Scores (Metrics)

These are the metrics ("scores") calculated for a plan, when you run the score_ensemble.py script.

To make them easier to work with, metrics are stored in separate files by category:

- **General** – population deviation
- **Partisan** – measures of partisan bias (fairness) & competitiveness (responsiveness)
- **Minority** – measures of the opportunity for minority representation
- **Compactness** – measures of compactness
- **Splitting** – measures of county-district splitting
- **Global** – measures that depend on other measures, e.g., MOD districts

For each of those categories, there is a CSV with plan-level scores and a JSONL file with by-district measurements. *Note: The first value in each by-district list is the total for the state. The values 1-N are the values for the individual districts.*

General

There is one general metric:

- **population_deviation** – The population deviation of the plan.

Partisan

The measures of partisan bias (next) and competitiveness & responsiveness (following) are described in some detail in Advanced Measures of Bias & Responsiveness. Many use fractional seat probabilities.

- **estimated_vote_pct** – The Democratic two-party vote share.

These are the plan-level partisan bias metrics:

- **pr_deviation** – The deviation from pr_seats. Smaller is better, and zero is perfect.
- **estimated_seats** – The estimated number of fractional Democratic seats.
- **fptp_seats** – The estimated number of Democratic seats using "first past the post" (FPTP), all-or-nothing accounting.
- **disproportionality** – estimated_vote_pct minus estimated_seats as a percentage of the number of districts.
- **efficiency_gap_wasted_votes** – The efficiency gap calculated using the wasted votes formula. Smaller absolute value is better. Positive values favor Republicans; negative values favor Democrats.
- **efficiency_gap_statewide** – The efficiency gap calculated using the statewide formula and FPTP accounting.
- **efficiency_gap** – The efficiency gap calculated using the statewide formula and fractional seat probabilities.
- **seats_bias** (α_s) – The seats bias at 50% Democratic vote share.
- **votes_bias** (α_v) – The votes bias at 50% Democratic vote share.
- **geometric_seats_bias** (β) – The seats bias at the statewide Democratic vote share, not 50% (aka "partisan bias").
- **declination** (δ) – The declination angle (in degrees), calculated using fractional seats and votes. Smaller is better.
- **mean_median_statewide** – The statewide Democratic two-party vote share minus the median Democratic two-party district vote share.
- **mean_median_average_district** – The mean Democratic two-party district vote share minus the median Democratic two-party district vote share.
- **turnout_bias** (TO) – The difference between the statewide Democratic vote share and the average their average district vote share.
- **lopsided_outcomes** (LO) – The difference between the average two-party vote shares for the Democratic and Republican wins.
- **proportionality** – DRA's propoprtionality rating. Integers [0-100], where bigger is better.

There are two by-district aggregates:

- **dem_by_district** – The number of Democratic votes by district.
- **tot_by_district** – The total two-party (Democratic & Republican) votes by district.

These are the competitiveness & responsiveness metrics:

- **competitive_district_count** – The number of districts that fall into the 45-55% Democratic/Republican range.
- **competitive_districts** – The estimated number of competitive districts, using fractional seat probabilities. Bigger is better.
- **average_margin** – The average margin of victory. Smaller is better.
- **responsiveness** (ρ) – The slope of the seats-votes curve at the statewide Democratic vote share.
- **responsive_districts** – The likely number of responsive districts, using fractional seat probabilities.
- **overall_responsiveness** (R) – An overall measure of responsiveness which you can think of as a winner's bonus.
- **competitiveness** – DRA's competitiveness rating. Integers [0-100], where bigger is better.

Minority

These are measures of the opportunity for minority representation. See also the measures in the 'global' category below.

- **mmd_black** – The count of Black-alone majority-minority districts (MMD).
- **mmd_hispanic** – The count of Hispanic-alone majority-minority districts (MMD).
- **mmd_coalition** – The count of Black & Hispanic-together coalition districts (MMD).
- **opportunity_districts** – The estimated number of single race or ethnicity minority opportunity districts, using fractional seat probabilities (and DRA's method). Note: This revised metric means does not clip below the 37% threshold (like DRA does). Hence, the results are more continuous.
- **proportional_opportunities** – The proportional number of single race or ethnicity minority opportunity districts, based on statewide VAP.
- **coalition_districts** – The estimated number of all-minorities-together coalition districts, using fractional seat probabilities (and DRA's method). Note: This revised metric means does not clip below the 37% threshold (like DRA does). Hence, the results are more continuous.

- **proportional_coalitions** – The proportional number of all-minorities-together coalition districts, based on statewide VAP.
- **minority** – DRA's minority opportunity rating. Integers [0-100], where bigger is better. Note: This revised metric means does not clip below the 37% threshold (like DRA does). Hence, the results are more continuous.

There are mostly self-explanatory by-district aggregates for each VAP category:

- **total_vap**
- **white_vap**
- **black_vap**
- **hispanic_vap**
- **asian_vap**
- **pacific_vap**
- **native_vap**
- **minority_vap** – The total VAP minus white VAP, i.e., all minorities combined.

Compactness

The measures of compactness:

- **reock** – The average Reock measure of compactnes for the districts. Bigger is better.
- **polsby_popper** – The average Polsby-Popper measure of compactness for the districts. Bigger is better.
- **cut_score** – The number of edges between nodes (precincts) in the contiguity graph that are cut (cross district boundaries). A measure of compactness using discrete geometry. Smaller is better.
- **spanning_tree_score** – The spanning tree scrore. Another measure of compactness using discrete geometry. Bigger is better.
- **population_compactness** – The population compactness of the map. Lower is more *energy* compact. Smaller is better.
- **compactness** – DRA's compactness rating. Integers [0-100], where bigger is better.

There are two sets of by-district aggregates for compactness. First abstracts of district shapes from which Reock & Polsby-Popper can be computed efficiently:

- **area**
- **diameter**
- **perimeter**

and the by-district measurements of them:

- **reock**
- **polsby_popper**

Splitting

These are measures of county-district splitting:

The county and district splitting measures are described in <u>Measuring County & District Splitting</u>.

- **county_splitting** – A measure of the degree of county splitting. Smaller is better, and 1.0 (no splitting) is the best.
- **district_splitting** – A measure of the degree of district splitting. Smaller is better, and 1.0 (no splitting) is the best.
- **counties_split** – The number of counties split across districts. Smaller is better.
- **county_splits** – The number of *times* counties are split, e.g, a county may be split more than once. Smaller is better.
- **splitting** – DRA's county-district splitting rating. Integers [0-100], where bigger is better.

Global

This category (and CSV file) includes metrics that depend on other metrics and/or depend on by-district measurements from multiple categories. Right now this category includes:

- **mmd_districts** – The sum of majority-minority districts (MMD) for Blacks alone, Hispanics alone, and Blacks & Hispanics together (but neither alone, i.e., coalitions).
- **mmd_reock** – The average Reock for MMD districts.
- **mmd_polsby_popper** – The average Polsby-Popper for MMD districts.
- **mmd_district_splitting** – The average district-splitting for MMD districts.

Separate from those plan-level scores, there are a series of parallel JSONL files that hold by-district measurements.