

Dissertation press release

20.04.2020

Sparsity- and Compressibility- Driven Supervised Learning Techniques for High-Dimensional Data Analysis and Signal Processing

Title of the dissertation Sparsity Driven Statistical Learning for High-Dimensional Regression and Classification

Contents of the dissertation A plethora of applications involve data generation in high-dimensional (HD) settings due to technological advancement and the nature of the task. Accordingly, the massive amount of HD datasets demands advanced supervised learning approaches for their explanatory and predictive modeling that helps in extracting meaningful and decisive information. Statistical learning from HD data is still a challenging problem despite the continuous improvement of computational resources and learning techniques. The performance of supervised learning approaches, such as regression or classification, often degrades when there exists an insufficient number of observations (samples) compared to data dimensionality (variables). This dissertation proposes new sparsity- and compressibility-driven techniques for regression and classification, which offer improved explanatory and predictive powers. The developed methods are successfully applied (i) for the detection and estimation of directions-of-arrival using compressed beamforming technique, and (ii) for the data-dependent feature (gene) selection in the gene expression-based classification problems. It should be emphasized that the developed methods are widely applicable also in other applications areas where sparse linear regression and compressive classification methods have found to be useful.

Field of the dissertation Signal Processing Technology

Doctoral candidate Muhammad Naveed Tabassum, M.Sc.

Time of the defence 14.05.2020 time 16:00

Place of the defence via a remote connection

Opponent Professor Andreas Jakobsson, Lund University, Sweden
Professor Christoph Mecklenbräuker, Vienna University of Technology, Austria

Custos Associate Professor Esa Ollila, Aalto University School of Electrical Engineering,
Department of Signal Processing and Acoustics

Electronic dissertation <http://urn.fi/URN:ISBN:978-952-60-3859-9>

Doctoral candidate's contact information Department of Signal Processing and Acoustics, Aalto University,
muhammad.tabassum@aalto.fi | +358 50 5342857