What to Feed a Gerrymander

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Summary

Gerrymandering, the practice of dividing political districts into winding and unfair geometries, has a deleterious effect on democratic accountability and participation. Incumbent politicians have an incentive to create districts to their advantage (California in 2000, Texas in 2003); so one proposed remedy for gerrymandering is to adopt an objective, possibly computerized, methodology for districting.

We present two efficient algorithms for solving the districting problem by modeling it as a Markov decision process that rewards traditional measures of district "goodness": equality of population, continuity, preservation of county lines, and compactness of shape. Our Multi-Seeded Growth Model simulates the creation of a fixed number of districts for an arbitrary geography by "planting seeds" for districts and specifying particular growth rules. The result of this process is refined in our Partition Optimization Model, which uses stochastic domain hill-climbing to make small changes in district lines to improve goodness. We include as an extension an optimization to minimize projected inequality in district populations between redistrictings.

As a case study, we implement our models to create an unbiased, geographically simple districting of New York using tract-level data from the 2000 Census.

The text of this paper appears on pp. 261–280.