



REVIEW

of Tihomir Videv Videv's dissertation

on the topic "Generalized network models of Data Mining processes for management and protection of a smart home" for awarding the educational and scientific degree "PhD" in the doctoral program "Computer Systems and Technologies", Higher education field "5. Technical sciences", Professional area 5.3. "Communication and Computer Engineering"

from Prof. Stefan Todorov Hadjitodorov, DSci

According to the Orders of the Rector of the University "Prof. Dr. Asen Zlatarov", Burgas, No. UD - 64 / 21.02.2024 and No. UD - 79 / 06.03.2024 I have been appointed as a member of the scientific jury and a reviewer under the procedure for the defense of a dissertation for awarding an educational and the scientific degree "PhD" in the doctoral program "Computer systems and technologies", Higher education field 5. Technical Sciences, Professional Area 5.3. Communication and computer technology on the topic "Generalized network models of Data Mining processes for management and protection of an intelligent home" of part-time doctoral student Tihomir Videv Videv. I have received all the documents of the dissertation.

Brief biographical data of the PhD student

Tihomir Videv was born on 07/08/2072 in the town of Chirpan, Stara Zagora region. In 2015 he obtained a master's degree in CST at "Prof. Dr. Asen Zlatarov" University, Burgas. He worked and works at "Computermax" OOD, and since 02.1.2017 he is a doctoral student at the CST department of "Prof. Dr. Asen" University Zlatarov" Burgas.

Dissertation on "Generalized Network Models of Data Mining Processes for Management and Protection of an Intelligent Home"

Tihomir Videv's dissertation is 140 pages long and consists of an introduction, three chapters, contributions to the dissertation, directions for future research, a list of publications on the dissertation, a bibliography with 112 titles, and an 11-page appendix. The dissertation work is dedicated to the development and description of generalized network models of Data Mining processes related to one of the modern and widespread topics today - management and protection of a smart home. In contrast to existing developments, here for the first time the apparatus of generalized networks, created by the first supervisor of the doctoral student, is used as a modeling tool.

In order to achieve this goal, the following tasks have been set:

1. To study and describe the processes taking place in IH management through algorithms for Data Mining processes.
2. To develop, describe and present some of the IH systems by means of Generalized Networks (GNETs);
3. To develop a generalized network model of a security system through algorithms for Data Mining processes, investigating the possibility of penetration and interference in the system processes through fuzzy evaluation through IFE.

4. To test and present one of the systems in IH using the GN IDE software.
5. Development of a generalized network model of a payment system.
6. Development of a generalized network model of the power and security system of the Smart house.
7. To describe the results and draw the relevant conclusions.

Without going into detail on the content, I will outline what I consider to be the most important contributions of the thesis, also indicating some of my critical remarks.

The first chapter is entirely overview. It is called "Fundamentals of Generalized Network Theory", but its final paragraphs are devoted to notes in the field of Data Mining, a topic that goes beyond the chapter title.

At the beginning of the Second Chapter, the essence and main elements of the structure of an intelligent home are discussed. These notes are necessary for the following descriptions of generalized network models. In this chapter, generalized network models of a system for automatic switching on and adjustment of lighting in a room and a cyber-system for a smart home with intuitionistic fuzzy estimation are proposed. For the first generalized network model, a demonstration simulation was done in GN IDE (Software tool for simulation of models developed with generalized networks). For the second model, an alternative method for assessing the risk of a cyber-attack over the control of a smart home through intuitionistic fuzzy evaluations is also proposed.

The third chapter contains generalized network models of a payment process in an electronic payment gateway, the risk assessment process of drone cyber-interference using intuitionistic fuzzy estimation, and a power and security system in a smart home. I will note that the name of the first of these models - "Generalized network model of the flow of states of the real payment process in PGW" is not quite accurate, because the described generalized network models the payment process, not its state.

I accept the dissertation's contributions as formulated by him.

Abstract

The abstract reflects the content of the dissertation work and corresponds to the requirements of ZRAS and the Regulations for the terms and conditions for acquiring scientific degrees and for holding academic positions at the University "Prof. Dr. Asen Zlatarov" - Burgas.

Dissertation Related Publications

From the attached reference, it can be seen that Tihomir Videv is the author of 8 publications related to his dissertation work, three of them in specialized Springer series with SJR-factor, one in a journal with impact-factor, one in a collection of papers before the IEEE conference "Intelligent Systems" for 2020, a paper to the 21-st International Workshop on Intuitionistic Fuzzy Sets and Generalized Nets, Warsaw, Oct. 2023, which will be published in a Springer thematic collection with an SJR-factor and two where the name of the journal is not indicated. These publications cover the requirements of the Regulations for the terms and conditions for acquiring scientific degrees and for holding academic

positions at the University "Prof. Dr. Asen Zlatarov" - Burgas. Tihomir Videv did not provide citation data, but I found 2: [1*] is cited in

Halim, H. *Exploring Information Technology in Smart Tourism in Indonesia*. In:- *Handbook of Technology Application in Tourism in Asia* (A. Hassan, Ed.), Springer, Singapore, 2022, https://doi.org/10.1007/978-981-16-2210-6_22,

and [5*] is cited in

Spasic, A., D. Jankovic, P. Rajkovic, D. Aleksic. *Program-Sensitive Modifications of Generalized Net Model of Software-Intensive Production of Stereoscopic Multimedia Content*. *Journal of Computer and Systems Sciences International*, Volume 61, Issue 5, Oct 2022, pp 824–842
<https://doi.org/10.1134/S1064230722050136>.

Critical notes and recommendations

Some remarks were made above in describing the chapters of the dissertation. I will just point out some others:

- in section 2.2.2.1 there is a terminological inaccuracy – intuitionistic fuzzy pairs are used for the evaluations, not sets, as written on page 65;
- there are some grammatical and terminological inaccuracies in the text - for example, on page 59 the kernel Ω is called "Intuitionistic fuzzy estimation" when this is actually its characteristic;
- I recommend that, in addition to the simulation of one of the generalized network models, he should also do simulation for the others.

Despite the indicated inaccuracies, the text as a whole is well organized and structured and essentially original.

Conclusion

The above is a reason to give a positive assessment of the dissertation work and the materials to it and to recommend to the respected members of the Scientific Jury to vote for awarding Tihomir Videv Videv the educational and scientific degree "PhD" in professional direction 5.3. "Communication and Computer Engineering".

16.4.2024

Reviewer:

Подпис заличен
Чл.2 от ЗЗЛД -

(Prof. Stefan Todorov Hadjitodorov,
Section "Bioinformatics and Math
modeling", IBPBME - BAS)