

Learning in Networks: Complex-valued Neurons, Pruning, Data Compression and Rule Extraction

Dr. Jacek M. Zurada

George Mason University Lecture
January 17, 2008

SUMMARY: This talk introduces neural networks with complex-valued (CV) neurons with discrete outputs. When CV neurons are generalized to assume a continuum of values, they can be used as versatile CV substitutes for real-valued perceptron networks. Learning of CV layers is discussed in context of traditional multilayer feedforward architecture. Such learning is derivative-free and it usually requires networks of reduced size. Selected examples and applications of CV-networks in bioinformatics and pattern recognition are discussed. The lecture also covers specialized learning techniques for data compression, process centering, logic rule extraction and for prediction. Such techniques include learning with pruning, unsupervised dimensionality reduction and can be used in expert systems, drug dosing, manufacturing processes and other applications that rely on models developed to fit measured data.

SPEAKER: Dr. Jacek M. Zurada serves as Distinguished University Scholar and Professor of Electrical and Computer Engineering at the University of Louisville. He is the author of the 1992 PWS text *Introduction to Artificial Neural Systems*, co-editor of several volumes, including the 1994 IEEE Press book *Computational Intelligence: Imitating Life*, and of the 2000 MIT Press volume *Knowledge Based Neurocomputing*. He is also the author or co-author of more than 280 journal and conference papers in the area of neural networks, data mining and computational intelligence. In 1998-2003, Dr. Zurada was the Editor-in-Chief of IEEE Transactions on Neural Networks, and in 2004-05 he was the President of IEEE Computational Intelligence Society. He is an IEEE Fellow and IEEE CIS Distinguished Speaker.