

Preface

The 24th International Conference on Database and Expert Systems Applications (DEXA 2013), with proceedings published as volumes 8055 and 8056 in Springer's Lecture Notes in Computer Science, featured some outstanding keynote presentations and regular articles. As with previous editions of the DEXA conference, the Program Co-chairs of DEXA 2013 invited some of the authors to submit extended papers to a special issue of the Springer journal Transactions on Large-Scale Data- and Knowledge-Centered Systems (TLDKS). Following these invitations, both keynote papers and eight regular articles were submitted. Apart from the keynotes, each submission was carefully assessed by at least two (often more) recognized experts in the respective field. In total, 35 reviews were received, most of them of excellent quality. After two rounds of revisions, five of the eight regular papers were accepted for inclusion in this special issue, in addition to the two keynote papers.

The contributions in this special issue address a range of important modern subject areas in data-centric systems and applications, inclusive of argumentation, e-government, business processes, predictive traffic estimation, semantic model integration, top-k query processing, uncertainty handling, graph comparison, community detection, genetic programming, and web services. In the DEXA tradition, all contributions distinguish themselves by the novelty and innovation they bring to these subject areas.

The first keynote paper is authored by the presenter, Trevor Bench-Capon, from the University of Liverpool, England, together with his colleagues Katie Atkinson, also from Liverpool, and Adam Wyner, affiliated with the University of Aberdeen in Scotland. Each of them is a distinguished expert in the field of *computational argumentation*. Theoretical work on argumentation usually focuses on inferring consistent sets of facts, rules, and assumptions that support each other and form coherent positions on an issue. In addition to that, the authors investigate an argumentative form of *practical reasoning*, for justifying decisions about actions, as opposed to *theoretical reasoning*, which merely deals with what is the case. The particular application of practical reasoning investigated in the keynote paper entitled "Using Argumentation to Structure E-Participation in Policy Making" is the engagement of citizens in dialogues with governmental entities about policies, by means of electronic computational devices using argumentation.

For the second keynote paper, several authors from the Software Competence Center in Hagenberg and the close-by University of Linz, both in Austria, have collaborated under the leadership of the original keynote presenter, Klaus-Dieter Schewe. Traditionally, the many different aspects of business process modeling have been addressed by different models. This makes it nearly impossible for stakeholders to develop sufficient levels of trust in the quality of the business processes as a whole, preventing mission-critical analysis and decision making. In their contribution "Horizontal Business Process Model Integration," the authors propose the integration of different process models by specifying their semantics uniformly with abstract state machines.

The proposal is driven by the strong desire to derive targeted levels of quality on the business processes in their entirety, which can be derived by taking advantage of the rigorous verification and formal validation techniques that are a built-in feature of abstract state machines.

The paper entitled “Exact and Approximate Generic Multi-criteria Top-k Query Processing” is concerned with the ranking of answers to queries. It is authored by Mehdi Badr and Dan Vodislav, both from the University of Cergy-Pontoise, France. Top-k queries ask for the k best answers, where answer goodness is ranked according to the scores produced by criteria that are stated in the query as *ranking predicates*. Most top-k query processing algorithms are tailored to work for a specific kind of access to ranking predicate scores, which may either be sorted, or at random, or both sorted and random. An important contribution of the work by Badr and Vodislav is that they propose a framework for *generic* top-k processing, in which it is possible to express and analyze any top-k algorithm, regardless of whether it uses some strict (i.e., either sorted or random) or some hybrid form of access. They have also elaborated on extended, more generic variants of previously proposed algorithms, such that they become easily comparable. Many existing approaches for top-k query processing only compute exact results. While, in principle, exactness is desirable, it all too often comes at the expense of execution time, so that more efficient approximations have to be resorted to. The generic framework presented in this paper results in a thorough performance analysis and comparison of exact and approximate top-k algorithms.

A pragmatic and highly interesting special-purpose solution to the problem of timely traffic route prediction is proposed in the article on “Continuous Predictive Line Queries for On-the-Go Traffic Estimation,” authored by Lasanthi Heendaliya, Dan Lin, and Ali Hurson from the Missouri University of Science and Technology in Rolla, Missouri, USA. Instead of simply offering predictions of optimal routings, called *lines*, that are based on static snapshots of traffic conditions, the paper proposes a new type of spatial-temporal queries, called *continuous predictive line queries*. These result in continuously monitoring traffic dynamics, and return adjusted route suggestions whenever the monitored circumstances change significantly. Thus, a much more up-to-date feedback loop to users on the road is enabled. Details about a novel data structure and the pseudo-code of algorithms for implementing the proposed approach are provided in the paper, as well as assiduous analyses of its performance and costs. The evaluations reveal quantifications of efficiency and effectiveness that improve conventional static predictions.

The recent resurgence of graph and network data types in the framework of graph databases is reflected in the paper entitled “Query Operators for Comparing Uncertain Graphs,” authored by a team of researchers from Georgetown University, Washington DC, USA, consisting of Denis Dimitrov, Lisa Singh, and Janet Mann. Graph comparison is useful for detecting deviations and for hypothesizing properties of networked structures by analogy from known properties of similar networks. Several query languages feature operators for comparing graphs and subgraphs. Others have proposed extensions of graph models by incorporating vague attribute values, as well as uncertainties about the presence or absence of vertices and edges. However, the combination of comparison and uncertainty as presented in this paper is innovative. Dolphin observation and citation networks are two showcases used to illustrate the query language and its ability to analyze real-world uncertain graph data.

A performance study shows the viability of the proposed framework for reasonably large graphs.

The paper entitled “Fast Disjoint and Overlapping Community Detection” is authored by Yi Song and Stéphane Bressan, from the University of Singapore, and Gillian Dobbie, from the University of Auckland, New Zealand. Grosso modo, their work falls into the topic area of *social networks*. Communities are defined as the subgraphs of such networks that feature a significantly high interconnectivity among their members. The detection of such communities is useful in many applications, such as sociology, biology, marketing, health care, etc. Many approaches to community detection focus on partitions of disjoint communities (which, for example, is natural for distributed networks of data stores that are fragmented by some node failures or broken connections). However, the algorithms presented in this paper can be parallelized for scaling them up to possibly large networks with overlapping communities. Such overlaps are typical for social networks and critical applications such as epidemics control or, more generally, networks with nonlocal interconnectivity. The metrics used for empirically quantifying the effectiveness and runtime efficiency of the algorithms involve network dimensions such as modularity, conductance, internal density, cut ratio, community size, and weighted community clusters. The measurements of effectiveness and efficiency also serve to compare the algorithms with state-of-the-art solutions, with favorable results for the approach presented by the authors.

Finally, the paper “A Hybrid Approach using Genetic Programming and Greedy Search for QoS-Aware Web Service Composition,” by Hui Ma, Anqi Wang, and Mengjie Zhang from the Victoria University of Wellington, New Zealand, offers insights into synergies obtained by applying methods from the hybrid fields of genetic programming and greedy search, resulting in surprising improvements in web service composition. The difficulties of the latter have grown proportionally to a tremendous increase of web services in recent years. The authors propose the use of a greedy algorithm for generating populations of candidate services, on which genetic-programming-based mutations are performed in order to obtain optimized service compositions. The validity of the proposal is made plausible by an experimental study based on public benchmark test cases with repositories of large quantities of web services and pertinent properties. Moreover, the authors elaborate on an extension of their approach in terms of optimizing solutions according to some given quality of service criteria.

We would like to thank all authors for their contributions to this special issue. We are grateful to all reviewers for their invaluable work in reviewing the papers and ensuring the high quality of this collection of articles. Last, but not least, our gratitude goes to Gabriela Wagner, whose editorial assistance and handling of all the communication with the authors and the reviewers finally made this volume possible.

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