Theory Comput Syst (2009) 45: 427–428
DOI 10.1007/s00224-009-9189-3

WAOA 2006 Special Issue of TOCS

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Published online: 29 January 2009

This special issue of *Theory of Computing Systems* is dedicated to selected papers from the Fourth Workshop on Approximation and Online Algorithms (WAOA 2006) that took place in Zurich, Switzerland in September 2006. Of 62 papers submitted to WAOA 2006, 26 were accepted for presentation at the workshop, and revised versions of 7 papers appear in this special issue. All the contributions presented here were invited to this special issue, but went through the standard refereeing process of *Theory of Computing Systems*.

In their contribution *Online Dynamic Programming Speedups*, Bar-Noy, Golin and Zhang consider dynamic programming in an online context where the problem size is not known in advance and the coefficients of the dynamic programming matrix are revealed row by row. They show that if the matrix satisfies a certain stronger version of the Monge property, it is possible to achieve a linear speedup compared to the naive algorithm even in this online scenario.

In *Covering Many or Few Points with Unit Disks*, de Berg, Cabello and Har-Peled consider, for a given set of weighted points in the plane, the problem of placing m unit disks so as to cover points of maximum total weight, and the problem of placing a single unit disk with center in a given region so as to cover points of minimum total weight. For both problems, they give near-linear-time approximation schemes.

In *Online k-Server Routing Problems*, Bonifaci and Stougie study the problem of minimizing the makespan or the sum of completion times in the setting where k

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servers have to visit points in a metric space as they arrive in real time. They present competitive algorithms, resource augmentation results and lower bounds in a wide class of metric spaces.

The problem of partitioning a set of input points that arrive online into a minimum number of subsets that can each be enclosed by a unit ball is considered by Chan and Zarrabi-Zadeh in *A Randomized Algorithm for Online Unit Clustering*. They present a 15/8-competitive randomized online algorithm for the one-dimensional case, thus beating the naive upper bound of 2. Furthermore, they give lower bounds and an extension to higher dimensions.

In their contribution *On Hierarchical Diameter-Clustering and the Supplier Problem*, Das and Kenyon-Mathieu consider a hierarchical clustering problem where the goal is to minimize the maximum cluster diameter. They show that two different previously known algorithms, one online and one offline, output essentially the same results when points are considered in the same order. In addition, they provide new lower bounds and a new constant-factor approximation algorithm for the hierarchical k-supplier problem.

In their article *Network Design with Edge-Connectivity and Degree Constraints*, Fukunaga and Nagamochi deal with the problem of computing, for a given undirected complete graph with metric edge costs, a minimum-cost k-edge-connected subgraph in which the degree of every vertex v is exactly $b(v)$, where b is specified in advance. They give a constant-factor approximation algorithm and show that this result extends to a directed version of the problem.

Finally, Harks, Heinz and Pfetsch consider in *Competitive Online Multicommodity Routing* a setting where commodities of a multicommodity flow arrive online and have to be routed sequentially so as to minimize a cost that is determined by a load-dependent price function on the links. For the case of affine price functions, they give a competitive analysis of a greedy online algorithm that routes each commodity by minimizing a convex cost function depending on the previously routed flow. They also discuss lower bounds and a problem variant where the flow of each commodity is unsplittable.

We would like to thank the authors for contributing to this special issue and the referees for their diligent work in the review process.