

Inputs

- Total minority votes
- “Wasted” minority votes
- Minority-elected officials
- Total elected officials
- Sum of excess votes in winning districts
- Sum of all votes in losing districts
- Total votes in all districts
- District demographics

Output

- Gerrymandering score (0-1)

Variables

- ◆ Efficiency gap (E)
- ◆ Packing (P)
- ◆ Cracking (C)
- ◆ Misrepresentation (M)
- ◆ Impact (T)

Weights

- ◆ $\alpha = 0.2$
- ◆ $\beta = 0.15$
- ◆ $\gamma = 0.15$
- ◆ $\delta = 0.20$
- ◆ $\epsilon = 0.30$

Gerrymandering Score =

$$(\alpha \times M) + (\beta \times P_{\text{total}}) + (\gamma \times C_{\text{total}}) + (\delta \times T_{\text{total}}) + (\epsilon \times \bar{E})$$

$$M = \frac{\text{Wasted Minority Votes}}{\text{Total Minority Votes}}$$

$$P = \frac{\sum \text{Excess Votes in Packed Districts}}{\text{Total Votes in All Districts}}$$

$$C = \frac{\sum \text{Votes for Minority Group in Losing Districts}}{\text{Total Minority Votes}}$$

$$T = \frac{\text{Number of Minority-Elected Representatives}}{\text{Total Number of Representatives}}$$

$$E = \frac{1}{N} \sum_{i=1}^N \frac{(\text{Wasted Votes for Party A} - \text{Wasted Votes for Party B})}{\text{Total Votes in District } i}$$

Identification Model Version B (IMVB)

Description

Corrections needed with Version A: Collinearity; overcomplicated; overuse of same variables

Description of IMVB: Modified efficiency gap model

Similar to the first iteration, this model also yields an output range of 0-1 where a greater score, close to 1, represents more gerrymandering and a lower score, closer to 0, represents less gerrymandering.

Variable and Calculations

Efficiency gap (EG) = Absolute value of ((Party A's wasted votes - Party B's wasted votes)/Total votes)

Popular vote deviation for Party A (PVDA) = Absolute value of ((Total votes for Party A/Total votes) - (Party A's won districts/Total districts))

Popular vote deviation for Party B (PVDB) = Absolute value of ((Total votes for Party B/Total votes) - (Party B's won districts/Total districts))

Assigned coefficients:

- EG → 0.5
- PVDA → 0.25
- PVDB → 0.25

Final Model

Gerrymandering Score = (EG*0.5) + (PVDA*0.25) + (PVDB*0.25)