

[Abedin, Paniz; Ganguly, Arnab; Hon, Wing-Kai; Nekrich, Yakov; Sadakane, Kunihiro; Shah, Rahul; Thankachan, Sharma V.](#)

**A linear-space data structure for range-LCP queries in poly-logarithmic time.** (English)

Zbl 1441.68021

Wang, Lusheng (ed.) et al., Computing and combinatorics. 24th international conference, COCOON 2018, Qing Dao, China, July 2–4, 2018. Proceedings. Cham: Springer. Lect. Notes Comput. Sci. 10976, 615–625 (2018).

Summary: Let  $T[1, n]$  be a text of length  $n$  and  $T[i, n]$  be the suffix starting at position  $i$ . Also, for any two strings  $X$  and  $Y$ , let  $\text{LCP}(X, Y)$  denote their longest common prefix. The range-LCP of  $T$  w.r.t. a range  $[\alpha, \beta]$ , where  $1 \leq \alpha < \beta \leq n$  is

$$\text{rlcp}(\alpha, \beta) = \max\{|\text{LCP}(T[i, n], T[j, n])| \mid i \neq j \text{ and } i, j \in [\alpha, \beta]\}.$$

*A. Amir* et al. [Lect. Notes Comput. Sci. 7074, 683–692 (2011; [Zbl 1350.68298](#))] introduced the indexing version of this problem, where the task is to build a data structure over  $T$ , so that  $\text{rlcp}(\alpha, \beta)$  for any query range  $[\alpha, \beta]$  can be reported efficiently. They proposed an  $O(n \log^{1+\epsilon} n)$  space structure with query time  $O(\log \log n)$ , and a linear space (i.e.,  $O(n)$  words) structure with query time  $O(\delta \log \log n)$ , where  $\delta = \beta - \alpha + 1$  is the length of the input range and  $\epsilon > 0$  is an arbitrarily small constant. Later, *M. Patil* et al. [Lect. Notes Comput. Sci. 8214, 263–270 (2013; [Zbl 1442.68040](#))] proposed another linear space structure with an improved query time of  $O(\sqrt{\delta} \log^\epsilon \delta)$ . This poses an interesting question, whether it is possible to answer  $\text{rlcp}(\cdot, \cdot)$  queries in poly-logarithmic time using a linear space data structure. In this paper, we settle this question by presenting an  $O(n)$  space data structure with query time  $O(\log^{1+\epsilon} n)$  and construction time  $O(n \log n)$ .

For the entire collection see [[Zbl 1390.68029](#)].

#### MSC:

- [68P05](#) Data structures
- [68Q25](#) Analysis of algorithms and problem complexity
- [68W32](#) Algorithms on strings

Cited in 1 Document

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