

STATEMENT

By Assoc. Prof. Nadezhda Ivanova Angelova, PhD

Trakia University, Stara Zagora

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 the Production of Textile Fibers“

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. ПД-22-771/27.03.2025 of the Rector of the University of Plovdiv "Paisii Hilendarski" (PU) 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 the Production of Textile Fibers*" 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 Nikolov Hadzhikolev, PhD and Assoc. Prof. Silvia Nikolaeva Gaftandzhieva, PhD from University of Plovdiv "Paisii Hilendarski".

The set of materials presented by Miroslav Trendafilov 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 University of Plovdiv to disclose the procedure for the defence of a dissertation work;
- a curriculum vitae in European format;
- a protocol from the departmental council, related to reporting the readiness to open the procedure and to a preliminary discussion of the dissertation;
- an abstract;
- a declaration of originality and authenticity of the attached documents;
- a certificate of compliance with the minimum national requirements;

- a list of scientific publications on the topic of the dissertation;
- dissertation work;
- copies of the publications on the topic of the dissertation work;

The PhD student has submitted 4 (four) publications, 2 (two) of them are indexed in SCOPUS and have a SJR, one of which has a quartile Q4, and the other is also indexed in Web of Science.

In 2018, PhD student Miroslav Trankov obtained the Master's degree in Software Technologies at the University of Plovdiv “P. Hilendarski”. In 2019 he was enrolled as a full-time PhD student at the Department of Computer Informatics of the same university. He speaks English. He works as a data administrator and data processing expert at EVN Bulgaria, Electricity Supply, KK Billing Department, system administrator at Coolbox AD. Since 2018, he has been a system administrator at Suedwolle Group Italy – Bulsafil S.p.A. branch, and since 2022 he has been working as a scientific data analyst.

2. Relevance of the topic

The topic of the dissertation is up-to-date, considering automation and quality management in the context of the textile production process with the dynamic and developing technologies of Industry 4.0 and Big Data. The possibilities for automation and optimization of the textile fiber production process are presented, and for the purpose of the dissertation research, a prototype of a software system for automating production planning using machine learning methods has been designed and developed. Experiments with the created software application are in a real working environment and show its scientific and practical significance.

3. Knowledge of the research problem

PhD student Miroslav Trendafilov Trankov is familiar with the field of research very well. The list of used references contains 182 titles, of which 37 are Internet sources. All listed sources are in English.

4. Research methodology

The methodology applied in the dissertation work by PhD student Miroslav Trendafilov Trankov is standard for the field of informatics and computer science and is suitable for achieving the goal of the dissertation research. A review of the research in the subject area was made and based on the study, a software system for planning and optimization of the production of textile fibers was designed. A software prototype of a system for planning and optimization of the production of textile fibers was developed. After experiments in a real environment, the system was improved and conclusions were drawn about the applicability of the proposed solutions for optimizing the production processes.

5. Characterization and evaluation of the dissertation work and contributions

The presented dissertation work (total 164 pages) consists of an introduction, four chapters and a conclusion, a list of the author's publications on the topic, a declaration of originality, a list of

used literature and appendices with parts of the code for implementing the software application. The list of used references contains 182 titles, of which 37 are Internet sources. Lists of abbreviations, tables and figures are also presented.

The **Introduction** presents the subject area of the dissertation research, sets the goal and objectives.

In **Chapter 1**, the PhD student examines the basic concepts of the research subject area related to the production of textile fibers. Machine learning models and their possible application for improving the processes for the production of textile fibers are studied.

Chapter 2 describes the process of designing a software system for managing the production process in a textile fiber factory. Based on the analysis, the functional and non-functional requirements, user roles and their main activities are determined, and the architecture of the software system and data model are proposed. The main components of the system and their relationships, modules and classes, processes, algorithms, etc., are described. The main activities in which machine learning methods can be applied are identified, and a selection of techniques and technologies for system development is made.

Chapter 3 presents the developed prototype of a software system and describes in detail the developed modules for Production Control, Production Organization, Statistics and Machine Maintenance.

Chapter 4 describes experiments from its testing in the company Suedwolfe Group Italy – Bulsafil S.p.A. branch.

The **Conclusion** summarizes the tasks set and solved within the framework of the dissertation research. The contributions are described, and the prospects and directions for future continuation of the conducted research are outlined.

The main contributions of the dissertation work can be characterized as **scientific-applied** and **applied**. The *scientific-applied contributions* of the dissertation research include: proposed architecture of a software system for managing the production process in a textile fiber production factory and implemented software prototype of a software system for managing the production process in a textile fiber production factory. *Applied contributions* of the dissertation research are: implementation of the developed prototype of a software system in the company Suedwolfe Group Italy – Bulsafil S.p.A. branch and conducted experiments for testing the developed modules of the system and experiments for automated generation of reports and sending notifications.

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

The results obtained in the dissertation work have been sufficiently tested before a scientific audience, the main ones of which are reflected in the publications of the PhD student. 4 (four) publications have been presented on the topic of the dissertation – 2 (two) in specialized journals, in English and 2 (two) in conference proceedings in Bulgarian. One of the publications is independent, the other three are co-authored.

Two of the publications presented on the topic are indexed in SCOPUS and have a SJR (SJR=0.174, SJR=0.152), one of which is in the quartile Q4, and the other is also indexed in Web of Science. The PhD student has a total number of 110 points from indicators A and G, which fully covers the required number of 80 points according to the minimum national requirements for acquiring the ONS "Doctor" in Professional field 4.6.

A citation of one of the publications according to Scopus database was noted, which indicates the relevance of the topic of the dissertation.

After reviewing the dissertation and the materials presented, I believe that the formulated contributions and the obtained results are the personal work of the PhD student.

7. Abstract

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

8. Recommendations for future use of dissertation contributions and results

I have no critical remarks on the layout of the dissertation. The topic and the results provide certain opportunities for future development and expansion of the applications. I recommend that Miroslav Trendafilov Trankov continue his research and expand its popularization.

CONCLUSION

The dissertation contains *scientific-applied and applied results that represent an original contribution to science* and *meet the requirements* of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of ZRASRB, and the relevant Regulations of PU.

The dissertation work shows that the PhD student Miroslav Trendafilov Trankov **possesses** in-depth theoretical knowledge and professional skills in the scientific speciality "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".

25.04.2025 г.

Reviewer:

Assoc. prof. Nadezhda Angelova, PhD