MUM_TX Statement on SB6: Main Points

- Using ensemble analysis, mathematicians can now generate a large number of random, legally valid maps which can then be used as an unbiased baseline to understand what a typical map should look like.
- MathForUnbiasedMapsTX (MUM_TX) performed such an analysis, generating over 500,000 US Congressional maps to compare with the proposed map C2135 (SB6).
- Their analysis shows that C2135 is gerrymandered along partisan and racial dimensions.

Protecting incumbents from their voters

- C2135 artificially reduces the competitiveness of nearly 50% of its districts through "cracking and packing".

Partisan gerrymandering

- In C2135, if Republicans and Democrats split the vote 50-50, Republicans would win 24 seats and Democrats 14. In a typical unbiased map, Republicans would win 18 while Democrats would win 20.
- In C2135, Republicans win 19 seats with as little as 42.2% of the statewide vote; Democrats would need 57.8%. In a typical unbiased map, Republicans need 51% while Democrats need only 49%.
- Not a single map in the 500,000-member ensemble shows this level of bias towards Republican candidates

Racial gerrymandering

- C2135 removes Black and Hispanic voters from districts where they form a narrow majority or a near majority, into districts where they will now have an overwhelming majority.
- This has the effect of decreasing the total number of districts in which Black and Hispanic voters have a majority (14 for the proposed map, vs. 16 or 17 for a typical member of the ensemble)

Finally…

- There is no need to choose a gerrymandered map: literally *hundreds of thousands* of less biased maps can be found, and more can be generated in a matter of minutes!

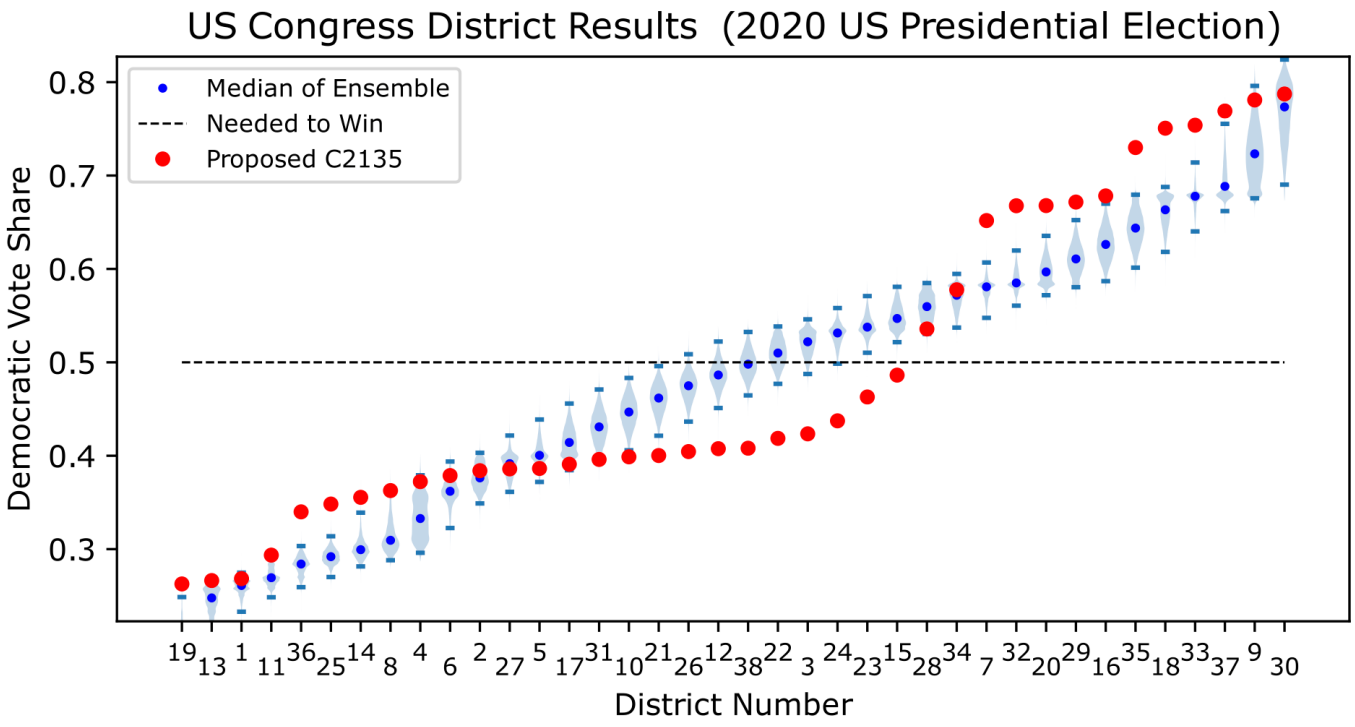
MUM_TX Statement on C2135

Tuesday, October 12, 2021

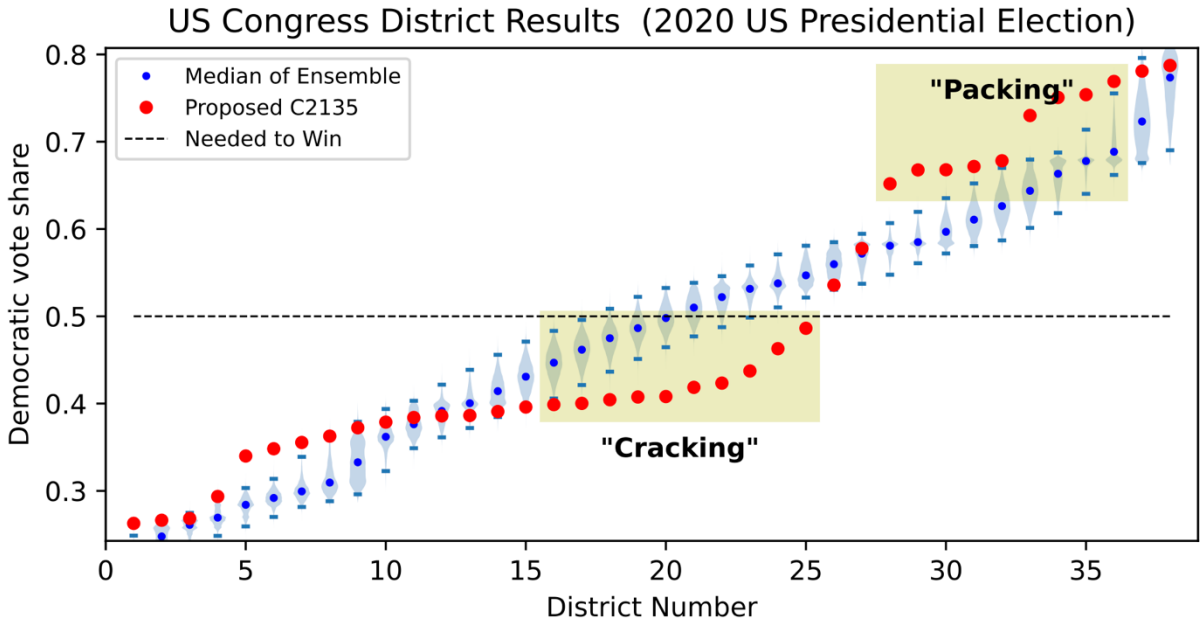
Math For Unbiased Maps TX (MUM_TX) is an interdisciplinary, nonpartisan coalition of Texas mathematicians, political scientists and philosophers working to ensure a fair and transparent redistricting process. Our research concerns the development and application of ensemble sampling techniques, and in particular their application to the current TX redistricting cycle. In brief, we use *Markov Chain Monte Carlo* techniques to generate a large number of random, legally valid maps which can then be used as an unbiased baseline to understand what a typical map should look like. Conversely, when a proposed map is an outlier from the ensemble, this may be an indication of gerrymandering.

We have applied our methods to the Congressional maps that have been made available by the Texas Legislative Council. As of 10/12/21, we have seen a large number of maps posted, culminating in C2135 which is now being considered by the House. We generated a table of two important statistics that are commonly used by political scientists to assess partisan gerrymandering: the mean-median score and partisan bias score. You can find the table at our webpage: www.smu.edu/Dedman/Research/Institutes-and-Centers/DCII/Scholarship/Research-Cluster-on-Political-Decision-Making/TXGerryWatch.

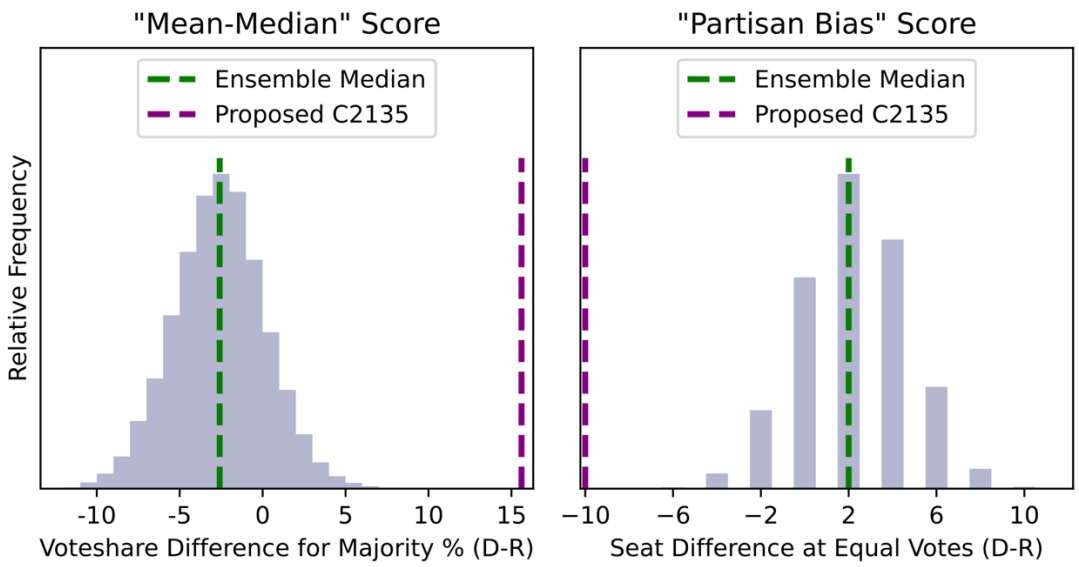
Unfortunately, our assessment of 10/12/21 is not complementary: C2135 is (1) egregiously gerrymandered to reduce the competitiveness of nearly every congressional district, and (2) manipulated to give the Republican Party, in particular, an outsized advantage, completely unlike any plan in our unbiased ensemble. The result is that nearly every district (both Republican AND Democratic) is uncompetitive in a general election, and that among these there are far too few Democratic districts, given the actual political leanings of Texan voters. Finally (3) minority voters are “cracked and packed” into a few overwhelmingly minority districts, at the cost of decreasing the total number of districts which would allow minority communities to elect candidates of their choice.



We focus on C2135, which is the map currently under consideration. We compared the proposed map to an *ensemble* of 500,000 randomly-drawn maps. In this figure, districts are ordered by the number of votes a Democratic candidate for US Congress would have received in the 2020 election, had voters used "straight ticket" voting. On average, maps within our ensemble (blue dots) exhibit smoothly increasing vote shares as one moves from Republican-leaning to Democratic-leaning districts. This smooth increase is the hallmark of an unbiased map. But in the proposed map (red dots), the increase is highly disjointed, a clear sign of gerrymandering.

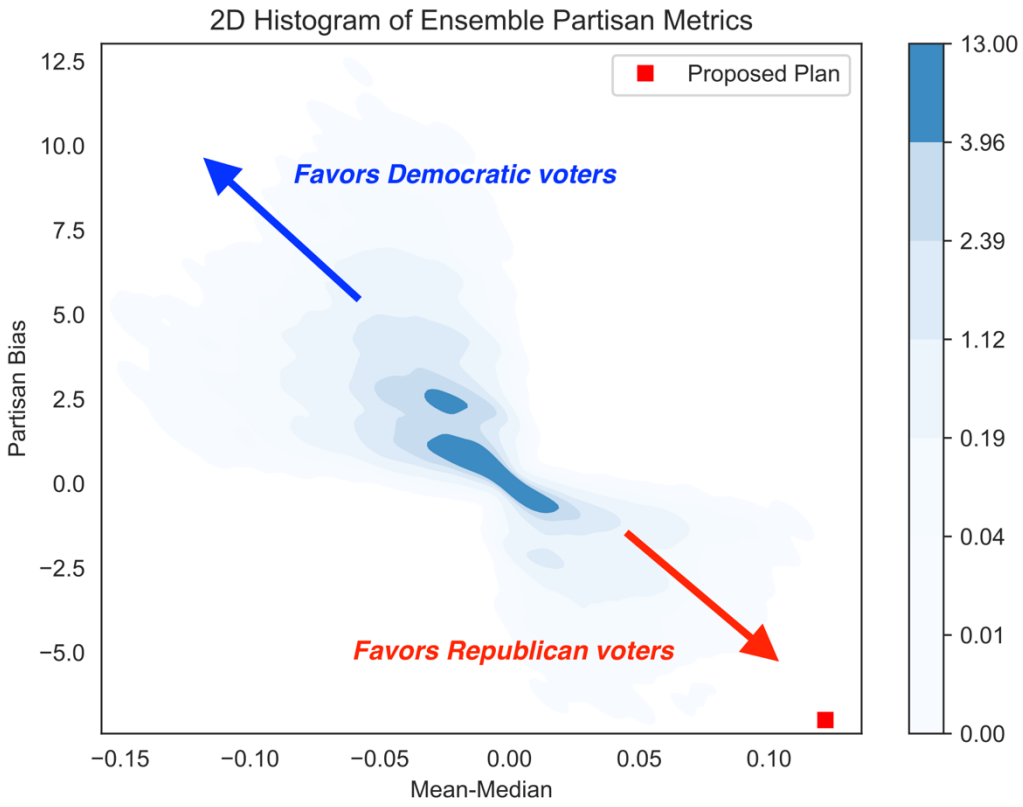


We note several specific features of the proposed plan. First, Democratic voters are disproportionately removed from a swath of districts in between 10 and 15 (District numbers are along the x-axis) that would be competitive in an unbiased map (a process known as "cracking"), and placed into uncompetitive districts such as 7, 32, 20, 29, 35, 18, and 33 (a process known as "packing"). Second, the list of outcomes between Districts 2 and 3 (a total of 13 districts) is very nearly flat, which is a hallmark of maps created with the assistance of computer algorithms designed to automate the gerrymandering process. Finally, the predicted vote share between Districts 15 and 7 changes abruptly by about *20 points,* with only 2 districts in between (28 and 34) -- this represents a "wall" designed to protect legislators from changing voter opinions over time (see actual district numbers on the previous figure).

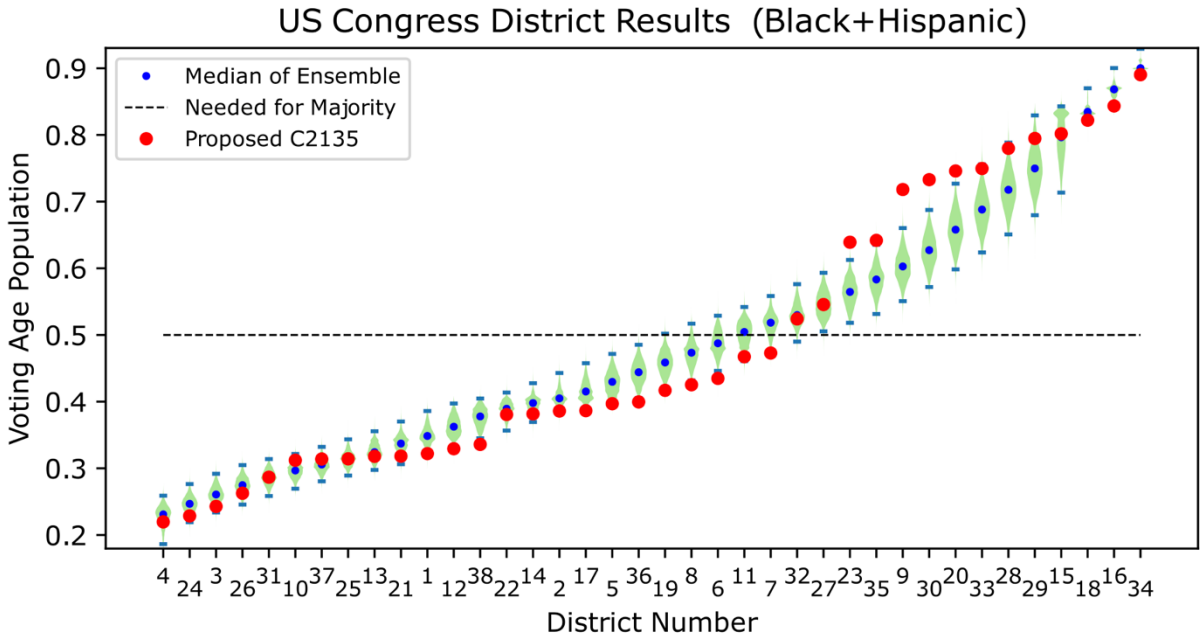


We also compute two common numbers that political scientists use to "score" maps. The first such number is called the "mean-median" score: the difference in statewide vote percentage each party would need to win the majority of the chamber. For the proposed map, the Republican Party would need to win only **42.2%** of the vote to win 19 seats, while the Democratic Party would need to earn **57.8%**; the difference of these numbers gives a "mean-median" score of **15.6** (note: to get these numbers from the figure, scale up by a factor of 100). The second such score is called the "partisan bias" score: the difference in the number of seats each party wins if each were to earn 50% of the vote. For the proposed map, the Republican Party would win **24 seats** with 50% of the vote, while the Democratic Party would win only **14 seats**; the difference of these numbers gives a "partisan bias" score of **–10**. In contrast, the median map in our ensemble has a mean-median score of **–2.2** and a partisan bias of **2** (when the statewide vote splits 50-50, the Republican Party wins **18** seats to the Democratic Party's **20**).

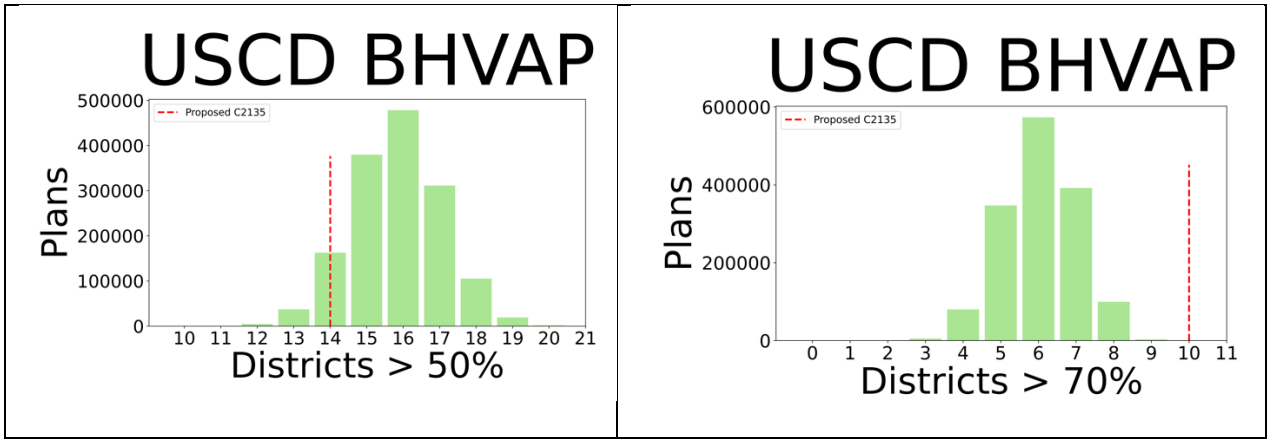
Of course, no plan is going to be perfectly aligned with the ensemble, so just how gerrymandered is this plan? A little? A lot? An extreme amount? This question can be answered using statistics, by comparing each score above to the *distribution* of those scores within the 500,000-map ensemble. This is done in the figure below, and the results are disappointing. As shown in the following figure, both the "mean-median" and "partisan bias" scores are very far from their typical values within an unbiased ensemble. In fact, both the mean-median and the partisan bias scores were more extreme than any value we saw in our ensemble. **Not a single map** in our ensemble had a mean-median score greater than that of the proposed map, and **not a single map** had a partisan bias score as negative.



This is vividly illustrated by the 2D histogram showing the joint distribution of these scores across the ensemble (the plot has been smoothed for visualization, as partisan bias is integer-valued). Another evident fact from this histogram is that there is no good reason why the legislature must pick such a manipulated map; there are literally hundreds of thousands of maps that are less biased.



In the next figure we present another "violin" plot, but with districts sorted according to the fraction of the voting age population that is Black + Hispanic. We clearly observe the same type of trend as in the sorting by parties: some districts (19, 8, 6) all contain many fewer Black + Hispanic voters than would be expected from an unbiased map, whereas others (23, 9, 30) all contain many more Black + Hispanic voters than would be expected. The story is essentially identical to that observed above – SB6 removes Black and Hispanic voters from districts where they form a near majority, and their voices might influence election outcomes, into districts where they already form a large majority.



We illustrate this point by next asking, "How many Districts have an BHVAP over 50%?" (or 60%, or 70%, etc..). The BHVAP is the combined Black and Hispanic voting age population. These histograms show the values for the ensemble, and the value for the Proposed map is shown in red. Above, we show the number of districts that have BHVAP above 50% and 70%;

that is the number of districts that are majority-minority, vs. the number of Districts that are ***overwhelmingly*** majority-minority. Here is what we observe:

- The number of majority-minority districts in the Proposed plan (C2135) is much lower than the typical value in the ensemble (14 vs. 16-17).
- The number of overwhelmingly majority-minority districts is higher than the typical value in the ensemble (10 vs. 6).
- This suggest that minority voters have been packed into a small number of districts, at the cost of reducing the total number of districts in which they may be able to elect representatives of their choice.

In summary, C2135 fails Texas voters by gerrymandering along both partisan and racial dimensions. First, this map artificially reduces the competitiveness of a large number of districts: *at most* 3 out of 38 districts might charitably be viewed as competitive in a general election. The map also inflates the advantage to the Republican Party, in comparison to a typical unbiased map; an unbiased map would be closely balanced between the parties (and far more reflective of the views of actual Texas voters, who voted 54% to 46% in the 2020 election). Second, this map packs Black and Hispanic voters into a relatively small number of overwhelmingly minority districts, at the cost of reducing the total number of districts which effectively perform for minorities. We urge legislators to go back to the drawing board and return with a map that is fair to Texas voters.