Editorial

Special Issue on Algorithms and Data-Structures for Compressed Computation

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1. Introduction

As the production of massive data has outpaced Moore's law in many scientific areas, the very notion of algorithms is transforming. Today's algorithms must not only be able to deal with large amounts of data, they also must be capable of using resources close to their theoretical limits. Against this landscape, compression has become a fundamental tool to provide storage for this kind of data in the first place.

While motivated by the fact that large data are often very compressible, this approach poses interesting algorithmic challenges. Can we compute directly on compressed data without first decompressing it? Can we propose measures and frameworks to compare different approaches? Can different techniques for compressed computation be unified?

Thanks to more than two decades of successful research on the subject, today we know that many algorithmic marvels are indeed possible. In fact, compression and computation are two sides of the same coin, as they exploit the same underlying structure both for storing and operating on data.

This Special Issue collects advanced results in the field of compressed computation, touching upon different aspects of the theme.

2. Special Issue

The papers in this volume, evaluated by anonymous and expert reviewers, are related to the design of techniques and data-structures exploiting compression in order to efficiently represent families of sets (see [1]), present novel algorithms for factorization and substring compression queries (see [2]), and present a randomized communication protocol to compute the Hamming distance of compressed strings (see [3]). Moreover, two further papers in the Special Issue manage computational complexity bounds. The study in [4] establishes new upper bounds and a conditional lower bound on the indexed regular expression matching problem and [5] improves existing analyses on the approximation ratios for common grammar-based compressors.

The outcome of the Special Issue is an updated and interesting picture of a collection of techniques related with compressed computation and illustrating new results, questions, and trends.

Conflicts of Interest: The authors declare no conflict of interest.

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