

Combinatorial generation: graphs, algorithms, polytopes, and optimization

Torsten Mütze

`torsten.mutze@warwick.ac.uk`

University of Warwick

In mathematics and computer science we frequently encounter different classes of combinatorial objects. In this talk I focus on algorithms for efficiently generating these objects, i.e., an algorithm should visit each of the objects from the class exactly once. This problem has ramifications into algorithms, graph theory, algebra, geometry etc., which I will highlight in this talk. Moreover, I present two recent frameworks which allow solving the generation problem systematically for a large variety of different objects. The first framework is based on encoding the combinatorial objects by permutations. The second framework uses combinatorial optimization as a black box for the purpose of generation. The listings of objects computed by both frameworks correspond to Hamilton paths and cycles on very general classes of polytopes.