Case ID:M20-149P

Published: 4/30/2021

Inventors

Jon Miller

Vikash Bajaj

Srinivasa Srivatsav Kandala

Fangwu Wei

Michael Kuby

Contact

Shen Yan
shen.yan@skysonginnovations.com

Automated Voter Precinct Designer

Background

Government officials responsible for administering and conducting elections subdivide regions such as counties, townships, or boroughs into voting precincts with residential addresses assigned to specific precincts. When subdividing regions into precincts, officials typically consider numerous factors. For example, precincts should be geographically compact and contiguous while not containing too many or too few voters. By balancing precinct boundaries and number of required precincts, election officials aim to minimize ballot design and printing variance, and streamline allocation of supporting resources.

Commonly employed techniques for precinct design do not take full advantage of information technology tools. In smaller counties, precinct maps are often created by hand, on paper. In geographically larger and/or more populous counties, staff are employed to design precincts using commercial, off-the-shelf Geographic Information System (GIS) software. Even with GIS software, precinct design remains a resource-intensive, trial-and-error process that requires technicians to possess not only technical skills but also political and legal acumen.

Invention Description

Researchers at Arizona State University have developed a decision-making and resource-management software application that automates the precinct design process through a web-based interface. Election officials input data related to the number and locations of voters as well as multiple map layers of the various districts for which elections are held. These districts include congressional and legislative districts, municipalities, school districts, special taxing districts, judicial districts, etc. Based on parameters specified by the user, the software automatically generates precincts using a multi-objective optimization algorithm and outputs suggested precincts for viewing on a web-based browser or as a downloadable spatial file.

The tool allows election administrators to simulate multiple polling scenarios using a transparent design process that delivers a mathematically optimized solution based on rank order of the design criteria. Offering such a geographically visualized solution expedites the decision-making process by creating greater stakeholder buy-in via immediate understanding and elimination of concerns over

undue designer bias. The ease of adaptability to evolving local, regional, or statewide districting considerations allows election administrators to respond to changing conditions. Furthermore, the end-to-end nature of the tool enables agencies responsible for voting administration—no matter their size or level of technical expertise—to easily adopt the tool in place of complicated, disjointed workflows that can require costly external guidance.

Potential Applications

- Voter precinct design

- Geographical optimization of resources

Benefits and Advantages

- Provides election administrators with an unprecedented ability to run various scenarios and optimize resource allocation

- Automated approach removes concern over designer bias

- Lowers precinct design costs and lessens reliance on trial and error