

OPINION

by Prof. Snezhana Dineva Sulova, PhD,
department of Informatics, University of Economics – Varna,
member of a scientific jury for the academic position “professor”,
field of higher education 4. “Natural sciences, mathematics and informatics”,
professional field: 4.6 “Informatics and computer sciences”

1. General information

The opinion was prepared by Prof. Snezhana Dineva Sulova, PhD, professional field 4.6. “Informatics and Computer Sciences”, member of the scientific jury, determined by order of the Rector of the University of Economics – Varna № RD 06-33/27.02.2024, Decision of the Scientific Jury dated 13.03.2024, the Law for the development of the academic staff in the Republic of Bulgaria (ZRASRB), Regulations for the implementation of the Law for the Development of the Academic Staff in the Republic of Bulgaria (PPZRASRB) and Regulations for the Development of the Academic Staff at the University of Economics – Varna (PRASUE).

2. Data about the competition

The competition is for the occupation of the academic position “professor” in the professional field 4.6 “Informatics and Computer Sciences” (Informatics), for the needs of the department of “Informatics” of the University of Economics – Varna. The competition was announced in the State Gazette issue № 2/05.01.2024.

3. Contest candidate

The only candidate for the competition is: **Assoc. Prof. Pavel Stoyanov Petrov, DSc.**

The candidate graduated with a master's degree in “Economic Informatics” at the University of Economics – Varna. In 2003, he obtained the educational and scientific degree “doctor” in the scientific specialty “Application of computing technology in the economy”. Since 2004, he has held the position of “chief assistant professor”, and since 2011, the position of “associate professor” in the “Informatics” department of University of economics – Varna. In 2022, at the University of Library Studies and Information Technologies, he obtained the degree of “Doctor of Science”.

The fulfilment of the minimum national requirements for the groups of indicators for occupying the academic position “professor” is as follows:

- for indicator group “A” – the candidate has a defended dissertation for awarding the educational and scientific degree “doctor”, diploma № 28474 / 19.05.2003 (50 points);
- for indicator group “B” – a habilitation thesis monograph published in Monograph Library “Prof. Tsani Kalyandzhiev”, vol. 92, ISBN 978-954-21-1162-7, in 2023 (100 points);
- for indicator group “C” – a total of 25 scientific publications are presented in issues that are referenced and indexed in world-renowned databases with scientific information (Scopus or Web of Science), as well as parts of a collective monograph. The applicant’s scores significantly exceed the required 200 points on this metric.
- for indicator group “D” – a total of 55 citations are presented in Scopus and Web of Science, each of which brings 8 points to the candidate, according to this indicator the points are also sufficient;
- for indicator group “E” – the candidate has obtained the scientific degree “Doctor of Sciences” – (75 points); the candidate has supervised one successfully defended doctoral student (50 points); he has participated in 8 national projects and has supervised 7 scientific projects (220 points). In addition, a list of 6 published textbooks and practical textbooks is presented (105 points). In total, the points for this indicator are sufficient.

According to the Reference-declaration for occupying the academic position of “professor” in the field of higher education 4. “Natural Sciences, Mathematics and Informatics” at University of economics –Varna assoc. prof. Pavel Petrov, DSc. fully satisfies the requirements under Art. 77, item 5 of PRASUE.

5. General evaluation of the educational work

Assoc. prof. Pavel Petrov, DSc. has 23 years of teaching experience in the “Informatics” department of the University of Economics –Varna. To bachelor’s degree students he has taught the disciplines: Informatics, Object Oriented Programming, Visual Programming with Java, Computer Graphics, Server

8. Conclusion

After familiarizing myself with the materials and scientific works provided by assoc. prof. Pavel Stoyanov Petrov, DSc., analyzing their significance and the contributions contained in them, I confirm the compliance of the candidate's results with the requirements of the ZRASRB, the Regulations for the implementation of the ZRASRB for occupying the academic "professor" position in the professional field 4.6. "Informatics and Computer Sciences", as well as the Regulations for the Development of the Academic Staff at IU – Varna.

I give my positive opinion on the readiness of the candidate, assoc. prof. Pavel Petrov, DSc., to occupy the academic position "professor" in professional field 4.6 "Informatics and computer sciences" at the University of Economics – Varna.

Date:
22.04.2024

Prepared the opinion

/ prof. Snezhana Sulova, PhD/

Заличена информация съгласно
ЗЗЛД и регламент (ЕС) 2016/ 679



О P I N I O N

Вх. № PA20-614/25.04.2024г.

on a **competition for the academic position "Professor"** in professional field 4.6. "Informatics", scientific specialty "Informatics", announced for the needs of the Department of Informatics, University of Economics - Varna with candidate Assoc. Prof. Pavel Petrov, DSc

Prepared the opinion: Prof. Silvia Stoyanova Parusheva, PhD, habilitated in professional field: 4.6. Informatics and Computer Science

1. Grounds for preparing an opinion on the competition

The opinion was prepared on the basis of Order of the Rector of the University of Economics - Varna No RD 06-33 / 27.02.2024 and a Decision of the Scientific Jury from the meeting on 13.03.2024 for the election of a chairman, reviewers and drafting opinions.

2. Competition data

The competition was announced in professional field 4.6 "Informatics", scientific specialty "Informatics" for the needs of the Department of Informatics at the Faculty of Informatics. The announcement for the competition is published in the State Gazette, issue. 2/05.01.2024.

3. Details of the candidate in the competition

Pavel Stoyanov Petrov is the only candidate in the competition. He holds the academic position "Associate Professor" at the Department of Informatics (Certificate No D005 of 16.12.2011) and holds the scientific degree "Doctor of Science" in professional field 4.6. "Informatics" (Diploma No 529 of 22.03.2022). The topic of his dissertation is "Security and productivity in the digitalization of financial services".

The professional path of Assoc. Prof. Pavel Petrov, DSc, started at the University of Economics – Varna in 2001 as an assistant professor and successively passed through the academic positions of Chief Assistant Professor and since 2011 Associate Professor.

Assoc. Prof. Petrov is a member of the Union of Scientists – Varna and Chairman of the Control Council of the Union with a mandate of 2021-2025.



4. Quantitative and meaningful characteristics of the scientific works submitted since the last procedure

For participation in the competition for occupying the academic position "professor" Assoc. Prof. Pavel Petrov, D.Sc. has presented a total of 81 publications with a volume of 1553 printed pages, of which 75 scientific works and 6 textbooks and textbooks. The majority of them are co-authored – 57 in number (630 printed pages) and 24 publications are independent (923 pages).

The scientific output of the applicant includes the following publications:

1. **5 monographs** (incl. 2 self)
2. **6 studios** (incl. 2 self-contained);
3. **27 research papers** (incl. 4 stand-alone);
4. **37 scientific reports** (incl. 3 self-contained).

According to the attached reference, 35 of the publications are indexed in the Scopus and/or Web of Science scientific databases.

The monographic paper "Algorithmic Approaches to Geospatial Data Coding" with a volume of 198 standard typewritten pages meets the requirements of Art. 62, item 3 and Art. 71, para. 2 of the Rules for the Development of Academic Staff at the University of Economics - Varna - it does not repeat publications for acquiring the scientific degree "Doctor of Science", it is published in a specialized scientific publishing house, it was discussed in a specialized primary unit within the meaning of §1, item 6 of the Law on the development of the academic staff and was reviewed by two habilitated persons.

The monographic work of Assoc. Prof. P. Petrov is dedicated to solving two main problems on the occasion of geocoding: the first one is related to the recursive partitioning of space, proposing a new approach taking into account the spherical shape of the earth in order to ensure an equi-area division of space. The second applies to the transformation of geographical coordinates, by considering the process of transforming vector coordinates into a scalar geocode value, with emphasis on optimizing calculations and reducing processing time. The main thesis of the work is related to the need to refine existing geocoding systems in order to speed up the processing of geospatial data and to meet the growing needs. The goal is to propose new algorithmic approaches in the Geohash geocoding system to accelerate computational operations and apply new approaches to the use of geospatial data in the conditions of rapid growth of geospatial data volumes from different devices. The results obtained include the following: a new "rasterizing algorithm" for fast character finding from geohash code has been proposed; equi-area tessellation has been



developed for Geohash coding; the benefits of equi-area tessellation have been demonstrated; Methods for finding parts of a geocode have been proposed.

In their totality and structure, the publications of the candidate meet the requirements and meet the national and university requirements for occupying the academic position of "Professor".

A. The minimum national requirements for occupying the academic position "Professor" in the professional field 4.6. Informatics and Computer Science are met in accordance with the indicators listed below:

According to the indicators of group "G" the candidate has submitted a total of 21 publications with accumulated 630 points with a minimum required 200 points. According to the indicator from group "D" are presented 40 citations of publications of the candidate in the world-famous databases with scientific information and respectively 320 points with a minimum requirement of at least 100 points.

Assoc. Prof. Petrov has managed 1 successfully defended a PhD student in the doctoral program "Application of Computing in Economics". In addition, Assoc. Prof. Petrov has acquired a DSc degree after defending a dissertation on "Security and productivity in the digitization of financial services" (diploma number 0529/22.03.2022). The applicant has a serious project activity – he has participated in 15 research projects and has been the head of 7 of them. To participate in the competition, he has also applied participation in 4 textbooks and 2 independent textbooks. According to the indicators of group "E" the candidate has accumulated a total of 450 points with a requirement of at least 100 points.

Assoc. Prof. Pavel Petrov has reached a total of 1550 points, thus fully satisfying and exceeding the minimum national requirements for occupying the academic position of "professor" in professional field 4.6. Informatics and Computer Science.

B. The requirements for occupying the academic position of "Professor" in the professional field 4.6. Informatics and Computer Science are met **according to Art. 77, item 5 of the Rules for the Development of Academic Staff at UE-Varna.**

According to the attached Reference-declaration for occupying the academic position "Professor" in the field of higher education 4. "Natural Sciences, Mathematics and Informatics", according to Art. 77, item 5 of the Rules for the Development of Academic Staff at UE-Varna (in force from 01.07.2021) Assoc. Prof. Petrov has submitted for participation in the competition:

1. Papers – 22 in number, of which there are 155 points with a minimum required 60 points.

2. Scientific articles and studies – 23 in number, of which there are 128 points with the minimum required 115 points.



3. Publications in Scopus and/or Web of Science – 25 in number, of which there are 180 points with the minimum required 30 points.

4. Citations in Scopus and/or Web of Science – 56 in number, of which there are 840 points with the minimum required 15 points.

5. Defended PhD student – 1 PhD student 40 pts.

6. Research projects – 15 participations, of which there are 330 points with the minimum required 15 points.

With these indicators Assoc. Prof. Pavel Petrov fully satisfies and exceeds the requirements of UE-Varna to occupy the academic position of "Professor" in the field of higher education 4.

5. Quantitative and qualitative assessment of teaching work

Assoc. Prof. Pavel Petrov in the last 2 academic years testifies that he teaches *six disciplines in Bachelor's degree*, including Informatics, Object-oriented Programming, Visual Programming with Java, Computer Graphics, Server Programming, Server MVC Programming; *seven disciplines in Master's degree* (E-Business, Server MVC Programming, Web Applications with Node.js, Real-Time Web Technologies, Object-Oriented Programming (English), Server Programming (English), Visual Programming with Java (English)) and *one discipline* (Foundations of Object Oriented Programming) in front of *Erasmus students*.

Over the years, the candidate has developed curricula in 9 subjects in bachelor's, 7 in master's degree, and 6 disciplines in the doctoral programs "Application of Computing in Economics" and "Informatics".

According to the attached reports, Assoc. Prof. Petrov has the necessary teaching activity and has the necessary serious teaching experience to occupy the academic position of "professor".

For the competition, the candidate presents participation in one independent textbook and two independent textbooks, as well as in 3 textbooks and co-authoring study aids.

Regarding the work with PhD students Assoc. Prof. Petrov has a scientific management of five PhD students, including he has led one successfully defended a PhD student in the doctoral program "Application of Computing in Economics". In addition, he works actively with PhD students and students on research projects, performs scientific guidance, and reviews theses, participates in committees for doctoral examinations.



In summary of the teaching work of Assoc. Prof. Pavel Petrov, D.Sc. it can be pointed out that he meets the requirements related to the academic activity for occupying the academic position of "Professor".

6. Identification of scientific contributions

As a result of the publication activity and research work of Assoc. Prof. Pavel Petrov, DSc, scientific and applied scientific contributions can be identified. I accept as valid the five contributions mentioned in the Reference for the scientific and applied scientific contributions of the applicant, related to the habilitation work developed by him and covered in his other publications.

They can be highlighted as essential and candidate's contributions concerning research on the activities of startups, as well as the application of new protocols and approaches in the creation of server web applications, as well as in the field of data storage. Important contributions in connection with research and analysis of the processes of digitalization of educational services and the banking sector are also identified.

7. Critical remarks and recommendations

I recommend to Assoc. Prof. Pavel Petrov, D.Sc. to continue his active publication activity by focusing on reputable journals with a high impact factor. To continue with its successful work on various scientific projects, incl. with the participation of young scientists and PhD students.

8. Conclusion

Based on the analysis of the provided by Assoc. Prof. Pavel Petrov, PhD, scientific works, materials, as well as his scientific contributions shall be established compliance of the results achieved by him with the requirements and criteria for occupying the academic position of "professor" according to the Law on Academic Research, the Rules for its implementation and the Rules for the Development of the Academic Staff at the University of Economics - Varna.

This gives me reason to give my **positive assessment** of the election of Assoc. Prof. Pavel Petrov, D.Sc. to the academic position of Professor in professional field 4.6 "Informatics", scientific specialty "Informatics"

23.04. 2024 г.

Prepared the opinion:

Заличена информация съгласно
ЗЗЛД и регламент (ЕС) 2016/ 679

Varna

(Prof. Silvia Parusheva, PhD)



OPINION

for taking the academic position "**Professor**" in an announced competition at
the University of Economics - Varna

Bx. № 220-512 / 05.04.2024

From: *Prof. Dr. Krasimir Todorov Shishmanov*

D. A. Tsenov Academy of Economics, Svishtov

Professional field 3.8 Economics,

Scientific specialty "Application of Computing in The Economy"

1. General information

The opinion was prepared by Prof. Dr. Krasimir Todorov Shishmanov, on the basis of the Order of the Rector of UE-Varna № RD 06-33/27.02.2024 and Decision of the Scientific Jury of 13.03.2024.

2. Competition data

The competition for the academic position of "professor" in professional field 4.6. "Informatics and Computer Science", scientific specialty "Informatics", was announced in the "State Gazette", issue 2/05.01.2024 for the needs of the Informatics Department.

3. Candidate in the competition

The only candidate in the competition for the academic position "Professor" is **Assoc. Prof. DSc Pavel Stoyanov Petrov, lecturer** at the University of Economics – Varna, Faculty of Informatics, Department of Informatics. He graduated from the Second High School of Mathematics – Varna in 1988. He received his higher education at the University of Economics – Varna, first as a bachelor specialty "Economic Informatics" in 1996 and then Master Economist-Informatician in 1997. Simultaneously with his studies he worked in practice as an editor of the newspapers "Pozvanete" and "The World of the Internet".

In the period 1998-2003 Pavel Petrov was a PhD student at the Department of Informatics at the University of Economics - Varna, where after a successful

defence in 2003 he acquired the Educational and Scientific Degree "Doctor" in scientific specialty 05.02.08 "Application of Computing in Economics".

In 2022, he acquired the degree of Doctor of Science at PF 4.6 "Informatics and Computer Science", Diploma 529/22.03.2022, with the topic of the dissertation: "Security and Productivity in the Digitalization of Financial Services".

Since 2001, he has been an assistant professor in the Department of Informatics at the University of Economics - Varna, since 2004 he has been Chief Assistant Professor in the same department, and since 2011 he has held the academic position of Associate Professor in professional field 4.6 "Informatics and Computer Science".

Assoc. Prof. DSc P. Petrov successfully combines teaching with scientific work and has participated in 15 scientific projects, in 7 of which he is the head of the research team.

4. Quantitative and meaningful characteristics of the scientific works submitted since the last procedure

The applicant has correctly presented the necessary evidence and documents on the various indicators for the fulfilment of the quantitative requirements. For participation in the competition for the academic position "professor" Assoc. Prof. DSc Pavel Petrov presents a total of **81 publications** with a total volume of **1553 pages**:

- **monographs and book chapters - 5;**
- **studies - 6;**
- **scientific articles - 27;**
- **scientific reports - 37;**
- **textbooks and teaching aids - 6.**

The presented as a main monographic work "Algorithmic Approaches to Geospatial Data Coding" with a volume of 169 standard pages meets the requirements of Art. 62, item 3 and Art. 71, para. 2 of the Rules for the Development of Academic Staff at the University of Economics - Varna, as the published monographic work does not repeat publications for acquiring the educational and scientific degree "Doctor", it is published in a specialized scientific publishing house, it was discussed in the specialized primary unit within

the meaning of § 1, item 6 of the "Law On The Development Of The Academic Staff In The Republic Of Bulgaria" (ZRASRB) and was reviewed by two habilitated persons.

In the monographic work of Assoc. Prof. DSc Pavel Petrov are looking for and finding answers to several problematic questions. The first of these is related to the recursive subdivision of a given space, the next in importance question is related to the very process of transformation of geographical coordinates from vector to scalar value. The answers to these questions also suggest the main goal, which is to propose new algorithmic approaches to the widely used geocoding system Geohash, which will allow acceleration of computational operations and application of new approaches to the use of geospatial data.

In the presented paper, the author successfully defends the thesis of the need to change and improve existing geocoding systems in a direction to support their use in different situations and to contribute to faster processing of geospatial data in new ways in the conditions of constantly increasing volumes of them.

The other scientific publications submitted for participation in the competition also meet the requirements. Most of them are in English and are published in authoritative Bulgarian and foreign scientific journals, referenced and indexed in world-famous databases with scientific information such as Scopus (35 of the publications) and Web of Science (15 of the publications).

The attached references show that 155 citations of scientific publications were found, including 136 citations in Scopus and 17 in Web of Science.

In conclusion, it can be pointed out that the candidate in the competition Assoc. Prof. DSc Pavel Petrov meets the mandatory conditions under the ZRASRB. The publications presented by him fully cover the minimum national requirements set out in the ZRASRB, PPZRASRB, as well as the internal requirements set out in PRASIUV for the academic position of "professor" in PN 4.6. "Informatics and Computer Science".

5. Quantitative and qualitative assessment of teaching work

Assoc. Prof. DSc Pavel Petrov has a total of over 23 years of academic experience. The last position "Associate Professor" was occupied over 13 years at the University of Economics - Varna, which meets the requirements of Art. 137, 3 art. 86 of the Rules for the Development of Academic Staff at the University of

Economics – Varna. The applicant has conducted Erasmus+ teaching mobilities at the University of Limerick, Ireland in 2017 and Altinbas University, Turkey in 2019, as well as additional teaching activities over the years at the Medical University – Varna, Varna Free University and the Knowledge and Business Vocational Training Centre.

Assoc. Prof. DSc Pavel Petrov has contributed to the development of a number of lecture courses, including 9 for the Bachelor's degree, 7 for the Master's degree, and 6 for the PhD. He has conducted lectures and exercises in a variety of disciplines related to the announced competition:

- **Bachelor's degree:** Informatics, Object-oriented programming, Visual programming with Java, Computer graphics, Server programming.

- **Master's degree:** E-business, Server MVC programming, Web applications with Node.js, Real-time web technologies, Object-oriented programming (English), Server programming (English), Visual programming with Java (English language).

- **For Erasmus students:** Foundations of Object Oriented Programming.

For the professional training of students he has published textbooks and study guides in certain disciplines. There are total of 9, of which 4 independently and 5 are co-authored.

Assoc. Prof. DSc Pavel Petrov has led 5 PhD students, one of whom has successfully defended the PhD degree, two have been deducted with the right of defence and two are in a period of study. He has managed 16 bachelor's degree students and 2 master's graduates.

With this teaching work Assoc. Prof. Petrov contributes to the formation of the necessary professional training of future specialists so they can utilize contemporary information technologies in their future professional endeavours.

Assoc. Prof. DSc Pavel Petrov's teaching activities are successful primarily because of his broad technical, economic, and specialized training, as well as the fact that the material he teaches is focused on the most recent and essential for practice knowledge regarding the use of information technologies in business.

The candidate's serious teaching activity leads me to believe that he has the necessary teaching experience and is well-prepared for the academic position of "professor" at the University of Economics - Varna.

6. Identification of scientific contributions

The analysis of scientific publications, with which Assoc. Prof. DSc Pavel Petrov competed for the academic position of "professor" at PN 4.6 "Informatics and Computer Science", enables the formulation of a number of scientific contributions. The most significant 11 of them are presented in the Reference for Scientific and Applied Contributions, respectively 5 on the basis of the main monographic work and 6 on the basis of other publications. I accept the contributions as significant, real and enriching the existing theory and practice. I believe that they can be defined as contributions of a scientific and scientifically applied nature.

7. Critical remarks and recommendations

The applicant for the academic post of "professor" satisfies all of the established indicators and requirements. Therefore, I have no critical remarks, but I will allow myself one recommendation: I believe that on the basis of the experience gained both a researcher and a lecturer, Assoc. Prof. DSc Pavel Petrov is able to prepare and lead to successful defence more PhD students to continue research in the scientific fields in which he works.

8. Conclusion

In conclusion, based on the documentation and information provided during the competition, I believe that the candidate fully meets the requirements of the ZRASRB, the Rules for the Implementation of the ZRASRB, and the Rules of the University of Economics - Varna for occupying the academic position of "professor".

I give a **positive opinion** on the choice of **Assoc. Prof. DSc Pavel Stoyanov Petrov** for the academic position of "**professor**" in the field of higher education Natural Sciences, Mathematics and Informatics, professional field 4.6. Informatics and Computer Science at the University of Economics - Varna.

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ЗЗЛД и регламент (ЕС) 2016/ 679

Date: 29.03.2024

Prepared the opinion:

/Prof. Dr. Krasimir Shishmanov/

OPINION

by prof. Miroslav Nikolov Galabov, Ph.D.
department "Computer systems and technologies",
Faculty of "Mathematics and Informatics"
University "St. St. Cyril and Methodius"

by

competition for the academic position of "professor"
field of higher education 4. Natural sciences, mathematics and informatics,
professional direction 4.6. Informatics and Computer Science (Informatics)
announced in SN No. 2 of January 5, 2024.

1. COMPETITION DATA

The competition procedure was launched on the basis of order No. RD-06-33/27.02.2024 of the Rector of the University of Economics, Varna. Within the legal deadline, the documents of one candidate - assoc. prof. Pavel Stoyanov Petrov, D.Sc. A commission has established their regularity. The first meeting of the scientific jury was held on 13.03.2024. Everything about the procedure corresponds to the ZRASRB and the Regulations for the Development of the Academic Staff at the University of Economics, Varna. The candidate has fulfilled the minimum national requirements under Art. 2b, para. 2 and 3 of ZRASRB and the additional university requirements according to art. 77, item 5 of PRAS in IU-Varna (in force from 01.07.2021). According to the groups of indicators, there are respectively: A - 50, B - 100, D - 840, D - 440, E - 460 points.

2. DATA ABOUT THE CANDIDATE

Assoc. prof. Pavel Stoyanov Petrov, D.Sc. graduated from the University of Economics with a bachelor's degree in 1996, University of Economics, Varna, specialty in "Economic Informatics". In 1997 - OKS "master", specialty "Economist-informatics". In 2003, he defended his thesis on the topic "Application of computing technology in the economy", and in 2022 he defended his thesis for the Doctor of Sciences on the topic "Security and productivity in the digitalization of financial services". From 2001 to the present, he worked at the University of Economics, Varna, successively as an assistant, chief assistant and associate professor in the Department of Informatics.

3. DESCRIPTION OF SCIENTIFIC PAPERS

The candidate has presented a total of 81 scientific papers for his participation in this competition. Of these, 5 monographs, 6 studies, 27 articles, 37 reports and 6 textbooks. Five scientific directions stand out in the candidate's research:

- I. Proven models and ideas related to geospatial data processing using geocoding systems.
- II. Problems related to the activity of start-up companies with the subject of activity the development of a new software product.
- III. Research and analysis of the possibilities of application of new protocols and approaches in the creation of server web applications working in real time.
- IV. Research and analysis regarding the processes of digitization of educational services and in the field of the so-called "social business analytics".
- V. Application of innovative big data processing technologies in construction, logistics and maritime transport.

In the first direction:

1. In the monograph *"Algorithmic approaches in coding geospatial data"* (1) an analysis of the existing basic geocoding systems used in practice was made. A new approach has been developed for applying isoplanar tessellation to geohash and a number of software modules for encoding and decoding geohash codes using the rasterization algorithm.
2. In the studies *"Practical approach for modifying existing geocoding system from equal angular to equal area"* (11), the study focuses on the main characteristics of equal-angle geocoding systems and demonstrates how an existing equal-angle geocoding system can be modified to become a flat area geocoding system.
3. In the article *"Investigating the possibilities of the H3 geocoding system developed by Uber Technologies"* (38), the focus is on a geocoding system with an almost equal area tessellation, which uses the figures of a pentagon and a hexagon as a basis for dividing the spherical earth's surface.
4. The publication *"The Geohash geocoding system improvement opportunities"* (46) discusses the coding of geographic coordinates using the Geohash system. An approach

is proposed to divide the space into individual cells based on the principle of equal areas.

5. The publication *"CAD Technology for Optimal Territory Covering"* (62) presents an approach to solving the problem of minimizing energy consumption by adjusting sensor coverage radii. An algorithm is also presented to construct an optimal sensor trajectory that provides maximum coverage. Computer simulation confirms the effectiveness of using the proposed approach.

6. The publication *"Historiographical Study of the Evolution of the Geocoding Systems with Equiangular Tessellation"* (69) examines the key moments in the development of some fundamental geocoding techniques developed in recent decades. As a result, a number of similarities in the development of the studied geocoding systems are identified.

7. The publication *"Geocodes in Geographic Information Systems"* (72) introduces the main geocoding systems and outlines their main characteristics. It is concluded that in a number of cases the "high accuracy" parameter, which is characteristic of the representation of locations with geographic coordinates, is less important compared to the "convenience" and "processing speed" parameters.

8. The publication *"Application of geocoding systems in big data processing"* (75) presents the results of research and systematization of geocoding systems that can be applied in big data processing. The scope of the study is limited only to modern geocoding systems implemented in practice today.

In the second direction:

1. The article *"Strategic and Tactical Problems in Fintech and E-business Companies"* (22) analyzes some problems in fintech and e-business companies regarding the strategic and tactical levels of management.

2. The article *"An Approach for Creating Business Model for Using Virtual Tools in Startup Companies"* (24) examines the application of virtualization and the use of virtual tools by startup companies in the individual phases of business model and software product development.

3. In the article *"Business Scenarios for Interaction in the Development of the Software System in a Start-up Software Company"* (25) issues related to creating interaction scenarios are considered.

4. The article *"Projects Management in Technology Start-ups for Mobile Software Development"* (32) presents the possibilities of improving the management of a technology start-up company for mobile software development, which includes various activities such as specification creation, development, implementation, sale and support of software for mobile devices, as well as services therefor

5. The article *"Domain Driven Design Approaches in Cloud Native Service Architecture"* (37) presents the application possibilities of domain-driven design approaches when integrated into cloud service architecture.

6. In the publication *"Business Models for Starting Software Companies"* (55), based on a theoretical review of business models suitable for starting software companies, two approaches to describing business models are presented, for one of them - Lean Canvas is found to be better suited for software startups.

7. The publication *"The Nature and Main Features of Technology Startups"* (57) researched questions about technology startups that develop, maintain, and support software products.

8. The publication *"Development of Software Systems by Using Interaction Business Scenarios"* (58) presents the processes of creating interaction scenarios by a business expert or a power user.

9. The publication *"Incremental Transformation of Legacy Information Systems"* (64) analyzes the advantages of creating, implementing and transforming a software product.

10. The publication *"Risk Management Processes in Information Systems Development"* (65) discusses issues of risk management as part of the concept of sustainable corporate development.

In the third direction:

1. In the studio *"Modern approaches to work in real time using web technologies"* (6) approaches to building web applications in real time are presented and an assessment of the perspective of some emerging approaches is given.

2. The article *"Possibilities of using NoSQL systems to increase the performance of information systems"* (12) focuses on the possibilities of NoSQL systems to be used as a cache layer between an application and RDBMS SQL systems. A series of tests were done to determine when it would be advantageous to use such an approach.
3. The article *"Usage of HTTPS protocol in the public websites of banks in Bulgaria"* (17) summarizes, systematizes and analyzes collected data from a conducted study on the use of HTTPS protocol in the public websites of banks in Bulgaria.
4. The article *"Relative Performance of Various Types of Repositories for MySQL Archive Backup and Restore Operations"* (35) discusses backup and restore operations as an essential part of the database system administration process.
5. The publication *"Opportunities for Creating Applications Using WebSocket"* (42) discusses the ability to efficiently (in terms of traffic volume and server load) transmit data in small chunks, at high frequency, and asynchronously.
6. The publication *"JSON Data Processing in JavaScript - Application Approaches for Real-Time Work"* (43) presents the possibilities for creating real-time web applications by focusing on some application moments when working with the JSON format .
7. The publication *"Using the HTTP/2 Server Push Technology to Reduce Web Page Loading Latency"* (45) presents the main factors influencing web page loading latency. It concludes that nowadays network bandwidth plays less and less role in terms of latency.

In the fourth direction:

1. In the monograph *"Digitalization of management processes and educational services in a university environment"* (5) in chapter one, the following topics are presented in an attached plan: Basic types of hardware used in the digitalization of processes; Infrastructural aspects of digitization of educational activities using own hardware and data center; Data center cooling and energy efficiency. Chapter Five treats various problems, again in applied terms: Hardware defects as a cause of failure; Using archival memory in digitization solutions.
2. The study *"Digitalization of Educational Services with Regard to Policy for Information Security"* (10) focuses on the development of "Policy for Information Security" based on various control frameworks such as ISO27001, COBIT, ITIL, etc.

3. The article *"A Systematic Design Approach in Building Digitalization Services Supporting Infrastructure"* (31) explores the issues of creating an effective digital infrastructure as a prerequisite for the successful operation of any digital service with a high degree of complexity. The use of an appropriate method in decision-making for the construction of digital infrastructure for digitization services is suggested.
4. The article *"Infrastructure Capacity Planning in Digitalization of Educational Services"* (34) addresses issues of infrastructure capacity planning in the digitalization of educational services in order for the IT infrastructure to meet not only the current load but also the future load, as and meet future, newly emerging requirements.
5. The article *"Database Administration Practical Aspects in Providing Digitalization of Educational Services"* (36) focuses on the creation of a specific administrative plan in the digitalization of educational services, designed to ensure maximum access, rapid recovery from failure and reduction of the duration of time, through which the service is unavailable while ensuring a good level of security.
6. The publication *"Determining the degree of digitization achieved"* (56) presents the different ways in which the degree of digitization can be determined. Three main approaches are covered – the Open Data Maturity Model of the Open Data Institute, the Digital Maturity Model of Deloitte and the Open Digital Maturity Model of Open ROADS.

In the fifth direction:

1. In the monograph *"Digitalization of business processes in construction and logistics"* (4) in chapter two - "Determining the degree of required digitization" the topics are considered: Universal models for determining the reached level of digitization; Open Data Institute organization model; Open ROADS Organization Model; Digitization with a view to building a new business solution.
2. The study *"Prototype Model for Big Data Predictive Analysis in Logistics Area with Apache Kudu"* (7) focuses on a prototype ICT model with analytical tool Apache Kudu in logistics area. Data are presented for Bulgaria and Croatia and some trends regarding empty road freight transport are identified.
3. The article *"Real Time Big Data Analysis by Using Apache Kudu and NoSQL Redis in Web Applications"* (23) discusses some of the possibilities of using Apache Kudu

and NoSQL Redis systems, which makes them suitable for joint use when there is a need for fast streaming data processing.

4. The paper *"Information Technology for Big Data Sensor Networks Stability Estimation"* (26) discusses sensors and sensor networks as core components of the Internet of Things and Industrial Internet of Things concepts. The results of a simulation confirm the feasibility and effectiveness of the proposed approaches.

5. In the article *"Integrating Distributed Hadoop System into the Existing Infrastructure"* (27), the study covers the problem of integrating one remote Hadoop cluster to another. Several findings have been made based on a comparison between different ways of organizing data processing - multiple clusters and multi-leasing.

6. The article *"Technological Organization in Big Data Analysis with Apache Kudu Analytical Tool"* (28) examines the Hadoop Apache Kudu analytical tool in relation to the creation of methods and models for big data analysis in the field of construction.

7. In the publication *"Possibilities for Digital Transformation of Ship Traffic Management Activity in the Black Sea"* (74), the possibilities for joint use of the Hadoop system through the SpatialHadoop extension with the National Ship Traffic Management Information System (VTMIS) are outlined.

4. QUANTITATIVE AND QUALITATIVE ASSESSMENT OF SCIENTIFIC TEACHING WORK

Conducts training sessions with students for:

1. EQD "Bachelor": Informatics, Object-oriented programming, Visual programming with Java, Computer graphics, Server programming.

2. Master's degree: Electronic business, Server MVC programming, Web applications with Node.js, Real-time web technologies, Object-oriented programming (English language), Server programming (English language), Visual programming with Java (English language).

3. For Erasmus students: Foundations of Object Oriented Programming.

He is the scientific supervisor of five doctoral students, one of whom has successfully defended his thesis.

He participated in 15 scientific projects, of which he was the leader of 7.

In order to improve the quality of student education and provide it with study materials, a number of book and online textbooks, study aids, manuals and support materials have been developed and published, which can be used in the following disciplines:

- Server programming (41, 79);
- Web technologies in real time (14, 15, 77);
- Object-oriented programming (76, 78, 80);
- Informatics (81).

5. SCIENTIFIC CONTRIBUTIONS

In general, the scientific achievements of the candidate are in the enrichment of existing knowledge and the application of scientific achievements in practice.

Contributions in the class enrichment of existing knowledge are:

1. A survey of the main geocoding systems used in practice was made. The thesis has been proven that in order to process data more efficiently, it is necessary to constantly look for new ways, in line with the modern technological level, through which to convert, store and process geospatial data.
2. A simplified unit testing approach using input thresholds is developed to investigate deviations in geohash code computation.
3. A new approach has been developed, by applying which only one symbol of the geohash code can be found without having to calculate the remaining bits or symbols, which can be used to create the so-called "short codes".
4. A new approach has been developed for applying equal-area tessellation to geohash.
5. A suitable formula is derived, using which the areas of the spherical segments and of the cells in them are the same.

Contributions in the class of application of scientific achievements in practice are:

1. A number of software modules have been developed for encoding and decoding geohash codes using the rasterization algorithm, to be implemented in relational database management systems, as well as to be used to accelerate the processing of big data and in web applications.

2. The problems related to the activity of start-up companies with the development of a new software product as a subject of activity are presented. The different business models, strategic and tactical problems, business scenarios for start-up enterprises, as well as the benefits of applying different approaches in their activities are revealed.
3. The possibilities for the application of new protocols and approaches in the creation of server web applications operating in real-time mode and also in the field of data storage have been investigated and analyzed. In an applied plan, the possibilities of decoding and classifying brain signals are investigated in order to implement a direct one-way connection (interface) human brain - computer.
4. Studies and analyzes have been made regarding the processes of digitization of educational services. Methodologies are proposed for: determining the degree of digitization reached, infrastructure capacity planning, administration of database management systems. The trends were investigated and the main regularities were revealed in the technologies used for digitization of the banking sector, as well as some issues related to information security.
5. The opportunities are identified and the limitations are highlighted regarding the application of innovative technologies for processing big data in construction, logistics and maritime transport.
6. The scope of the concept of "social business analytics" with significance in the field of marketing is defined and approaches suitable for application in the so-called "social media". Approaches have been developed for full-text search, classification, faceted search, which can be used in various information systems to help find relevant information on given topics.

5.1. CITATIONS

In the competition documents, the candidate indicated 155 citations of his scientific works, of which 56 were cited in Scopus and WoS.

6. CRITICAL NOTES AND RECOMMENDATIONS

I would recommend more participation in teaching mobilities abroad under the Erasmus+ programme.

7. CONCLUSION

I believe that the materials presented in this way meet the requirements of the RASRB and the Regulations for its implementation, as well as the Regulations for the development of the academic staff at the University of Economics, Varna.

On the basis of the above, I propose to the respected Scientific Jury **to choose** assoc. prof. Pavel Stoyanov Petrov, D.Sc. in the academic position of "professor" in professional direction 4.6. Informatics and computer sciences (Informatics) at the "Informatics" department of the University of Economics, Varna.

12/04/2024

V.Tarnovo

Sincerely:

Заличена информация съгласно
ЗЗЛД и регламент (ЕС) 2016/ 679

Prof.Miroslav Galabov, Ph.D.