IEEE SEMINAR

Quadratic Neural Unit & Quadratic Neural Network:
A Compromise for Industrial Applications

Date: Tuesday, 29 June 2010
Time: 2:30 - 3:30 PM
Place Rm. E2-393 EITC
Fort Garry Campus
Cost: *FREE*

Speaker: Prof. Ivo Bukovsky, PhD
Dept of Instrumentation & Control Eng
Czech Technical University in Prague
Prague, Czech Republic

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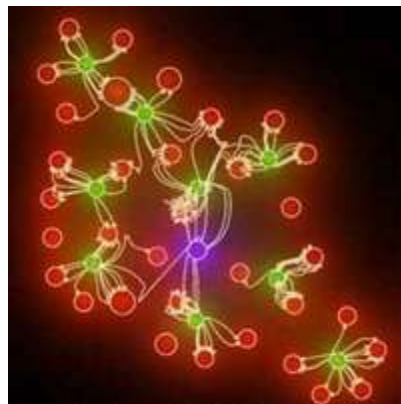Mathematical Sciences

CONTACT

W. Kinsner, Ph.D. P.Eng.

Department of Electrical &
Computer Engineering,
University of Manitoba

kinsner@ece.umanitoba.ca

Tel: 474-6490

Fax: 261-4639

Abstract

This talk will first summarize issues related to an adaptive methodology for evaluation of complicated time series by low-dimensional neural architectures. Then, it will introduce a Quadratic Neural Unit (QNU) as a promising low-dimensional neural architecture. The quadratic nature of the QNU assures sufficiently high quality of nonlinear approximation, while the QNU's convexity facilitates a simple optimization process in the vicinity of a global minimum. Next, a Quadratic Neural Network (QNN) with sequential learning will be introduced to cope with a large number of neural weights in the QNU, corresponding to a large number of input samples. This non-conventional neural architecture benefits from the convex (quadratic) attributes, while maintaining its ability to converge towards the global minimum. Finally, experimental results from the QNU and QNN in control and other applications will be discussed and compared to conventional neural networks.

Speaker Bio

Dr. Ivo Bukovsky's major research interests are the development of new neural architectures, adaptive methodologies, and their applications to real dynamical systems. He graduated from Czech Technical University in Prague where he received his Ph.D. in the field of Control and System Engineering in 2007. During his PhD studies, Ivo spent seven months working as a visiting researcher under supervision of Dr. M.M. Gupta at the Intelligent Systems Research Laboratory at the University of Saskatchewan under a NATO Science Fellowship. His Ph.D. thesis on nonconventional neural units and adaptive approach to evaluation of complex systems was recognized by the 2007 Verner von Siemens Excellence Award. For six months in 2009, Ivo worked on research and biomedical applications in the Matsumae International Foundation at the Cyberscience Center at the Tohoku University in Japan. Ivo is an active member in the IEEE Computational Intelligence Society.