

The Combinatorics of CAT(0) Cube Complexes

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There are numerous contexts where a discrete system moves according to local, reversible moves. The configuration space, which contains all possible states of the system, is often a CAT(0) cube complex. When this is the case, we can use techniques from geometric group theory and poset theory to understand, measure, and navigate these spaces. I will present a self-contained introduction to these ideas, and discuss some applications to robotic motion planning, enumerative combinatorics, and probability. I will discuss joint work with many people, including Tia Baker, Naya Banerjee, Hanner Bastidas, César Ceballos, John Guo, Megan Owen, Seth Sullivant, Coleson Weir, and Rika Yatchak, and will not assume previous knowledge of these topics.

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