# Congressional redistricting less contentious when resolved using computer algorithm

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Concerns that the process of U.S. congressional redistricting may be politically biased have fueled many debates, but a team of University of Illinois computer scientists and engineers has developed a new computer algorithm that may make the task easier for state legislatures and fairer for their constituents.

"United States congressional district maps are redrawn every 10 years in response to national census data, and this process empowers every state legislature to decide how they will carve up each of their congressional districts," said Illinois professor of computer science Sheldon H. Jacobson. "One of the problems is that this can lead to oddly shaped and dispersed districts that favor one political agenda over another."

The researchers' study, performed in collaboration with Douglas M. King, a lecturer of industrial and enterprise systems engineering, proposes a new, geographically based and data-driven algorithm that allows a user to specify the goal that guides the creation of the districts, then creates the districts computationally while enforcing other requirements, such as each district being a contiguous area. Their algorithm speeds up computations by gleaning insight from the geography of the state.

"As data scientists who study and analyze algorithms, we bring a nonpartisan approach to this problem," Jacobson said. "It's just data. It happens to have significant political ramifications, but it is still just data."

Presented in the journal *Computational Optimization and Applications*, the study uses publicly available data from the U.S. Census Bureau and other public sources in a program developed by King.

"One thing we are very keen on is making sure that we are using publicly available data so that everything we are doing is very transparent, with the same data that would be available to other districting stakeholders," King said.

"We are not political scientists, we are data scientists, and we view the data, the census blocks, as pixels," Jacobson said. "We have to group these pixels in a manner such that you define districts, each of which will meet a particular property, such as roughly equivalent populations."

Jacobson and King examine two specific districting objectives - population and political affiliation balance - to demonstrate computational results of their algorithm. They found that their algorithm can successfully generate contiguous district shapes far more efficiently than other computational algorithms.

"The algorithm can be tailored to emphasize the goals or needs of whoever wants to use the tool," King said. "Ultimately, what we are offering is a process to explore redistricting options in an efficient, computational manner."

"The use of our algorithmic framework is just one step in the direction of transparency when it comes to congressional redistricting," Jacobson said. "I think any legislator who is truly committed to their citizens must consider algorithmic redistricting as an available, and viable, option during the next redistricting period that will take place after the U.S. census in 2020."

**More information:** D. M. King et al, The geo-graph in practice:

creating United States Congressional Districts from census blocks, *Computational Optimization and Applications* (2017). DOI: 10.1007/s10589-017-9936-3

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