Informatik-Kolloquium

Fachgruppe Informatik

Lehrstuhl für Informatik 9

RHEINISCH-WESTFÄLISCHE TECHNISCHE HOCHSCHULE AACHEN

EINLADUNG

Zeit: Donnerstag, 22. Januar 2009, 16.30 Uhr

Ort: AH I, Ahornstr. 55

Referent: Prof. Nikos Mamoulis, Ph.D.
University of Hong Kong

Titel: Algorithms for Large-Scale Matching Problems

Abstract:

In this talk, I will discuss our research on evaluation of large-scale matching problems. Given two sets of objects (e.g., a set of cars and a set of parking slots) the goal is to find a one-to-one matching which satisfies a condition (e.g., stable-marriage property) or maximizes an objective function (e.g., number of cars in matching, sum of distances between cars and parking slots in the matching). Matching problems are found in many applications including assigning cars to parking slots, students to schools, customers of a booking service to hotel rooms, police cars to emergency incidents, mobile devices to WiFi routers, applicants to jobs, university applicants to degree programmes, etc. Although polynomial algorithms have been developed for matching problems considering a wide range of objectives, they all suffer from large space and time requirements. Specifically, all these methods have at least quadratic time and space complexity, a fact that makes them inapplicable for inputs in the order of millions. On the other hand, it is not uncommon to find real-life problems of that magnitude.

Our goal is to develop scalable algorithms for matching problems, which are applicable to large-scale inputs. Our methodology is based on the use of indexing methods to guide search and the development of geometric search techniques that can derive bounds for the objective function helping towards finding a solution without exploring the whole space. Recently, we have done some work in this direction for one-to-one and many-to-one matching problems where the objective function is parametric to the spatial distance between the matched pairs. Our solutions apply for instance to the problem of finding a matching between cars and parking slots that minimizes the total distance between pairs in the assignment. Other extensions currently being studied is updating the matching for dynamic data, the incorporation of additional constraints in the problems (e.g., a car may not be assigned to a very remote slot), and the study of alternative objective functions based on personalized ranking (e.g., users assigned to services like hotel rooms based on their personal preferences).

Es laden ein: Die Dozenten der Informatik