Proceedings of

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Neural Research Priorities in Data Transmission and EDA

Workshop

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Foreword

The Department of Electronics and Computers at Transilvania University of Brasov organized this workshop in order to establish a framework of cooperation with international partners. Considering the research profile of the Computational Intelligence Research Group at our department but also the aims of TEMPUS SJEP 8180-94 project, from which we obtained the support for the workshop, we focused on two very clear directions:

1. An American-European NSF research proposal on "Neural Function Approximations for Data Compression". Kolmogorov's superpositions can be interpreted as a device which computes arbitrary real-valued continuous functions through iterative parallel computations of continuous functions of one variable using fixed transfer functions. These superpositions have a nomographic structure which suggests applicability in a number of areas, but at the same time the characteristics of nomographic functions impose limitations which are inherent in their structure. We are most interested in computer implementations and in possible applications of approximations with superpositions in image and data compression.

2. An European ESPRIT research proposal on "Hardware Implementations of Neural Networks" that will shape the near and long term future of hardware implementations of ANNs in two important ways: Development of innovative learning algorithms together with the techniques and tools for designing analogue and mixed analogue/digital neural chips, and testing them on several medium to large scale projects; Advanced studies and experiments for integrating optical connections into the future neural chips and of interfacing such chips to micro-electromechanical systems.

Why exactly these very specific directions? This is a difficult question, since a complete answer should contain the history of the contacts between the participants at the workshop. This history stretches over two years and two continents, with very exciting discussions in Belfast, Dublin, London, Prague, Bucharest, Uppsala, Brasov, Santa Barbara, Los Alamos, and Detroit. Everything started as a sum of personal contacts between people coming from different scientific and geographic areas. We just tried to find out a common language and research interest. A principal concern was to concentrate on actual research priorities which are eligible for possible cooperation projects supported by EU or American funding, such as ESPRIT and NSF. Finally, we found the common language - the application of artificial neural networks in several areas (i.e., function approximation, hardware implementations, forecasting, speech recognition), but we also found out that we all need these bridges between East and West Europe, North and South Ireland, Europe and America.

The result of the workshop is measured by two effects. The first should be this volume, including the invited talks, except the talk of Professor Solomon Marcus. The
second effect is the acceptance (or non-acceptance) of both the ESPRIT and NSF proposals. Regardless this last quite unpredictable consequence, we consider this workshop was successful, at least in building bridges between such different scientific communities.

We express our thanks to the others members of the Steering Committee - Gheorghe Toacse, Iuliu Szekely, and Angel Cataron - for their help in the planning and organization of the meeting.

Thanks to all participants for coming to Brasov!

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