

Accepted Manuscript

Bubble-Flip—A new generation algorithm for prefix normal words

Ferdinando Cicalese, Zsuzsanna Lipták, Massimiliano Rossi

PII: S0304-3975(18)30437-7
DOI: <https://doi.org/10.1016/j.tcs.2018.06.021>
Reference: TCS 11644

To appear in: *Theoretical Computer Science*

Received date: 13 March 2018
Revised date: 30 May 2018
Accepted date: 7 June 2018

Please cite this article in press as: F. Cicalese et al., Bubble-Flip—A new generation algorithm for prefix normal words, *Theoret. Comput. Sci.* (2018), <https://doi.org/10.1016/j.tcs.2018.06.021>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Bubble-Flip—A New Generation Algorithm for Prefix Normal Words

Ferdinando Cicalese^a, Zsuzsanna Lipták^{a,*}, Massimiliano Rossi^a

^a*Dipartimento di Informatica, University of Verona
Strada le Grazie, 15, 37134 Verona, Italy*

Abstract

We present a new recursive generation algorithm for prefix normal words. These are binary words with the property that no factor has more 1s than the prefix of the same length. The new algorithm uses two operations on binary words, which exploit certain properties of prefix normal words in a smart way. We introduce infinite prefix normal words and show that one of the operations used by the algorithm, if applied repeatedly to extend the word, produces an ultimately periodic infinite word, which is prefix normal. Moreover, based on the original finite word, we can predict both the length and the density of an ultimate period of this infinite word¹.

Keywords: algorithms on automata and words, combinatorics on words, combinatorial generation, prefix normal words, infinite words, binary languages, combinatorial Gray code

1. Introduction

Prefix normal words are binary words with the property that no factor has more 1s than the prefix of the same length. For example, 11001010 is prefix normal, but 11001101 is not, since the factor 1101 has too many 1s. These words were introduced in [13], originally motivated by the problem of Jumbled Pattern Matching [5, 20, 15, 2, 9, 3, 10, 1, 14, 18, 12].

*Corresponding author

Email addresses: `ferdinando.cicalese@univr.it` (Ferdinando Cicalese), `zsuzsanna.liptak@univr.it` (Zsuzsanna Lipták), `massimiliano.rossi.01@univr.it` (Massimiliano Rossi)

¹This is an extended version of our paper presented at LATA 2018 [11].

Download English Version:

<https://daneshyari.com/en/article/6875385>

Download Persian Version:

<https://daneshyari.com/article/6875385>

[Daneshyari.com](https://daneshyari.com)