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EDITORIAL

Editorial to the special issue "Online algorithms"

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Online algorithms are best characterized by the fact that they are used in practice for a potentially infinite running time. During the run-time of an online algorithm, new requests for service are permanently issued, e.g., routing requests for data packets in a network or access requests in a storage system. Therefore, efficient online algorithms are a crucial prerequisite for ambitious computer applications processing huge amounts of data with increasingly complex hardware. As a consequence, the systematic development of efficient online algorithms is crucial for the implementation of reliable and efficient computer applications in science, economy, and everyday life.

In this special issue, we try to give a survey on the current developments in the field of online algorithms. Most of the work is done by the authors of the following six articles. I would like to thank these authors for their superb work and tremendous patience. In addition, I would like to thank several anonymous reviewers for their essential and excellent work.

Marcin Bienkowski addresses in "Migrating and replicating data in networks" the field of data management in networks. He presents a survey on the file allocation, the page migration, and the page replication problem. Further, he discusses extensions of these problems, such as versions that incorporate memory capacity constraints or dynamic changes to the network.

Tjark Vredeveld considers in "Stochastic online scheduling" an adequate approach to model online algorithms under uncertainty. Jobs arrive in an online manner and their processing times are random variables, whose probability distributions become known to the scheduling algorithm upon their arrival. This model combines the main characteristics of online and stochastic scheduling in a simple and natural way.

Benjamin Hiller and Tjark Vredeveld survey in "Probabilistic alternatives for competitive analysis" further alternatives to the classical competitive analysis. The most criticized deficit of the competitive analysis is that it is a worst-case performance measure, i.e., a competitive online algorithm has to perform well on all possible input sequences even if many of them are unlikely to occur in practice. They discuss randomized algorithms, average-case analysis, diffuse adversaries, smoothed analysis, and other approaches to circumvent these deficits.

Alexander Souza addresses in "Adversarial models in paging—Bridging the gap between theory and practice" the online paging problem in more detail. The classical paging model with unrestricted adversary exhibits the problem that the theoretical results are too pessimistic as, e.g., it does not take into account that typical instances have locality of reference. He examines different paging models with various restricted adversaries that model real-world instances more accurately.

Elmar Langetepe deals in "Optimizing two-sequence functionals in competitive analysis" with online motion planning problems. He presents results on an extension of the classical online motion planning problem, in which a target has to be found on a real line, to the situation where the target is hidden on one of two lines.

Matthias Englert considers in "An overview of some results for reordering buffers" online algorithms with reordering buffers. The basic idea is that, in problem settings where the order in which the tasks are processed is not important,

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a scheduling algorithm can choose to process any task waiting in the reordering buffer. These buffers are a generalization of lookahead, where the algorithm has knowledge of all the tasks in the lookahead queue but still has to process them in the order they arrived. He presents a survey on results for different scheduling problems.