

# Gerrymandering Metrics

## 2024 Election Results and the 2024 District Map

```
library(tidyverse)
```

```
— Attaching core tidyverse packages — tidyverse 2.0.0
—
✓ dplyr      1.1.4      ✓ readr      2.1.5
✓ forcats    1.0.1      ✓ stringr    1.5.2
✓ ggplot2    4.0.0      ✓ tibble     3.3.0
✓ lubridate  1.9.4      ✓ tidyr      1.3.1
✓ purrr      1.1.0
— Conflicts — tidyverse_conflicts()
—
* dplyr::filter() masks stats::filter()
* dplyr::lag()     masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all
conflicts to become errors
```

```
g24_house <- read_csv("data/g24_house_clean.csv")
```

```
Rows: 51123 Columns: 9
— Column specification
```

```
Delimiter: ","
```

```
chr (3): fips, svprec, svprec_key
```

```
dbl (6): county, cddist, totreg, totvote, house_dem, house_rep
```

```
i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this
message.
```

```
district_24 <- g24_house |>
  group_by(cddist) |>
  summarise(
    dem_votes = sum(house_dem, na.rm = TRUE),
    rep_votes = sum(house_rep, na.rm = TRUE)
  ) |>
  mutate(
    total = dem_votes + rep_votes,
```

```

    dem_share = dem_votes / total
  )

#filter out the wasted votes districts
contested_24 <- district_24 |>
  filter(total > 0, dem_votes > 0, rep_votes > 0)

#mean-median score
mean_24 <- mean(contested_24$dem_share, na.rm = TRUE)
median_24 <- median(contested_24$dem_share, na.rm = TRUE)

mean_median_24 <- mean_24 - median_24
mean_median_24

```

```
[1] -0.01076338
```

The mean–median difference for the 2024 congressional map is  $-0.01076338$ , indicating a slight bias toward Republicans meaning that the rep vote is “packed” which is good for democrats.

```

efficiency_gap <- function(d_votes, r_votes) {
  total <- d_votes + r_votes
  threshold <- floor(total / 2) + 1

  dem_wasted <- ifelse(d_votes > r_votes,
                      d_votes - threshold,
                      d_votes)

  rep_wasted <- ifelse(r_votes > d_votes,
                      r_votes - threshold,
                      r_votes)

  sum(dem_wasted - rep_wasted) / sum(total)
}
eg_24 <- efficiency_gap(contested_24$dem_votes,
                        contested_24$rep_votes)

eg_24

```

```
[1] -0.2638733
```

The efficiency gap for the 2024 congressional map is  $-0.2638733$ , suggesting a bias toward Republicans since they have more wasted votes.

```

list(
  mean_share_24 = mean_24,

```

```

median_share_24 = median_24,
mean_median_24 = mean_median_24,
efficiency_gap_24 = eg_24
)

```

```

$mean_share_24
[1] 0.5963854

```

```

$median_share_24
[1] 0.6071488

```

```

$mean_median_24
[1] -0.01076338

```

```

$efficiency_gap_24
[1] -0.2638733

```

## 2024 Election Results and the proposed 2025 District Map

```

#NEW PART PART 6
library(tidyverse)

# 2025 AB-604 hypothetical results
district_25 <- read_csv("data/new_district_results.csv", show_col_types =
FALSE) %>%
  mutate(
    total = dem_votes + rep_votes,
    dem_share = dem_votes / total
  )
contested_24 <- district_24 %>%
  filter(dem_votes > 0, rep_votes > 0)

contested_25 <- district_25 %>%
  filter(dem_votes > 0, rep_votes > 0)

mm_25 <- mean(contested_25$dem_share) -
  median(contested_25$dem_share)
mm_25

```

```

[1] 0.02707605

```

```

eg_25 <- efficiency_gap(
  contested_25$dem_votes,
  contested_25$rep_votes
)

```

```
)  
eg_25
```

```
[1] -0.1758706
```

```
results_comparison <- tibble(  
  metric = c("Mean-Median", "Efficiency Gap"),  
  old_map_2024 = c(mean_median_24, eg_24),  
  new_map_2025 = c(mm_25, eg_25)  
)  
  
results_comparison
```

```
# A tibble: 2 × 3  
  metric      old_map_2024 new_map_2025  
  <chr>          <dbl>         <dbl>  
1 Mean-Median    -0.0108         0.0271  
2 Efficiency Gap  -0.264         -0.176
```