Enumeration of lambda terms: different models and approaches

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In recent years growing attention has been given to quantitative research in logic and computational models. Investigated objects (e.g., propositional formulae, tautologies, proofs, programs) can be seen as combinatorial structures, providing therefore the inspiration for combinatorists and computer scientists. In particular, several works have been devoted to studying properties of lambda calculus terms. From the practical point of view, generation of random lambda terms is the core of debugging functional programs using random tests.

In my talk I will present several combinatorial models of lambda terms, as well as different attempts to solve the problem of enumerating closed terms. In most models, it is not difficult to define recurrence relations for the number of lambda terms of a given size. However, standard tools of analytic combinatorics are usually not sufficient to derive the asymptotic growth of the studied sequences since the related generating functions are expressed in the form of infinitely nested radicals.

References

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