February 2009

MADALGO seminar by Freek van Walderveen, Aarhus University

Space-filling curves for efficient spatial index structures

Abstract:

R-trees are a class of spatial index structures in which objects are arranged to enable fast window queries: report all objects that intersect a given query window. One of the most successful methods of arranging the objects in the index structure is based on sorting them along a space-filling curve.

In this talk, I will discuss how the choice of space-filling curve influences the query performance of such index structures. We take a look at two types of input objects.

- For sets of points in the plane we can qualify the efficiency of two-dimensional space-filling curves using quality measures. We develop new measures and prove general lower bounds for a number of cases. I will also discuss the results of our approximation algorithm for such measures for a number of space-filling curves.
- For sets of rectangles in the plane we propose new four-dimensional space-filling curves and test their performance on several real-world and synthetic data sets. The new curves combine the strengths of earlier approaches based on two- and four-dimensional curves, while avoiding their apparent weaknesses.

Joint work with Herman Haverkort.