O P I N I O N

by Prof. Asen Kanchev Rahnev, PhD

on dissertation
„Web-based Instruments for Data Visualization“
by Vesselina Rumenova Naneva

for obtaining the educational and scientific degree “Doctor of Philosophy”

in the field of higher education 4. Natural sciences, Mathematics, and Informatics, professional field 4.6 Informatics and Computer Science
doctoral program: Informatics

By order № RD-21-2229 from 27.11.2023. 2 of the Rector of the University of Plovdiv “Paisii Hilendarski”, I have been appointed a member of the Scientific Jury in connection with the defense of dissertation “Web-based Instruments for Data Visualization“, for obtaining the educational and scientific degree “Doctor of Philosophy” in the field of higher education 4. Natural sciences, Mathematics, and Informatics, professional field 4.6 Informatics and Computer Science, doctoral program: Informatics. The author of the dissertation is Vesselina Rumenova Naneva – a doctoral student at Department “Software technologies”, with scientific mentors Prof. Angel Atanasov Golev, Ph.D., and prof. Nikolay Velichkov Pavlov, Ph.D. of the Plovdiv University.

In my capacity as a member of the Scientific Jury, I have received a set of materials on an electronic media in accordance with Art. 26 (1) of the Internal regulation for Development of the Academic Staff of the University of Plovdiv.

The dissertation "Web based tools for data visualization", developed by Vesselina Rumenova Naneva, presents a finished form the results of an in-depth study by current field. The dissertation consists of 121 pages, of which 106 are main text. It consists of an introduction, four chapters, a conclusion, an author's reference for the contributions, an approbation of results, prospects for future development, a bibliography including 86 sources, and an appendix of in a volume of 19 pages with adjacent code fragments.

This dissertation is aimed at providing a model and architecture for building platform-independent customized visual elements in business research systems. The topic is current and has the potential for the realization of a positive economic effect in the creation of such elements. The doctoral student has good theoretical knowledge and practical skills and experience with the

technologies necessary to achieve the purpose of the dissertation.

The goal is clearly defined "to model an architecture for unified creation of custom data visualization for Microsoft Power BI and Tableau environments with the possibility of integration with their specific APIs, and the specified tasks correspond to it.

In the first chapter, the specifics of data visualization in relation to the field of business research, or BI, are discussed. Emphasis is placed on the characteristics of the two leading BI environments for the application of the architecture model embedded in the dissertation, namely Microsoft Power BI and Tableau. Chapter Two defines the specifics of working with the APIs of the above two BIs in relation to stylization and data access. Sample visualizations have been created with each specialized tool. In chapter Three, the developed model of an architecture for unified creation of custom visualizations, called TabWerBI, is demonstrated. Emphasis is placed on abstractions of ways to access data and ways to shape style changes in the view by the user. The main interfaces and classes that implement the proposed architecture are illustrated. Chapter Four presents a prototype of the architecture for unified visualization development for Microsoft Power BI and Tableau by building a "Insurance Claims Triangle", a single-field data label, "Lollipop" and "Tree". The conclusion analyzes the implementation of the formulated tasks and the achievement of the set goal. Opportunities for further enrichment and development of architecture in the future are outlined. The results of the dissertation can be taken as scientific and applied contributions. The links between the tasks and the results of the dissertation and where the latter are published are clearly indicated.

The doctoral student has submitted a list of 4 of his publications on the dissertation in English. Two of the publications are indexed in Scopus, which satisfies the minimum national requirements for obtaining a doctoral degree. The other two are in proceedings at international conferences.

The results of the dissertation were tested in two national and four university research projects.

The abstract, compiled in Bulgarian and English in the amount of 32 pages, meets the requirements for full and concise coverage of the dissertation.

I have known Vesselina Naneva for about ten years as an inquisitive and excellent student, responsible and executive colleague. It actively participates and supports the organization of academic activities and work with students, the organization of scientific forums in FMI and

other events.

I recommend the student to devote more time to scientific work and publish her results in specialized Informatics journals and proceedings of scientific conferences indexed in WoS, Scopus, IEEE.

Conclusion: My assessment of the dissertation, abstract, scientific publications, and scientific contributions of Vesselina Rumenova Naneva is positive.

The dissertation, abstract and publications submitted for review meet the requirements of ZRASRB, PZRASRB and PRASPU for obtaining degree “Doctor of Philosophy”.

The achieved scientific and applied results give me grounds to recommend to the esteemed scientific jury to award **Vesselina Rumenova Naneva** the educational and scientific degree DOCTOR in the field of higher education 4 Natural sciences, mathematics and informatics, professional field 4.6 Informatics and computer sciences.

03.01.2024. Reviewer:
Plovdiv /prof. Asen Rahnev, Ph.D./