

Review

Ph.D. Candidate : Ing. David Malanik, FAI, UTB ve Zlíně

Thesis name: Usability of the artificial intelligence and modern techniques for securing computer systems.

Content and structure

In the dissertation thesis are discussed practical usability of the neural network in computer security application. The main point of this thesis is focused on the small part of neural network inside the user verification process. The neural network represented some intelligent system which might be adapted to specific user characteristic and might be usable for the smart reconstruction and identification users. Thesis consist of 11 chapters. It contain introduction, contemporary state and application ANNs. With thesis are attached also results of candidate research in the form of publications. Based on contemporary state it can be stated that thesis represent interesting applications of soft computing on computer security.

Quality and defined aims

Quality of candidate thesis can be evaluated from graphical and formal point of view. In both views it can be stated, that level of quality is good.

Selected methods

In proposed thesis candidate used rigorous methods and its research follows standars scientific criteria.

Question and remarks

In proposed thesis I would have following questions and suggestions :

- In the section DISSERTATION GOALS are mentioned this goals :
 1. To prove that there is the place for the assembly of the neural networks to the user verification processes
 2. To prove that the neural network might successfully verified the user or might repaired the sample used for the user verification

that are already well known. Why did you choose them like goals? In this goal:

3. To prove that the speed of the solution based on the neural network is inside the practical limited (for example: the time for the learning, identification, etc.)

are you sure? What kind of today's technology shall be used to show that there are almost no limitations?

- You are talking about Blind shooting algorithm (BSA), do you mean Blind Search Algorithm?
- In Fig. 3.3 - BSA progress you are demonstrating BSA on simple unimodal function in 2D. How would work this algorithms on multimodal function in higher dimensions?
- You are using multilayer ANNs. What kind of learning algorithm are you using? Explain why learning curve at Fig. 8.17 - Training error L1000, L1500, L1000 is so much oscillating?

Conclusion

Ph.D. candidate Ing. David Malaník has published his results on various conferences and workshops. They were accepted by scientific community.

In proposed thesis Ing. David Malaník clearly demonstrated ability of independent scientific work. Proposed thesis fulfill all important criteria and thus I recommend proposed thesis to final defense.



Prof. Ing. Ivan Zelinka, Ph.D.

In Zlín 4.11.2011

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Review of Dissertation Thesis

Thesis name:	Usability of the artificial intelligence and modern techniques for securing computer systems
Ph.D. candidate:	Ing. David Malaník
Supervisor:	doc. Mgr. Roman Jašek, Ph.D.
Study branch:	Information technology
Place of work, where defence takes place:	Tomas Bata University in Zlín, Faculty of Applied Informatics Nad Stráněmi 4511, 760 05 Zlín

This thesis describes practical usability of the neural network in computer security applications. The thesis has a theoretical and practical part, which describes the potential of usage, and the practical part shows the namely usage.

The theme is very actually at this computer time. The student solves these problems with the according way. The dissertation goals have been presented at the introduction chapter. The core of the work has been detail described in the theoretical chapters. The practical part shows the technical usability of the designed system core. The main benefit flowing from this dissertation thesis is the description how to effectively using the neural network for the security system based onto biometric identification and neural network based cryptography systems.

The conclusion of this thesis is dedicated to summary of the results and appreciation of the dissertation goals. It can be stated that the goal of work was achieved. The theoretical benefit of this work is flowing from description of wide area for implementation of neural network inside the security systems. The practical/application benefits will be described inside the design of the system prototype and specification of potential usage of the neural network if identification process. I evaluated this work as a very successful. The text is logically divided to chapters and subchapters. Each part is written eternal, briefly and concisely. The work had very good graphical structure. I have not major comments to the language part of this work.

Remarks to the thesis:

The Ph.D. thesis has a very good graphical form; text is logically structured into chapters and subchapters.

With respect of the size of this Ph.D. thesis, is contains a few typing errors. Misprints and mistypes are minority, for example in fig. 10.3 is "tken" instead of "token".

I would like specifically highlight the fact that the author successfully used developed methods not only on the theoretical way, but also for the performing some practically test described in this thesis and Appendixes.

Questions:

1. How is solved the identification process problem with the deformed image?
2. Which tests you perform for the verification of the trained network?
3. Which is the real potential top of the neural network usability in identification process?

Conclusion:

In my opinion Ing. David Malaník has proved to be capable of soling difficult research problem. Practically described parts of this thesis have been published on 14 international conference papers. These papers always included the technical reports from realized tests. The neural based identification represents the future part of user verification procedures; this procedures starts to be implemented in real security applications.

I recommend

Ph.D. thesis submitted by David Malaník for acceptance by the Committee to be presented and defended in the information Technology study branch.

In Bratislava, 8.11.2011

A handwritten signature in blue ink, appearing to be 'Kucera', with a horizontal line extending to the right.

Review of the Doctoral Thesis

Tomas Bata University in Zlín

Faculty of Applied Informatics

Department of Informatics and Artificial Intelligence

Author: Ing. David Malaník

„ Usability of the artificial intelligence and modern techniques for securing computer systems“

Supervisor: doc. Mgr. Roman Jašek, Ph.D.

Reviewer Prof. Ing. Jiří Dvořák, DrSc.

A. The focus of the thesis.

This thesis deals with current issues of mathematical modeling for the future knowledge economy. The work is focused on the use of modern mathematical language for expressing abstract models in selected special class of systems. By correctly expresses the general systems theory correctly describes the possibilities of abstraction systems in the logical description of the stability of discrete systems using a very interesting direction of solving the dynamic changes in this systems. It shows that extremal algebras are often used for describing the behavior of complex systém working in discrete time. In this thesis approach to the investigation of stable states is describes. The eigenproblem is investigated in several types. The theoretical results are then transformed to appropriate algorithm for recognition of stable states of a given transition matrix and for describing all possible stable states of the given DES. The results is demonstrated by their interpretation in filds - on humen nervous system, on political system or on decision making in economy.

B. Meeting the targets.

The main goal was to abstract a possible model system for expressing the structure of fuzzy algebra and algorithms to verify that the mathematical model is described and demonstrated, correctly. In dissertation written at 99 pages and meets objectives. Interesting is the connection between mathematical model and its applications. Also generally managed to describe the future direction model of systems. The work is a contribution to the modern theory of systems and modeling. The objectives are met and solved the tasks demonstrated in information technology.

C. Problem Solving and the results of the dissertation.

Very well-described solutions consider it fair and indicative of a highly professional management doctoral supervisor. The benefits of work I see in the above general definition of a system, the possibility of defining a new mathematical modeling of systems and algorithms used for the construction of possible user applications,

D. Importance for the Advancement of Science.

The importance I see in a description of phenomena in a given class of models of the abstract systems. This represents a new direction for the science.

E. Presentation of the work.

Work is very good and meets the formal requirements of the dissertation. At work minor inaccuracies (on the charts and missing variables and general dimensions metric variables in mathematical relationships).

Questions for discussion: What is the importance of modern information and communication technologies for the new mathematical modeling systems.

E. Presentation of the work.

Publications is appropriate.

Conclusion: I recommend the dissertation for defense.

Brno, 2 August 2011

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