PhD thesis entitled “Robust methods for scaling and pointwise estimation” in 2008 which covers the requirements in group A. Since the candidate does not present a habilitation thesis, he covers the minimal national requirements in group C with two papers in journals from group Q2 that give 120 points. In group D he presents another eight papers that bring him 237 points (required are 200 points). All papers in groups C and D are written after 2020 and have not been used in previous applications of the candidate. His PhD degree is obtained in 2007 (under the old law) and his associate professorship is in 2013.

In his application the candidate gives evidence for 35 citations of his papers that have not been used in previous procedures. These citations give 280 points which covers by a wide margin the minimal national requirements in group E. The candidate covers and even exceeds the minimal requirements in this group.

The candidate fulfills the requirements in group F. In this group he claims a total of 240 points that are obtained from a participation in national projects (160 points) and international projects (80 points).

Groups G, I and J include special requirements imposed by the special regulations in the New Bulgarian University. The candidate fulfills and even exceed also the requirements in these three groups. He gives evidence for 85 points in group G, 80 points in group I, and 89 points in group J.

All in all, I accept the candidates fulfills the minimal national requirements and the specific requirements imposed by the regulations of the New Bulgarian University.

II. Research activities

The scientific research of Assoc. Prof. Dimitar Atanasov is devoted mainly to the application of various stochastic models to the solution of different practical problems, in particular, in the fields of psychology, psychometrics and the estimation of information characteristics. Technically this amounts to the development of tools for the estimation of different parameters in branching stochastic processes. A large part of the scientific work of Dimitar Atanasov includes the development of an original software which demonstrates and applies in practice the theoretical results obtained by him. The candidate has presented a list of 10 scientific papers that are published in the following journals:

- Educational & Psychological Measurement – 2
IF: 1.941, 3.088
- Comptes Rendus de l'Academie Bulgare des Sciences (IF) – 2
IF: 0.326, 0.326
- Journal of Applied Statistics – 1
IF: 1.416
- Psychological Thought – 1
SCOPUS
- Stochastics and Quality Control – 1
De Gruyter
- Measurement: Interdisciplinary Research and Persp. - 2
Routledge, Taylor & Francis
- Proc. Mathematics and Education in Mathematics – 1
SCOPUS

In five of the papers the candidate has one co-author, in four – two co-authors, and in one – three co-authors. I accept that the contribution of the candidate is equal to that of the other coauthors.

The candidate classifies the results obtained in his scientific research in four directions:

- (1) development, improvement and investigation of psychometric methods in the area of the evaluation of knowledge and individual abilities;
- (2) statistical methods for the estimation of parameters in branching stochastic processes;
- (3) statistical methods in the applications;
- (4) development of a specialized software which allows demonstration and practical application of the obtained theoretical results.

In the first group can be included papers [1], [2], [4], [9], and [10]; the second group contains papers [3], [5], [7], and [8], and the third group contains paper [6].

Papers [1] and [2] stand for a scientific monograph. In paper [1] the authors obtain and estimate for the parameters of the distribution of a latent characteristic, which in this case is a particular ability of different individuals. The independent observations are represented as random variables with a Bernoulli distribution, taking on the value 1 for a correct answer and 0 for a wrong answer. This approach is compared with the weighted D-scoring approach, where these indicators are weighted by a coefficient reflecting the difficulty of the question. A non-linear regression is used, in which the independent variables and the resulting variable are dichotomic. The author's contribution consists in the practical application of the described techniques. In paper [2], the candidate compares these models with a scheme in which the observed objects are distributed in groups according to their abilities. The remaining three papers contain various other applications of the techniques described in [1] and [2]. Paper [10] contains qualitative and quantitative estimates of the results of the first part of the state maturity test for the school year 2021/22, in which the pupils get questions with an open

answer. The obtained results are very useful for the improvement of the tests in the papers for the exams in the following years.

The papers in the second group are devoted to creating models of the development of COVID-19 contamination in Bulgaria under the condition that a part of the contaminated individuals are not registered. The main goal in paper [3] is to introduce a model for the development of the contamination of COVID-19 in a particular region. To this end the author considers a special branching process with two types of individuals. Only the daily statistics is used to estimate the main parameter of the contamination and to predict the observed number of contaminated individuals. This is a serious advantage in comparison with the more complicated models, where the official statistics do not suffice. The development of the COVID-19 contamination in different countries is considered. The described model is used to estimate the probability for an individual to be registered as contaminated provided he is contaminated. In papers [5] and [7] the model is made more complex by introducing the possibility of emigration, where to the basic population a random number of individuals is added. In paper [8], the general model for the development of the COVID-19 contamination is applied to Bulgaria. The model is further complicated by adding a new group of vaccinated individuals.

In paper [6], the Bulgarian adaptation of the “hope”, “boredom” and “hopelessness” scales of the Achievement emotions questionnaire (AEQ) was accomplished within a representative sample of 800 students. The Confirmatory and Exploratory analyses revealed that the 3 factor model with the three discrete emotions, standing for each of the individual factors, had an adequate fit. The reliability of the adapted scales is good. The same results for the reliability, validity, and internal structure of the adapted scale were confirmed in a subsequent study with an independent sample of 255 respondents.

D. Atanasov presents many software products, related primarily with the psychometric calibration, the development of evaluation and implementation scales of the psychometric tests and evaluation of their properties. Several software products – DELTA, SATA, TEQNCA – are developed. These products are used for evaluation of the students achievements and are developed for the National center of evaluation of education in Kingdom Saudi Arabia. Another group of products, developed by the candidate, implement the D-Scoring method. For instance one such package is the Matlab package for D-scoring. Another such product is published as open access. This is the R-package for D-scoring:, which can be found at <https://github.com/amitko/Dscoring.git>. For simulation and statistical estimation of branching stochastic processes an open access package in Matlab is realized: <https://github.com/amitko/matlab-bp-engine>.

III. Teaching activities

Dimitar Atanasov is very active as a teacher. During his career he has given lectures and tutorials in Sofia University and the New Bulgarian University. and is covering a large spectrum of courses in the New Bulgarian University. In the period 1999-2008 he is assistant professor in the Faculty of Mathematics and Informatics at Sofia University. He gives tutorials in Probability and Statistics. Since 2009 Atanasov is teaching in NBU in Department Informatics. I would stress here the fundamental courses for the programs in the New Bulgarian University like GENB002A GENB002B “Statistics”, PSYE107 “Statistics and behavioral research”, CITB655 “Data Warehouse”, CITB502 “Game Theory”, DSCM030 “Data Theory”. A large part of his courses are external for Department Informatics. As a

whole, his teaching load exceeds the average load of a teacher at the New Bulgarian University.

Dimitar Atanasov has developed teaching materials in all the disciplines he teaches. In addition, he is very active in supervising diploma theses of student from all programs in department "Informatics", in writing reviews for diploma theses, supervising student projects, in taking part in various scientific juries and panels for state exams. Assoc. Prof. Atanasov was very active in the creation of the bachelor's program „Information technologies”, specialization „Business informatics”, where he teaches several courses. In addition, Assoc. Prof Atanasov takes part in the development and actualization of several courses in the area fo probability and statistics.

At present Atanasov is the supervisor of one PhD student in the PhD program „Informatics”. The title of the PhD thesis is „Anotation of videocontent using neural networks” and the defnese of this PhD thesis is expected in near future.

IV. Administartive and community activities

Assoc. Prof. Atanasov is deeply involved in the activities of Department Informatics at NBU. In different periods of his engagement at the New Bulgarian University Dimitar Atanasov has served as a department chair of Department Informatics, as a Director of the program "Informatics", as a member of the faculty council of the Masters faculty, as well as a member of the Academic Council of the New Bulgarian University.

Assoc. Prof. Atanasov participates in a great number of national and international scientific projects funded by govermental intitutions, as well as of private organizations. All projects are in the area of education and evaluation. In these projects the candidate is responsible for the application of varios statistical and psychometric procedures used in the models on which the investigations are based.

Assoc. Prof. Atanasov is a member of the Bulgarian Statistical Society, Bulgarian society for investigation and evaluation in education, the editorial board of the journal „Mathematics and Informatics”, and the organization committees:

'Computer Science and Education in Computer Science (in the period 2019-2024);

'International Summer Conference on Probability and Statistics (in the period 2008-2014).

V. Personal comments

I have known Dimitar Atanasov for fifteen years. He is with the Department of Informatics at the New Bulgarian University since 2013. I have the most favorable opinion of his professional capabilities and his commitment to the teaching and research activities of the department.

VI. Critical remarks

I would refrain from critical remarks and suggestions for future work. At this level every candidate has a very clear idea for their research and publication activities. The standard remark here is to

suggest more active work with PhD students but this depends on the presence of a corresponding program at the corresponding university.

VII. Conclusion

Assoc. Prof. Dimitar Vladislavov Atanasov is a specialist in the field of statistics and its applications. He is a distinguished teacher with a huge teaching load in various disciplines related to probability and statistics and their applications. He has participated successfully in many interdisciplinary projects and has obtained results that are comparable with the best achievements in the field. In the publications presented in his application I have not discovered plagiarism of any kind. Dimitar Atanasov has considerable administrative duties, related to the organization of the teaching process at the department of Informatics.

I am deeply convinced that **Assoc. Prof Dr. Dimitar Vladislavov Atanasov** has all the merits and professional qualifications required for the position of a full professor of the New Bulgarian University for the scientific field 4. Natural sciences, mathematics and informatics, professional field 4.5. Mathematics (mathematical statistics and psychometry). He fulfills all the legal national requirements plus the specific ones of the New Bulgarian University for the professional field 4.5 Mathematics. I strongly recommend his application for the position of a full professor of the New Bulgarian University.

Sofia, 10.07.2024

Signature

(Prof. Ivan Landjev)