

Binary Gray codes

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(joint work with Torsten Mütze, Sven Jäger, Joe Savada, and Kaja Wille)

A *Gray code* for some class of combinatorial objects such as sets, permutations, trees etc. is an enumeration of its objects such that every two consecutive objects differ only in a constant amount, i.e., by adding or removing a single element, by a single adjacent transposition, or by a single tree rotation. Ideally, this leads to very efficient algorithms for generating these objects. We survey some recent results in particular for binary Gray codes with various restrictions. For this purpose, we explore generalized lexical matchings and symmetric chain decompositions in the Boolean cube, which are concepts of independent interest. We also present a shorter and much accessible proof of the long-standing middle level conjecture, originally proved by Mütze.