OPINION STATEMENT

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About: Dissertation thesis for the award of
educational and scientific degree "Doctor"
in area of higher education 5. Technical Sciences,
professional track 5.3. Communication and Computer Techniques,
PhD program Computer Systems and Technologies

Author of the dissertation thesis: Tihomir Videv Videv
Topic of the dissertation thesis: Generalized net models of Data Mining processes for management and securing of a Smart House
Supervisors: Acad. Prof. DSc DSc Krassimir Todorov Atanassov,
Prof. Eng. Sotir Nikolov Sotirov, PhD

1. Justification and general description of the presented materials

By order № UD-79/06.03.2024 г. of the Rector of University "Prof. Dr. Assen Zlatarov" – Burgas I am appointed to prepare an opinion statement as a member of the scientific jury (appointed by order № UD-64/21.02.2024) in the procedure for defence of a dissertation thesis titled Generalized net models of data mining processes for management and securing of a smart house for acquiring of the educational and scientific degree Doctor in area of higher education 5. Technical Sciences, professional track 5.3. Communication and Computer Techniques, PhD program Computer Systems and Technologies. Author of the dissertation thesis is Tihomir Videv Videv.

The materials presented by Tihomir Videv Videv for the procedure: dissertation thesis, author's summary of the dissertation thesis, copies of 8 publications related to the dissertation and a reference for fulfillment of the minimal requirements for acquiring of the educational and scientific degree Doctor are prepared according to the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation and the Regulations for the Conditions and Order of Acquiring of Scientific Degrees and Holding Academic Positions at the University "Prof. Dr. Assen Zlatarov" – Burgas.

2. Actuality of the topic and research methodology

Objects of research in the dissertation thesis are various processes from Data Mining theory through their modeling by Generalized nets and program realization of the simpler ones. In recent years, the notion of a smart house has become more and more popular and significant. On the other hand, the apparatus of the Generalized nets theory has been successfully used for construction of models of processes of various areas of the science and practice for the studying and proving of the properties of program systems and with aim of simulation of the processes behavior. With the help of the Generalized net models all processes in the smart house can be described as well as the connections between the separate components of the modelled system.

As a result of the research, processes in the smart house are described using algorithms for data mining processes; Generalized net models of smart house systems are described; a Generalized net model of a security system through data mining algorithms is described; a Generalized net model of security and supply system of a smart house is described.

3. Knowledge about the problem

The dissertation thesis and the presented publications show that Tihomir Videv has excellent knowledge on the subject. His knowledge about the problem is clearly evident from the writing style, the performed analysis and drawn conclusions, the comprehensive and up-to-date bibliography consisting of 112 sources. With very few exceptions, the sources in the bibliography are described exactly and comprehensively and are cited in the corresponding places in the text.

4. Evaluation of the dissertation thesis

The dissertation thesis presented by Tihomir Videv Videv is written very well. It spans over 140 pages and is structured according to the widely accepted norms, namely: Introduction, Chapter 1: Basic notions from the Generalized nets theory; Chapter 2: Generalized net models of systems for Data Mining processes in the smart house; Chapter 3: Generalized net models of Data Mining processes in the security of the systems in the smart house; Conclusion; Contributions in the dissertation thesis; Statement for originality of the results and Bibliography. The program code for simulation is included in the form of an application.

In the Introduction, the author has presented a good motivation for the choice of the topic, its actuality, as well as the main goal of the dissertation thesis and the formulated tasks the fulfillment of which leads to reaching the goal.

In Chapter 1, the basic notions of the Generalized nets theory are presented. The definitions of a transition and a generalized net are given. The algorithms for functioning of a transition and a Generalized net are also presented. Apart from that, the notions of a reduced and extended Generalized net and the operator aspect of the Generalized net theory are also discussed. The author has also described a process of construction of a Generalized net. The rest of the chapter is devoted to some basic notions of Data Mining and the modern tendencies in it which does not reflect the title of the chapter. It would be better if the part of the chapter starting at 1.6 till the end was included in a separate chapter.

In Chapter 2, Generalized net model of an automated lightening system in a room is described. Other Generalized net models described in this chapter are: a Generalized net model of a cyber system for a smart house with intuitionistic fuzzy estimation; a Generalized net model for estimation of the possibility for intruding in the systems of a smart house using intuitionistic fuzzy sets. A simulation of the functioning of a Generalized net representing the functioning of an automated lightening system is presented in the simulator GN IDE.

In Chapter 3, the following Generalized net models are described: a Generalized net model of the flow of states of a real payment process in PGW; a Generalized net model of a standard internet portal for electronic payment using intuitionistic fuzzy estimations; a Generalized net model for estimation of the risk of cyber interference in drones through the use of intuitionistic fuzzy estimations; a Generalized net model of the functioning of the electricity and security system of a smart house.

In the Conclusion, an overview of the results included in the dissertation thesis is made. Some conclusions are drawn, directions for future research are outlined and possible applications of the Generalized net models are briefly discussed.

5. Contributions

I accept all contributions formulated by Tihomir Videv. As a result of the research, important results with scientific and applied scientific character are obtained. These results concern different aspects of the modelling of processes in the smart house. The constructed Generalized net models of processes in the smart house can be included in more complex models of smart neighborhood and smart city, and can be easily modified for evaluation of economic parameters.

I confirm that I have not found any evidence of plagiarism in the dissertation thesis.

6. Publications on the topic of the dissertation thesis

Tihomir Videv has presented copies of 8 papers which contain the main results of the dissertation thesis. Out of them, 5 are in specialized series of Springer – [1,3,4,7,8]; 2 are reports at an international conference, indexed in IEEE Xplore – [2, 6]; 1 is a paper in an international journal – [5].

7. Author's dissertation summary

The author's dissertation summary spans over 51 pages. It is prepared according to the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation and the Regulations for the Conditions and Order of Acquiring of Scientific Degrees and Holding Academic Positions at the University "Prof. Dr. Assen Zlatarov" – Burgas. Its content reflects exactly and fully the content and the results of the dissertation thesis.

8. Conclusion

Taking into account the above said, I consider that the dissertation thesis has sufficient scientific and applied scientific contributions and meets the requirements of the the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation and the Regulations for the Conditions and Order of Acquiring of Scientific Degrees and Holding Academic Positions at the University "Prof. Dr. Assen Zlatarov" – Burgas. Therefore, I give a **positive evaluation** of the dissertation thesis, the author's summary of the dissertation thesis, the scientific publications and contributions of Tihomir Videv Videv.

On the grounds of the achieved scientific, applied scientific and applied results I **recommend** to the honourable scientific jury to award the educational and scientific degree Doctor in area of higher education 5. Technical Sciences, professional track 5.3. Communication and Computer Techniques, PhD program Computer Systems and Technologies to Tihomir Videv Videv

14 May 2024

Signed: ..

Подпис заличен
Чл.2 от ЗЗЛД

Assoc. Prof. Velin Andonov, PhD