Optimizing Geometric Requirements for Redistricting

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A newly created school district needs to be divided into four regions to address the needs of the community. There are two rules that must always be followed: 1) each region must be made up of exactly one piece so that buses do not have to travel through another region to pick up their students and 2) each region must not have a hole so their sport teams can easily compete with more than one neighboring school. How do we choose the "best" way to divide this school district? Local search algorithms can be applied to search the space for this "best" redistricting, but checking to ensure the two above rules are satisfied can be computationally difficult. In this talk, we discuss how to efficiently ensure that when moving small parts from one district to another district while sampling the space of possible redistrictings, we continue to satisfy the above two rules using the geometry inherent in the problem.