Preface

The Laboratory of Computer and Information Science (CIS, informaatiotekniikan laboratorio) is one of the research and teaching units of the Department of Computer Science and Engineering at Helsinki University of Technology. The laboratory has its roots in the Electronics Laboratory, established in 1965 by Professor Teuvo Kohonen. For more than 30 years, the research in the laboratory has concentrated on neurocomputing, especially associative memories, self-organization, and adaptive signal and image processing, as well as on their applications on pattern recognition. The laboratory has grown from its roots of one professor and a handful of students and researchers into a relatively large and well established unit of 5 professors and about 80 staff altogether.

The Neural Networks Research Centre (NNRC, neuroverkkojen tutkimusyksikkö) was established by Professor Kohonen in 1994 as a separate research unit with its own funding and own administrative position. It was selected as one of the first Finnish national Centers of Excellence in Research in 1995. The Academy of Finland extended its Center of Excellence status for the years 2000 to 2005 under the research proposal "New Information Processing Principles". This status has also implied financial resources from the Academy, Tekes, HUT, and Nokia Co., which are gratefully acknowledged.

The present biennial report includes the description of the final two years of the Neural Networks Research Centre. The activities of the centre did not end in 2005, though; they were inherited by a new and larger research unit, whose name "Adaptive Informatics Research Centre" reflects the changing emphasis of the research conducted here. This unit, too, was selected by the Academy of Finland as a national Center of Excellence for the years 2006 - 2011.

The Neural Networks Research Centre has operated within the Laboratory of Computer and Information Science, coordinating the major part of its research activities. It is not possible to separate the personnels of these two units, as the teaching staff of the CIS also participated in some research project of the NNRC. Professor Erkki Oja was the director of NNRC, with Professor Olli Simula the vice-director, and Professor Juha Karhunen participated in its research projects. In addition, 18 post-doctoral researchers, 34 graduate students, and a number of undergraduate students were working in the NNRC projects in 2005.

Professor Heikki Mannila joined the CIS laboratory in 1999. He is partner and vice-director of the **From Data to Knowledge research unit (FDK, Datasta tietoon - tutkimusyksikkö)**, a joint effort between Helsinki University of Technology and the University of Helsinki. Also this research group was selected as a national Center of Excellence from the beginning of 2002. Although the Neural Networks Research Centre and the From Data to Knowledge research unit were financially separate and stemmed from different research traditions, there has been an overlap in the research directions and projects between these two Centers of Excellence. This overlap has produced fruitful joint research which is expected to increase in the future.

The present report covers the activities during the years 2004 and 2005. Basically, the

report is divided in two parts. In the first part, the research of the NNRC is reviewed. In the second part, those projects of the FDK research unit are reviewed, that pertain to the research activities in the CIS laboratory. The main reason for this separation is that the present booklet also serves as the official report of the NNRC to its sponsors, and it is important to clearly distinguish exactly what work has been done under those finances.

The earlier achievements and developments of the NNRC have been thoroughly explained in the triennial reports 1994 - 1996 and 1997 - 1999 for the first period of CoE status, as well as the biennial reports 2000 - 2001 and 2002 - 2003 for the first four years of the second period. The web pages of the laboratory, `http://www.cis.hut.fi/` also contain up-to-date texts.

To briefly list the main numerical achievements of the period 2004 - 2005, the laboratory produced 9 D.Sc. (Eng.) degrees, 4 Lic.Tech. degrees, and 42 M.Sc. (Eng.) degrees. The number of scientific publications appearing during the period was 244, of which 51 were journal papers. It can be also seen that the impact of our research is clearly increasing, measured by the citation numbers to our previously published papers and books, as well as the number of users of our public domain software packages.

A large number of talks, some of them plenary and invited, were given by our staff in the major conferences in our research field. We had several foreign visitors participating in our research, and our own researchers made visits to universities and research institutes abroad. The research staff were active in international organizations, editorial boards of journals, and conference committees. Also, some prices and honours, both national and international, were granted to members of our staff.

One of the highlights of the two-year period was the 40 year anniversary of the Laboratory, held on May 3, 2005. It was in spring 1965 that Professor Teuvo Kohonen was appointed to his chair.

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Professor	Professor	Academy Professor
Director,	Director,	Vice Director,
Neural Networks	Laboratory of Computer	From Data to Knowledge
Research Centre	and Information Science	Research Unit