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## Editorial

## StringMasters 2011 Special Issue

This Special Issue of the Journal of Discrete Algorithms presents research generated collaboratively at StringMasters meetings held in 2011 at the Université de Rouen – France, McMaster University – Canada, and the Università di Palermo – Sicily. Established in 2007, the purpose of these scientific meetings is to promote new and continue existing collaborations focusing on computational problems featuring strings. StringMasters has matured into a productive while truly collegiate international research community; to date workshops have been held in four continents, and this is the third volume of research output generated via these problem-solving sessions.

The interleaving of theory and practice is evident in this collection: string combinatorics, algorithms and data structures all fuse to express the importance of stringology in discrete mathematics and applications of computer science.

In the first paper, G. Kucherov introduces a sophisticated suffix-based variant of the known heap data structure. This leads to a linear-time on-line algorithm for constructing a position heap for a string, subsequently extended into the augmented position heap that supports linear-time string matching.

J.M. Moosa, M.S. Rahman and F.T. Zohora follow by providing insights into sequences with no repeated elements. They introduce specialized longest common subsequence problems in the context of permutations and provide quadratic algorithms for these computations.

Applications of strings are abundant in bioinformatics. In the third paper, C. de Ridder, D.G. Kourie, B.W. Watson, T.R. Fourie and P.V. Reyneke introduce  $\text{Fire}\mu\text{Sat}_2$ , an efficient algorithm based on deterministic finite automata to detect microsatellites (short approximate tandem repeats) in DNA. Their robust implementation is attuned to the requirements of molecular biologists for data exploration.

The combinatorics of occurrences of squares in a word (string) is a tricky topic. G. Badkobeh gives a new constructive proof of the existence of an infinite binary word that contains only three squares. Following the binary case, she proves the existence of an infinite overlap-free ternary word containing only one square, and on a 4-letter alphabet an infinite  $3/2^+$ -free word containing only one  $3/2$ -power.

The fifth paper makes progress on open conjectures regarding quantifying runs in strings. A. Baker, A. Deza and F. Franek provide a computational framework for analyzing run-maximal strings, for which they introduce the concept of an  $r$ -cover and apply it to efficiently compute the maximum number of runs for classes of strings. Interestingly, they establish the existence of a binary run-maximal string of length 66 containing the word  $aaaa$ , which dismisses the common intuition that these strings contain no 4th powers.

Tree structures and pattern matching techniques are both particularly important in computer science. M. Christou, T. Flouri, C.S. Iliopoulos, J. Janoušek, B. Melichar, S.P. Pissis and J. Žďárek consider tree template matching in unranked ordered trees. Algorithmically, they preprocess a tree template once, allowing repetitive searching of subject trees. Their string-based table-driven algorithm is asymptotically optimal when searching for logarithmic sized tree templates.

String suffixes play a powerful role in stringology, and in the penultimate paper, Z. Adamczyk and W. Rytter present a linear-time constant-space algorithm for computing the maximal suffix of a string. An attraction is the particularly concise and elegant description of their algorithm, making it a competitor for a classic algorithm by J.-P. Duval.

We conclude with an informative survey by A. Langiu on the theory and practice of parsing for dictionary-based text compression schemes spanning the last three decades. In particular, the transition of the Zip scheme from the original approach, based on the minimum number of phrases, to the current bit-optimal parsing problem is mapped out.

This volume of StringMasters papers is a showcase of the high quality collaborative research achieved by this forum of problem-solving sessions. We are very grateful to the authors for driving the seeds of their ideas into solid results – some including experimentation – followed by the careful preparation of their manuscripts.

Underpinning this volume is the unseen activity of all the anonymous reviewers (at least two per paper) who generously contributed their time in support of disseminating this research: we warmly thank them for their diligence and integrity.

Finally, we thank the Journal of Discrete Algorithms and its team of efficient administrators for publishing this Special Issue.

For information about past, present and future StringMasters meetings, see <http://www.stringmasters.org/>.

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