Contribution ID: **96** Type: **not specified**

Convergence of the number of period sets in strings

Thursday, July 13, 2023 12:10 PM (20 minutes)

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Abstract: Consider words of length n. The set of all periods of a word of length n is a subset of {0,1,2,...,n-1}. However, any subset of {0,1,2,...,n-1} is not necessarily a valid set of periods. In a seminal paper in 1981, Guibas and Odlyzko have proposed to encode the set of periods of a word into an n long binary string, called an autocorrelation, where a one at position i denotes a period of i. They considered the question of recognizing a valid period set, and also studied the number of valid period sets for length n, denoted κ_n. They conjectured that $\ln(\kappa_n)$ asymptotically converges to a constant times $\ln^2(n)$. If improved lower bounds for $\ln(\kappa_n)/\ln^2(n)$ were proposed in 2001, the question of a tight upper bound has remained opened since Guibas and Odlyzko's paper. Here, we exhibit an upper bound for this fraction, which implies its convergence and closes this long standing conjecture. Moreover, we extend our result to find similar bounds for the number of correlations: a generalization of autocorrelations which encodes the overlaps between two strings.

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Session Classification: Track A-4