Linköping Studies in Science and Technology
Dissertations, No. 1191

Efficient Information Visualization of Multivariate and Time-Varying Data

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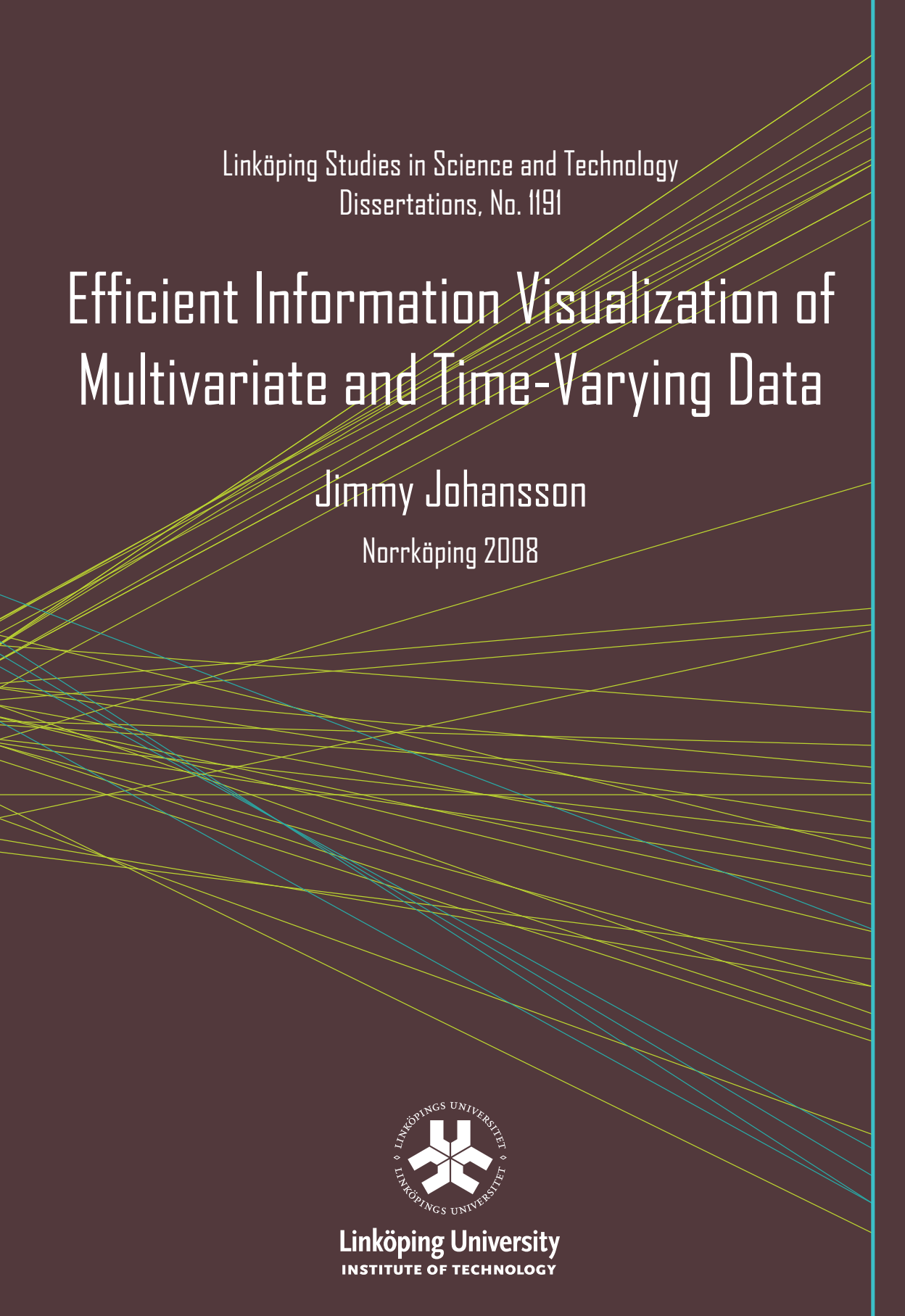
Norrköping 2008



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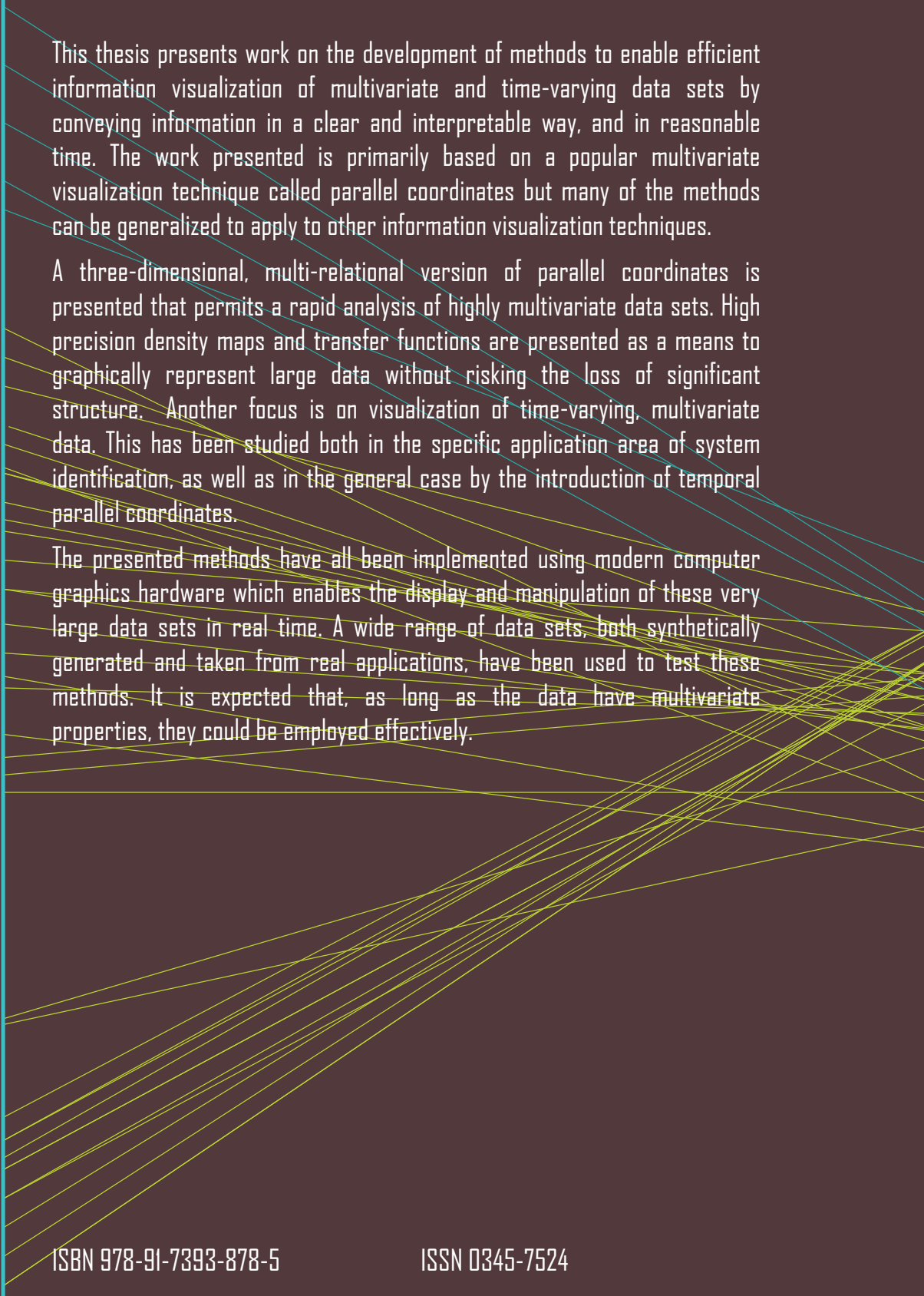

This thesis presents work on the development of methods to enable efficient information visualization of multivariate and time-varying data sets by conveying information in a clear and interpretable way, and in reasonable time. The work presented is primarily based on a popular multivariate visualization technique called parallel coordinates but many of the methods can be generalized to apply to other information visualization techniques.

A three-dimensional, multi-relational version of parallel coordinates is presented that permits a rapid analysis of highly multivariate data sets. High precision density maps and transfer functions are presented as a means to graphically represent large data without risking the loss of significant structure. Another focus is on visualization of time-varying, multivariate data. This has been studied both in the specific application area of system identification, as well as in the general case by the introduction of temporal parallel coordinates.

The presented methods have all been implemented using modern computer graphics hardware which enables the display and manipulation of these very large data sets in real time. A wide range of data sets, both synthetically generated and taken from real applications, have been used to test these methods. It is expected that, as long as the data have multivariate properties, they could be employed effectively.

ISBN 978-91-7393-878-5 ISSN 0345-7524