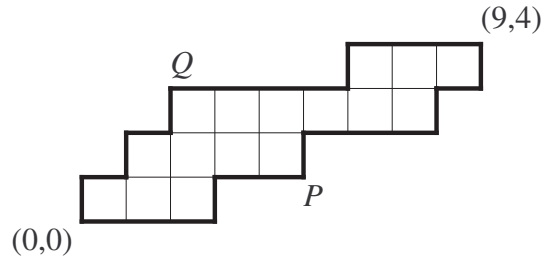


An Introduction to Matroid Theory Through Lattice Paths

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The first (and longer) part of the talk, which is based on joint work with Anna de Mier and Marc Noy of Universitat Politècnica de Catalunya, will introduce you to matroid theory through very concrete examples that arise from lattice paths. Fix lattice paths P and Q that go from $(0,0)$ to (m,r) , with P never going above Q , and consider the lattice paths from $(0,0)$ to (m,r) that stay in the region that P and Q bound. We show that these paths can be identified with the bases of a special type of matroid — a lattice path matroid. Many important invariants (such as the Tutte polynomial) that are $\#P$ -hard to compute for arbitrary matroids have natural interpretations for lattice path matroids, and these interpretations yield polynomial-time algorithms for computing the invariants.

The second part of the talk uses the ideas discussed in the first part to give a bird's-eye view of some of the major research areas in the field: representability over fields, well-quasi-ordering, Tutte polynomials, extremal matroid theory, matroid constructions, and more.