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Squares and primitivity in partial words.

Summary: Recently, P. Tittmann et al. [Eur. J. Comb. 32, No. 7, 954–974 (2011; Zbl 1229.05124)] introduced the subgraph component polynomial and showed that its power for distinguishing graphs is quite different from the power of other graph polynomials that appear in the literature such as the matching polynomial, the Tutte polynomial, the characteristic polynomial, the chromatic polynomial, etc. The subgraph component polynomial enumerates vertex-induced subgraphs in a given undirected graph with respect to the number of components. We show the use of the subgraph component polynomial to count the number of primitive partial words of a given length over an alphabet of a fixed size, which leads to a method for enumerating such partial words. We also give a tight bound for the maximum number of holes a primitive partial word can have. Doing so allows us to establish some tight upper and lower bounds on the maximum number of occurrences of primitively-rooted squares, i.e., adjacent occurrences of two compatible substrings with primitive root, in a given partial word with a fixed number of holes over a fixed alphabet size.

Keywords: combinatorics on words; partial words; primitive partial words; subgraph component polynomial; primitively-rooted squares
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