ANALYZING METRICS TO DETECT GERRYMANDERING VIA SHORT BURSTS

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In recent years, a wide variety of techniques and metrics have been proposed as measures to detect when a map is a partisan gerrymander. The most accessible measures, requiring easily accessible data, are metrics such as the Efficiency Gap, GEO metric, Mean¬ Median Difference, and Declination. But for most of these metrics, researchers have struggled to describe how the value of that metric on a single map indicates the presence or absence of gerrymandering.
In this talk, we use a recently designed method to create ``extreme maps,'' and see how these metrics act on those maps. This method is called the short burst method, and was shown by Cannon et al to be the most effective method at finding extreme numbers of majority¬ minority districts in a single state. Here, we use this method to find extreme numbers of Democratic¬ won (or Republican¬ won) districts in a single state, while restricting a metric to be within certain bounds. In this way, we can assess which of these metrics allows for more extreme maps.

Our main results are that the Mean Median Difference cannot distinguish more extreme maps from less extreme maps. The other metrics are more nuanced, but when assessed on an ensemble, none perform substantially differently from simply measuring the number of districts won by a fixed party. If there's time, we'll also delve into new theoretical findings as to the way that the Mean-Median Difference and Partisan Bias act, and attempt to explain our empirical findings with these theoretical and additional empirical results.