Speaker

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Title

Growing binary trees

Abstract

In this talk, we study a growing process that generates the family of binary trees. The process follows the next steps: we start with an anchor (that is, an active leaf), and at each step, we replace every anchor either by a (dead) leaf or by an internal node with two children that both are anchors themselves. Our interest is concentrated in active trees obtained using the above process, i.e., in trees with at least one anchor.

Let us denote by $t_{n,m}$ the number of binary trees with n internal nodes and m anchors. For a fixed value of n, the total number of such trees (when m varies) is the Catalan number C_n. We empirically observe that the proportion $t_{n,2}/C_n$ tends to a certain limit, as $n \to \infty$, and we show that this proportion is greater than $5/8$. On the other hand, for a fixed value of m, let us denote by a_n the number of nonzero elements $t_{n,m}$. We establish the behavior of the sequence (a_n) and show that it is known in the literature as a meta-Fibonacci sequence. Finally, we discuss some approaches for the generation of binary trees according to the growing process.

This talk is based on the ongoing work with Antoine Genitrini.