

Tree Enumeration by Leaf Numbers

Dominik Köppl

Tokyo Medical and Dental University, Japan,
koepp1.dsc@tmd.ac.jp

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Problem 1. Given a vector V specifying at entry $V[i]$ the number of leaves at depth i , enumerate all binary rooted trees having such a shape. (For the problem, we may assume that the trees can be either ordered or unordered.)

- Can we say something about the output size?
- Can we devise an efficient enumeration algorithm?

Related work:

- [1] studied the generation of unordered trees with specific diameters
- [2] studied the enumeration of ordered trees with exactly k leaves.

References

- [1] Shin-Ichi Nakano and Takeaki Uno. Constant time generation of trees with specified diameter. In Juraj Hromkovic, Manfred Nagl, and Bernhard Westfechtel, editors, *Proc. WG*, volume 3353 of *Lecture Notes in Computer Science*, pages 33–45. Springer, 2004. doi:10.1007/978-3-540-30559-0_3.
- [2] Katsuhisa Yamanaka, Yota Otachi, and Shin-Ichi Nakano. Efficient enumeration of ordered trees with k leaves. *Theor. Comput. Sci.*, 442:22–27, 2012. doi:10.1016/j.tcs.2011.01.017.