

Preface

The Laboratory of Computer and Information Science (CIS, informaatiotekniikan laboratorio) was one of the research and teaching units of the Department of Computer Science and Engineering at Helsinki University of Technology until the end of year 2007, after which the organization of The University was radically changed. The CIS laboratory had its roots in the Electronics Laboratory, established in 1965 by Professor Teuvo Kohonen. For more than 30 years, the research in the laboratory was 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 grew 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.

For 12 years, from 1994 to the end of year 2005, the majority of research in the laboratory was carried out within the **Neural Networks Research Centre (NNRC, neuroverkkojen tutkimusyksikkö)**, established by Professor Kohonen 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.

From January 2006, the activities of the NNRC were inherited by a new and larger research unit, whose name **Adaptive Informatics Research Centre (AIRC, adaptiivisen informatiikan tutkimusyksikkö)** reflects the changing emphasis of the research conducted by us. This unit, too, was selected by the Academy of Finland as a national Center of Excellence for the years 2006 - 2011 after a very tough competition. This status has also implied financial resources from the Academy, Tekes, HUT, and Nokia Co., which are gratefully acknowledged.

During 2006 - 2007, the AIRC was operating 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 research projects of the AIRC. Professor Erkki Oja was both the director of AIRC and the head of the CIS laboratory. Professor Samuel Kaski was the vice-chair of AIRC, with Professors Olli Simula and Juha Karhunen participating in its research projects. In addition, 18 post-doctoral researchers, 33 graduate students, and a number of undergraduate students were working in the AIRC projects in 2007.

Professor Heikki Mannila of the CIS Laboratory was partner and vice-director of yet another research centre, 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 a national Center of Excellence during 2002 - 2007. Although the Adaptive Informatics 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 2006 and 2007. Basically, the report is divided in two parts. In the first part, the research of the AIRC 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 AIRC to its sponsors, and it is important to clearly distinguish exactly what work has been done under those finances.

The achievements and developments of AIRC's predecessor Neural Network Research Centre have been thoroughly explained in the triennial reports 1994 - 1996 and 1997 - 1999 for the first six years of CoE status, as well as the biennial reports 2000 - 2001, 2002 - 2003, and 2004 - 2005 for the second six year 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 2006 - 2007, the laboratory produced 12 D.Sc. (Eng.) degrees, 1 Lic.Tech. degree, and 37 M.Sc. (Eng.) degrees. The number of scientific publications appearing during the period was 234, of which 46 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 prizes and honours, both national and international, were granted to members of our staff.

The first meeting of the Scientific Advisory Board of AIRC was held on May 10 - 11, 2007. The evaluation report written by the members of the Board, Professors Risto Miikkulainen and José C. Príncipe, was quite positive. Another evaluation for the whole CIS laboratory was carried out in the context of the Academy of Finland evaluation of Computer Science research in Finland 2000 - 2006. In that evaluation, the foreign experts state e.g. that "The Laboratory has generated outstanding research in its areas and is considered among the world's top ... it has a consistent outstanding publication record at top conferences and journals with spectacular citation impact."

Erkki Oja

Professor
Director,
Adaptive Informatics
Research Centre

Samuel Kaski

Professor
Vice-Director,
Adaptive Informatics
Research Centre

Heikki Mannila

Academy Professor
Vice Director,
From Data to Knowledge
Research Unit