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Guest Editorial: Computing and Combinatorics

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"Computing and Combinatorics" is an interesting and fundamental research area, which involves several fields, ranging from algorithms, theory of computation, and computational complexity to combinatorics related to computing. This issue consists of six papers, which are briefly discussed as follows.

The "Shorthand Universal Cycles for Permutations" paper investigates SP-cycles with maximum and minimum 'weight'. The authors show that periodic min-weight SP-cycles correspond to spanning trees of the $(n-1)$ permutohedron and provides two constructions by using 'half-hunts' from bell-ringing and the cool-lex order.

In "Zero-Knowledge Argument for Simultaneous Discrete Logarithms," the authors present an EQDL (the equality of two discrete logarithms) protocol in the ROM (random oracle model) which saves approximately 40 % of the computational cost and approximately 33 % of the prover's outgoing message size. This improvement benefits a variety of interesting cryptosystems, ranging from signatures and anonymous credential systems, to verifiable secret sharing and threshold cryptosystems.

The issue also includes the study of computational complexity. Namely, the paper "Tile-Packing Tomography is NP-hard" shows that for a fixed tile, it is NP-hard to reconstruct its tilings from their projections for all types of tiles. The $\#NC^1$ upper bound for the problem of counting accepting paths in any fixed visibly pushdown automaton is considered in "Counting paths in VPA is complete for $\#NC^1$". The paper also shows that the difference between $\#BWBP$ and $\#NC^1$ is captured exactly by the addition of a visible stack to a nondeterministic finite-state automaton.

Due to the NP-hardness of the problems, approximation algorithms are needed to provide a near-optimal solution. In "Exact and Approximation Algorithms for Geometric and General Capacitated Set Cover Problems", the first known polynomial-

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time exact solutions is presented along with approximation algorithms for several geometric and non-geometric variants of the standard set cover.

The paper entitled "Finding Maximum Edge Bicliques in Convex Bipartite Graphs" presents a new algorithm that computes a maximum edge biclique of given bipartite graph $G = (A, B; E)$ in $O(n \log^3 n \log\log n)$ time and $O(n)$ space, where $n = |A|$. For biconvex graphs and bipartite permutation graphs, a maximum edge biclique can be computed in $O(n\alpha(n))$ and $O(n)$ time respectively, where $n = \min(|A|, |B|)$ and $\alpha(n)$ is the slowly growing inverse of the Ackermann function.

This six papers cover a wide range of computing and combinatorics, thereby appealing to both the experts in the field as well as to those who wish a snapshot of the current breadth of computing and combinatorics research.