Postorder Preimages

Colin Defant, University of Florida

Given a set Y of decreasing plane trees and a permutation π, how can we compute the number of trees in Y that have π as their postorder readings? We provide a method for answering this question for some very natural sets Y and all permutations π. The proof relies upon a geometric construction of what we call "valid hook configurations" of a permutation; this construction allows us to decompose permutations appropriately. We will also discuss how we have applied this method in order to find improved upper bounds for the number of West t-stack sortable permutations of length n when $t \in \{3, 4\}$.

Keywords: postorder, decreasing plane tree, stack-sorting algorithm