Non-contiguous pattern avoidance in binary trees

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In 2010, Rowland considered pattern avoidance in rooted ordered binary trees with the following definition: binary tree $T$ contains binary tree $t$ if and only if $T$ contains $t$ as a contiguous rooted ordered subgraph. In this talk, we modify Rowland’s definition such that binary tree $T$ contains tree $t$ if and only if there is a sequence of edge contractions of $T$ that produce tree $T^*$ which contains $t$ as a rooted ordered subgraph. While Rowland’s tree patterns are analogous to consecutive permutation patterns, this new definition is analogous to classical permutation patterns. We completely classify Wilf-classes of trees avoiding a single non-contiguous binary tree pattern and provide generating functions that enumerate pattern-avoiding trees according to number of leaves. We also consider trees that avoid multiple tree patterns simultaneously and provide bijective relationships between certain sets of pattern-avoiding trees and sets of pattern-avoiding permutations.

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