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Research Interests

Computer Systems Security: Neural networks and artificial immune systems for intrusion and viruses detection

Monitoring and analysis of the network activities with the purpose of the network intrusion detection and prevention

Main objectives:

-to ensure host safety from DDoS, remote and local penetration, probing and other network attacks;

-to detect both known and unknown network attacks;

-to self-organize and to adapt the system to the changeable activities.

Automatic epileptic seizure detection in EEGs Based on Neural Networks and largest Lyapunov exponent

We propose a novel method for epileptic seizure detection that is reliant on the maximal short-term Lyapunov exponent (STLmax). The proposed approach is based on automatic segmentation of the EEG into epochs that correspond to epileptic and non-epileptic activity. The accuracy detection is about 97%.

Neural Network System for Transient Ischemic Attacks Diagnostics

Transient ischemic attacks recognition is based on integration of the NPCA neural network and multilayer perception. By combining two different neural networks (NPCA and MLP) it is possible to produce efficient performance in terms of detection and recognition of transient ischemic attacks. The main advantages of using neural network techniques are the ability to recognize "novel" TIA attack instances, quickness and ability to assist the doctor in making decision.

Multi-Agent Adaptive Robotics, intelligent control of mobile robot

We propose collaborative multiagent systems in which the agents have to work together in order to optimize a shared performance measure. To achieve effective behavior in multi-agent system two techniques can be used: influence value as a measure about executing actions from another agent, and coordination graphs that decompose a coordination problem into a combination of simpler problems. In influence value paradigm, agents estimate the values of their actions based on the reward obtained and a numerical value is called influence value. The influence model can specify two side relationships between agents whose behavior requires coordination. Influence value determines the measure of quality of agents' interactions. Since all agents in a collaborative multiagent system can potentially influence each other it is important to ensure that the actions selected by the individual agents result in optimal decisions for the group as a whole.

Publications

1. Vladimir Golovko, Leonid Vaitsekhovich. Neural network approaches for intrusion detection and recognition // Computing, Vol. 5, Issue 3. – 2006

2. Dzmitry Kaliukhovich, Vladimir Golovko and Andreas Paszynski. Control algorithms for the mobile robot "MAX" on a task of line following provided by intelligent image processing // Solid State Phenomena, vol.147-149, pp. 35-42, 2009.