OPINION

by Prof. Rositsa Zhelyazkova Doneva, PhD

University of Plovdiv Paisii Hilendarski

of a dissertation for awarding the educational and scientific degree "Doctor"

in field of higher education 4. Natural sciences, mathematics and informatics

professional field 4.6. Informatics and Computer Science

doctoral program "Informatics"

Author: Miroslav Trendafilov Trankov

Topic: "Application of Machine Learning Methods in Textile Fiber Production"

Scientific supervisors: Prof. Emil Nikolov Hadzhikolev, PhD and Assoc. Prof. Silvia Nikolaeva Gaftandzhieva, PhD– University of Plovdiv "Paisii Hilendarski"

1. General presentation of the procedure and the PhD student

By order No. RD-22-771/27.03.2025 of the Rector of the University of Plovdiv Paisii Hilendarski I have been appointed as a member of the scientific jury to ensure a procedure for the defence of dissertation work on the topic "Application of Machine Learning Methods in Textile Fiber Production" for the acquisition of 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 Science, Doctoral Program "Informatics". The author of the dissertation is Miroslav Trendafilov Trankov - a full-time PhD student at the Department of Computer Informatics, supervised by Prof. Emil Hadzhikolev, PhD and Assoc. Prof. Silvia Gaftandzhieva, PhD from PU.

The set of materials presented by Miroslav Trankov is under Article 36 (1) of the Regulations for the Development of the Academic Staff of the PU and includes the following documents:

– a request to the Rector of the PU to disclose the procedure for the defence of a dissertation work;

– curriculum vitae in European format;

– protocol from the departmental council for the preliminary discussion of the dissertation work and opinion from the scientific supervisors regarding readiness for preliminary discussion;

– abstract in English and Bulgarian;

– declaration of originality and authenticity of the attached documents;

– certificate of compliance with the minimum national requirements;

– list of publications;

– dissertation work;

– copies of the publications on the topic of the dissertation work.

The PhD student has attached four publications.

In 2011, PhD student Miroslav Trankov obtained the Master's degree at PU in Psychology, and in 2018 he obtained the Master's degree in Software Technologies at the same university. In 2019, he was enrolled as a full-time doctoral student at the Department of Computer Informatics at the Faculty of Mathematics and Informatics in PU.

The PhD student has professional experience as a data administrator (2012-2013) and a data processing expert for the legal claims team at EVN Bulgaria (2014-2016). During the period 2016-2020, Miroslav Trankov is a system administrator at Coolbox AD (2016-2018) and Suedwolle Group Italy – Bulsafil S.p.A. branch (2018-2020). Since 2020 Miroslav Trankov has worked as a scientific data analyst at the company Suedwolle Group Italy – Bulsafil S.p.A. branch, where he deals with collecting, analyzing and processing information from DBMS, integrating new functionalities into ERP systems, applying machine learning algorithms in production forecasting systems, and preparing technical analyses and reports.

2. Relevance of the topic

The global economy is characterized by unstable markets, dynamic and highly competitive conditions. In this context, manufacturers need to quickly implement innovative technologies that allow cost optimization and shorten the time to market for new products.

Despite technological progress, the textile industry faces challenges in managing quality and machine productivity due to unforeseen events and the need to optimize processes. Developing software systems for automating production planning using machine learning methods can help overcome these challenges.

I find the topic of the dissertation completely up-to-date. I believe that the formulated tasks allow the primary goal of the research to be achieved.

3. Knowledge of the research problem

Miroslav Trankov studied 182 references for his research, of which 37 were internet sources. The bibliographic reference led me to conclude that the PhD student has thoroughly familiarized herself with the state of research on the problem considered in the dissertation work.

4. Research methodology

The chosen research methodology is standard for a dissertation in Informatics. Based on the results of a study of the main stages of the textile production process, classical and modern approaches to organization and optimization of production and quality control, a prototype of a software system for managing the production process in a textile fiber factory was designed and developed. The developed system was tested in the fabric Suedwolle Group Italy – Bulsafil S.p.A. branch.

The research methodology allows him to achieve the set goal and fulfil the tasks solved in the dissertation work.

5. Characterization and evaluation of the dissertation work and contributions

The main text of the dissertation (total 162 pages) includes an Introduction, 4 chapters, a Conclusion and an Appendix, which contains program codes of modules of the developed system. The clarity of the presentation is contributed by the provided lists of abbreviations used, tables and figures and the literature used.

In the Introduction, the doctoral student introduces the topic of the research area and sets the main goals and objectives of the dissertation research.

In Chapter 1, the PhD student examines the main concepts of the research area, and studies machine learning models and their possible application for improving processes for textile fibers production, with practical applications illustrated with examples.

In Chapter 2, the PhD student determines the functional and non-functional requirements, user roles and their main activities, proposes an architecture of a software system for managing the production process in a textile fiber factory and a data model and identifies the main production activities in which machine learning methods can be applied. Based on a detailed analysis, he selects techniques and technologies for the development of the system.

Based on the proposed project of a software system for managing the production process in a textile fiber factory, he has developed a software system prototype, Chapter 3 describes in detail the developed modules for Production Control, Production Organization, Statistics and Machine Maintenance.

In Chapter 4, the PhD student presents results from experiments conducted when testing the system in the fabric Suedwolle Group Italy – Bulsafil S.p.A. branch, which prove its applicability for optimizing the production process.

The Conclusion summarizes the results obtained in fulfilling the tasks set, describes the contributions and outlines the prospects for the development of the research. Scientific and applied contributions of the research are the proposed architecture of a software system for managing the production process in a textile fiber factory and implemented software prototype. The implementation of the developed prototype of a software system in the fabric Suedwolle Group Italy – Bulsafil S.p.A. branch, experiments conducted for testing the developed modules of the system and for automated generation of reports and sending notifications can be mentioned as applied contributions of the dissertation research.

6. Evaluation of the publications and personal contribution of the PhD student

The results obtained in the dissertation have been presented to a sufficient extent to a specialized scientific audience, and the main ones are reflected in the publications of the PhD student.

The results are presented in 4 publications, 3 of which are in journals and 2 are indexed in the world-famous databases SCOPUS and(or) Web of Science and have impact rank. The minimum national requirements for acquiring the educational and scientific degree “doctor” in professional field 4.6 have been exceeded - 110 points against a minimum requirement of 80 points.

There is 1 citation of a publication on the topic of the dissertation work by 22.04.2025, which is proof of the relevance of the topic of the dissertation research and the significance of the achieved results.

I do not doubt the personal contribution of the PhD student in the attached publications.

7. Abstract

The abstract, written in Bulgarian and English, is made according to the current requirements and adequately reflects the content, main results and contributions of the dissertation work.

8. Recommendations for future use of dissertation contributions and results

I have no significant critical comments on the layout of the dissertation. In places, the text of the dissertation needs refinement.

The results obtained have the potential to be disseminated and multiplied. In this regard, I fully share the prospects for the development of the subject, as noted by the PhD student. I recommend the PhD student to continue research in the field and participate more actively in international conferences that would allow a wider international scientific community to evaluate the achieved results.

CONCLUSION

The dissertation contains scientific-applied and applied results, which represent an original contribution to science and meet the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations on the Implementation of the Development of Academic Staff in the Republic of Bulgaria Act and the relevant Regulations of PU.

The dissertation work shows that the PhD student Miroslav Trankov possesses in-depth theoretical knowledge and professional skills in Informatics, demonstrating qualities and skills for independent conduct of scientific research.

Due to the above, I confidently give my positive assessment of the conducted research, presented by the above-reviewed dissertation work, abstract achieved results and contributions, and I propose to the honourable scientific jury to award the educational and scientific degree “Doctor” to Miroslav Trendafilov Trankov in the field of higher education: 4. Natural sciences, mathematics and informatics, professional field 4.6. Informatics and Computer Science, Doctoral Program “Informatics”.

22.04.2025. **Reviewer**: .....

Prof. Rositsa Zhelyazkova Doneva