Cubulating the associahedron

Gabe Udell, Cornell University, Ithaca, NY – 14853

Abstract

The associahedron K_n is a convex polytope capturing the combinatorics of Catalan numbers and whose 1-skeleton can be oriented to give the Hasse diagram of the Tamari lattice. The "cubical realization" of the Tamari lattice by bracket vectors is a particularly nice way of mapping Catalan objects to points on the boundary of an axis-aligned parallelepiped. I will discuss a Minkowski decomposition of the associahedron into Bruhat interval polytopes, and a mixed subdivision of the associahedron into $(n-1)!$ (combinatorial) cubes which is closely related to the cubic realization of the Tamari lattice. This subdivision arises from a degeneration of the toric variety of the associahedron into a union of products of smooth toric Richardon varieties.