

Mandatory Exercise: Level Ancestor

Philip Bille

Inge Li Gørtz

Substring repetition Let S be a string of length n . Given a suffix i and an integer k , the *substring repetition query* is defined as follows.

- $\text{substring-repetition}(i, k)$: return the length of the longest prefix of $S[i, n]$ that appears at least k times in S .

Given a string S , the *substring repetition problem* is to preprocess S into a compact data structure that supports substring repetition queries.

Give a compact data structure for the substring repetition problem with query time logarithmic in the length of the suffix, $\ell = n - i + 1$, i.e., the query time should be $O(\log \ell)$. Ignore preprocessing.