

Asymptotic analysis for recurrences in random split trees

In this talk, we consider recurrences arising in the random split tree model. This tree model covers many other tree models used as data structures in computer science (e.g. binary search trees, b -ary search trees, quadrees, simplex trees, tries, digital search trees) and therefore, it allows to analyze all these trees in a universal way. The internal path length and the depth of a random node are examples for complexity measures for algorithms making use of the trees. This fact causes interest in the limit behavior of such functionals. The underlying tree structure yields these functionals satisfying distributional recurrences which again imply corresponding recurrences for the moments. We consider a probabilistic method to analyze the asymptotic behavior of the solutions of such recurrences using renewal theory. The sizes of the subtrees have a mixed binomial distribution where the mixing distribution is a parameter of the tree. We obtain general results under the assumption that this mixing distribution has a density with respect to the Lebesgue measure. Having determined the asymptotic behavior of the first (and second) moments, we can use the contraction method to obtain distributional limit theorems for the rescaled functionals.