

On closed factors, complexity and periodicity in infinite sequences

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Combinatorics on words aims at finding connections between various properties of finite and infinite sequences (words). The resulting theoretical findings, among other things, are often used in the design of efficient combinatorial algorithms for string processing. The property of a word we will consider is that of being closed. A finite word is called *closed* if it has length ≤ 1 or it starts and ends with the same word that has no other occurrences but these two. Otherwise the word is called *open*. The notion of closed word is actually the same as the notion of complete return word.

The name return word is usually referred to factors of an infinite word and is used to study its properties. It can be regarded as a discrete analogue of the first return map in dynamical systems, and it constitutes a powerful tool in the study of words, symbolic dynamical systems, tilings, and in string algorithms.

In this talk, we will highlight several results on closed words studying. We will consider the functions that count the number of closed and the number of open factors of a given length in an infinite word in the context of aperiodicity. We will also discuss some properties of these functions and their connection to other complexity functions and word characteristics. To conclude, we will provide a short overview of the recent study on words that are extremal with respect to the proportion of closed factors, so-called “poor” and “rich” in closed factors words.