

# ElectionAnalysis

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## Read In File

```
votes = read.csv("C:/Users/Scott/desktop/2012-and-2016-presidential-elections/votes.csv", header=T)
```

## Exploratory Analysis - Maps

### Basics

```
colnames(votes)
```

```
## [1] "X.1"                 "X"                  "combined_fips"
## [4] "votes_dem_2016"       "votes_gop_2016"     "total_votes_2016"
## [7] "Clinton"              "Trump"              "diff_2016"
## [10] "per_point_diff_2016"  "state_abbr"        "county_name"
## [13] "FIPS"                 "total_votes_2012"   "votes_dem_2012"
## [16] "votes_gop_2012"       "county_fips"       "state_fips"
## [19] "Obama"                "Romney"             "diff_2012"
## [22] "per_point_diff_2012"  "fips"               "area_name"
## [25] "state_abbreviation"  "population2014"    "population2010"
## [28] "population_change"   "POP010210"         "AGE135214"
## [31] "AGE295214"            "age65plus"          "SEX255214"
## [34] "White"                "Black"              "RHI325214"
## [37] "RHI425214"            "RHI525214"          "RHI625214"
## [40] "Hispanic"              "RHI825214"          "POP715213"
## [43] "POP645213"             "NonEnglish"          "Edu_highschool"
## [46] "Edu_batchelors"        "VET605213"          "LFE305213"
## [49] "HSG010214"             "HSG445213"          "HSG096213"
## [52] "HSG495213"             "HSD410213"          "HSD310213"
## [55] "Income"                "INC110213"           "Poverty"
## [58] "BZA010213"              "BZA110213"           "BZA115213"
## [61] "NES010213"              "SB0001207"           "SB0315207"
## [64] "SB0115207"              "SB0215207"           "SB0515207"
## [67] "SB0415207"              "SB0015207"           "MAN450207"
## [70] "WTN220207"              "RTN130207"           "RTN131207"
## [73] "AFN120207"              "EPS030214"           "LND110210"
```

```
## [76] "Density"           "Clinton_Obama"      "Trump_Romney"
## [79] "Trump_Prediction"   "Clinton_Prediction" "Trump_Deviation"
## [82] "Clinton_Deviation"
```

## Vote Share Plots

```
library("choroplethr")
```

```
## Warning: package 'choroplethr' was built under R version 3.3.2
```

```
## Loading required package: acs
```

```
## Warning: package 'acs' was built under R version 3.3.2
```

```
## Loading required package: stringr
```

```
## Loading required package: plyr
```

```
## Loading required package: XML
```

```
## Warning: package 'XML' was built under R version 3.3.2
```

```
##
```

```
## Attaching package: 'acs'
```

```
## The following object is masked from 'package:base':
```

```
##
```

```
##     apply
```

```
library("choroplethrMaps")
```

```
## Warning: package 'choroplethrMaps' was built under R version 3.3.2
```

```
library("ggplot2")
```

```
## Warning: package 'ggplot2' was built under R version 3.3.2
```

```
#Explore total votes per county
total_votes = votes[,c(6,13)]
colnames(total_votes) = c('value','region')

vote_count = county_choropleth(total_votes,
                               legend = "Votes",
                               num_colors = 9,
                               title = "Vote Count by County")
```

```

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 51515, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185,
## 2195, 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

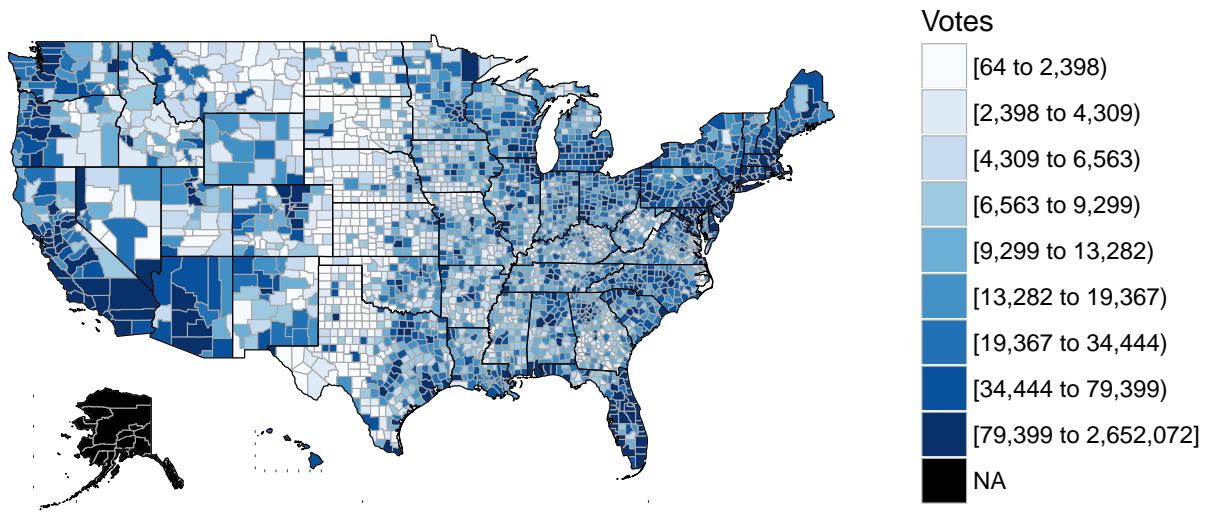
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

```

vote\_count

## Vote Count by County



#Break down county vote into regions of the US for easier viewing

```

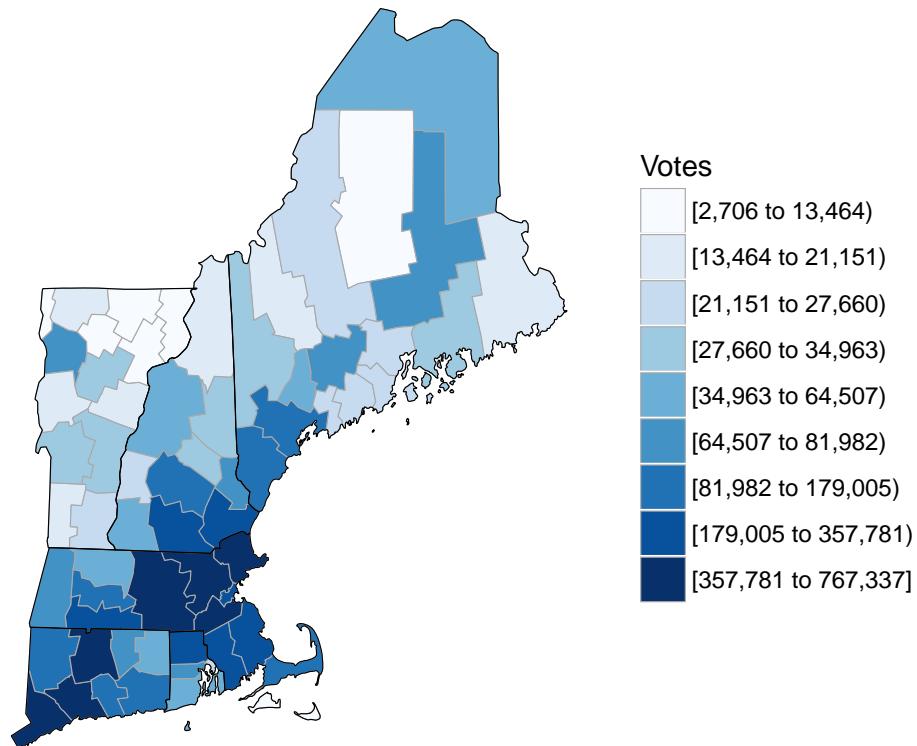
##New England Region
vote_count_NE = county_choropleth(total_votes,
                                    legend = "Votes",
                                    num_colors = 9,
                                    title = "Vote Count by County - New England",
                                    state_zoom = c("maine", "new hampshire", "vermont", "massachusetts", "connecticut")

```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
vote_count_NE
```

## Vote Count by County – New England

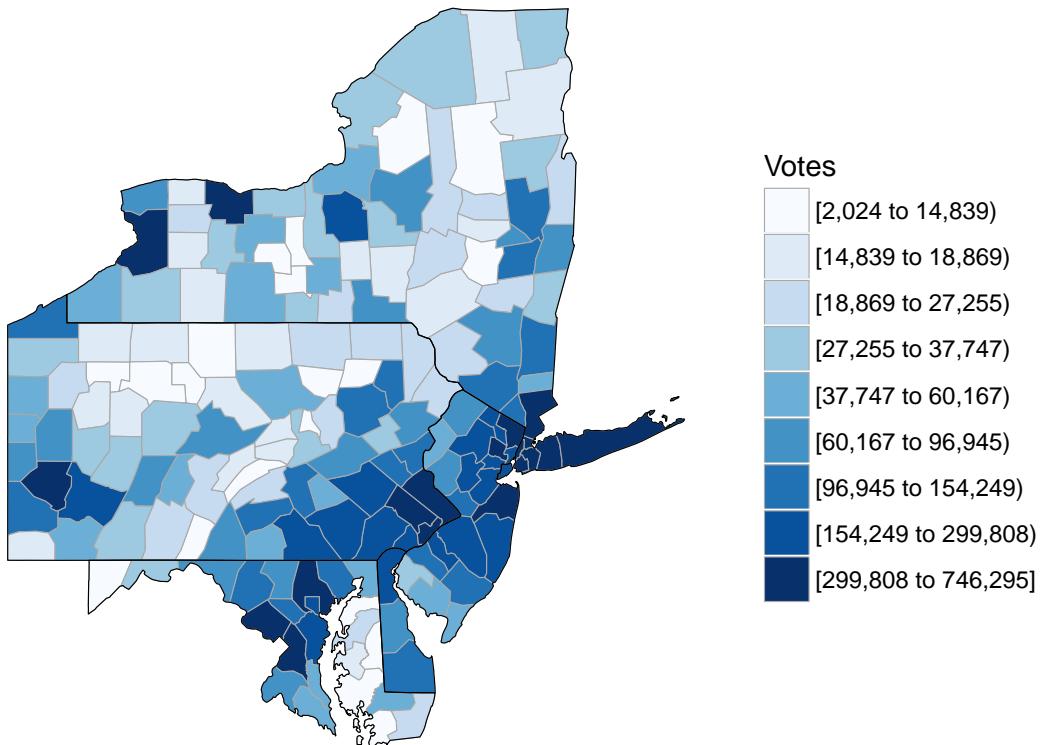


```
##Mid-Atlantic Region
vote_count_MA = county_choropleth(total_votes,
                                    legend = "Votes",
                                    num_colors = 9,
                                    title = "Vote Count by County - Mid-Atlantic",
                                    state_zoom = c("new york", "pennsylvania", "new jersey", "maryland", "delaware")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
vote_count_MA
```

## Vote Count by County – Mid-Atlantic



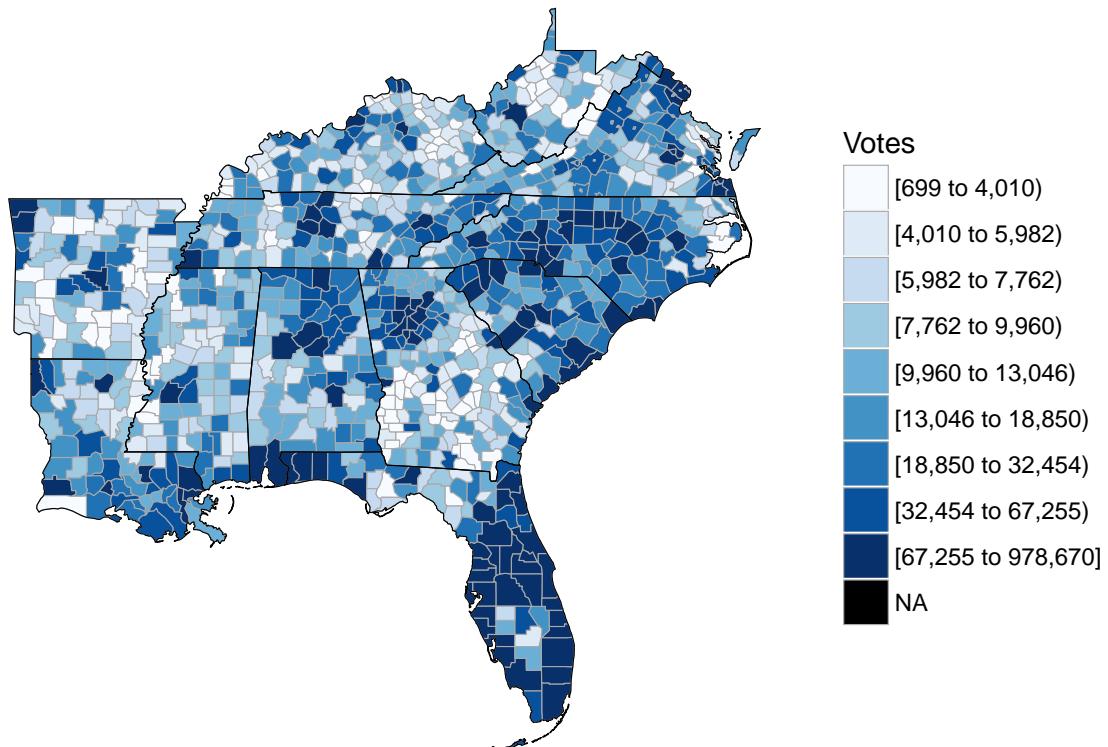
```
##South East Region
vote_count_SE = county_choropleth(total_votes,
                                    legend = "Votes",
                                    num_colors = 9,
                                    title = "Vote Count by County - South East",
                                    state_zoom = c("west virginia","virginia","tennessee","kentucky","north carolina"))

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

vote_count_SE
```

## Vote Count by County – South East

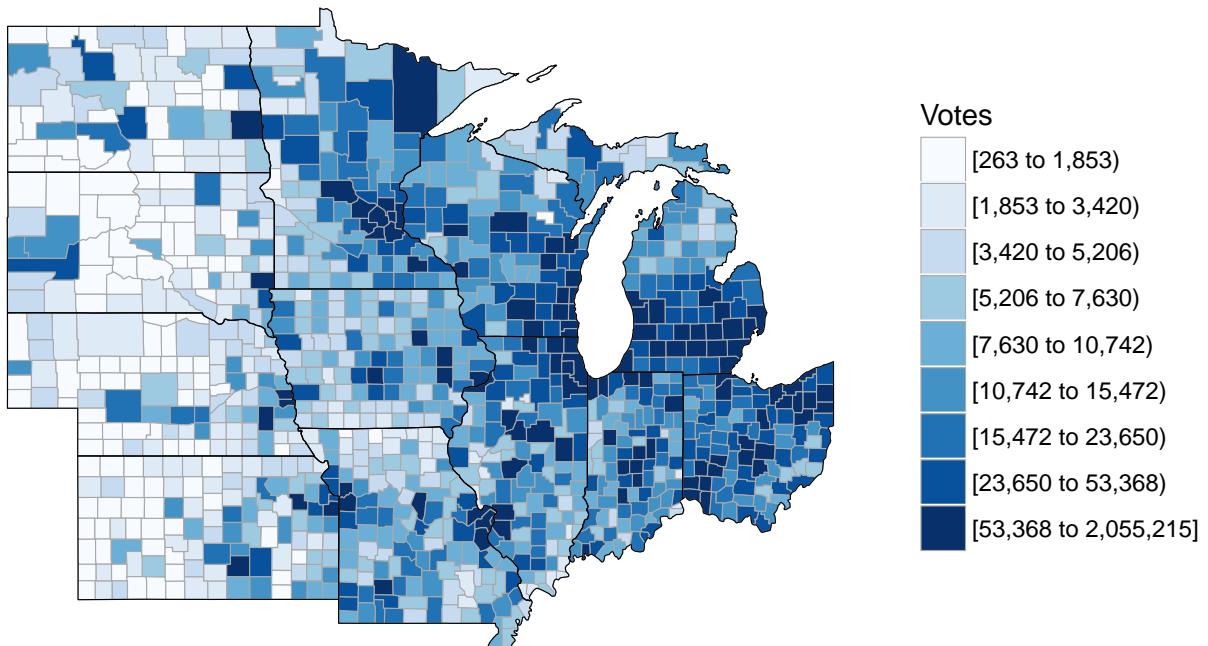


```
##Mid West Region
vote_count_MW = county_choropleth(total_votes,
                                    legend = "Votes",
                                    num_colors = 9,
                                    title = "Vote Count by County - Mid-West",
                                    state_zoom = c("ohio","michigan","indiana","illinois","wisconsin","minne

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

vote_count_MW
```

## Vote Count by County – Mid-West

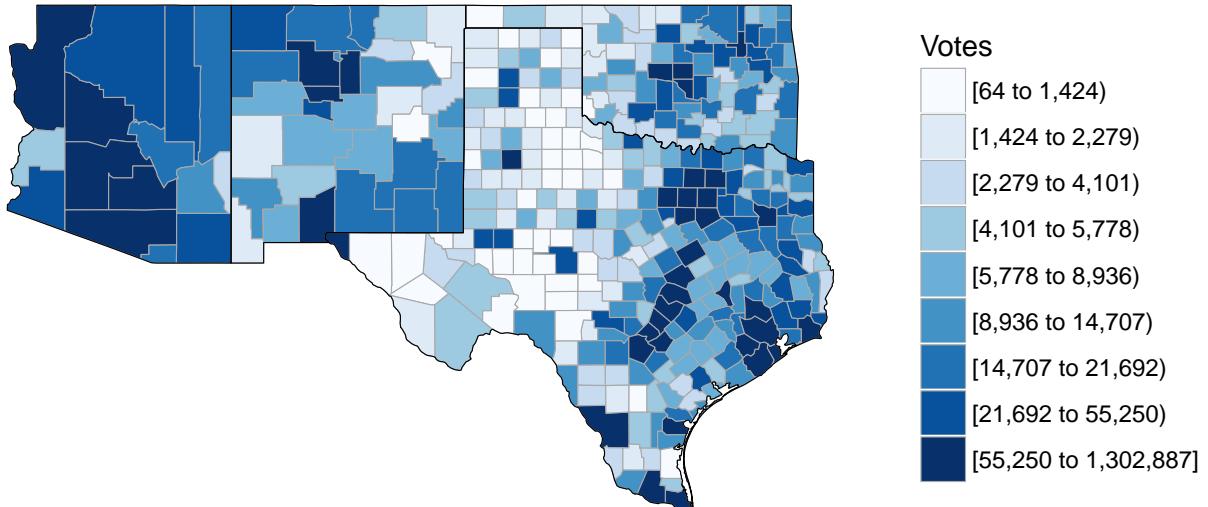


```
##South West Region
vote_count_SW = county_choropleth(total_votes,
                                    legend = "Votes",
                                    num_colors = 9,
                                    title = "Vote Count by County - South West",
                                    state_zoom = c("texas","oklahoma","new mexico","arizona"))

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

vote_count_SW
```

## Vote Count by County – South West



```
##West Region
vote_count_W = county_choropleth(total_votes,
                                   legend = "Votes",
                                   num_colors = 9,
                                   title = "Vote Count by County - West",
                                   state_zoom = c("colorado","wyoming","montana","idaho","utah","nevada","ca"))

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185, 2195,
## 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

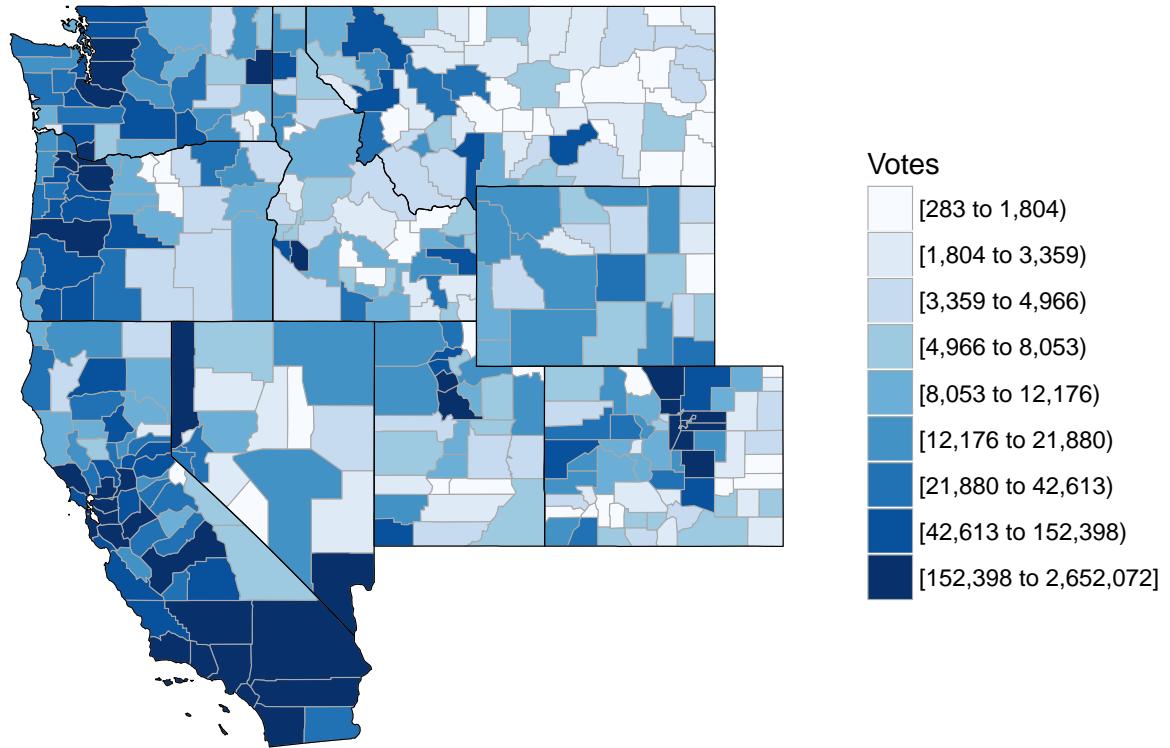
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

vote_count_W
```

## Vote Count by County – West



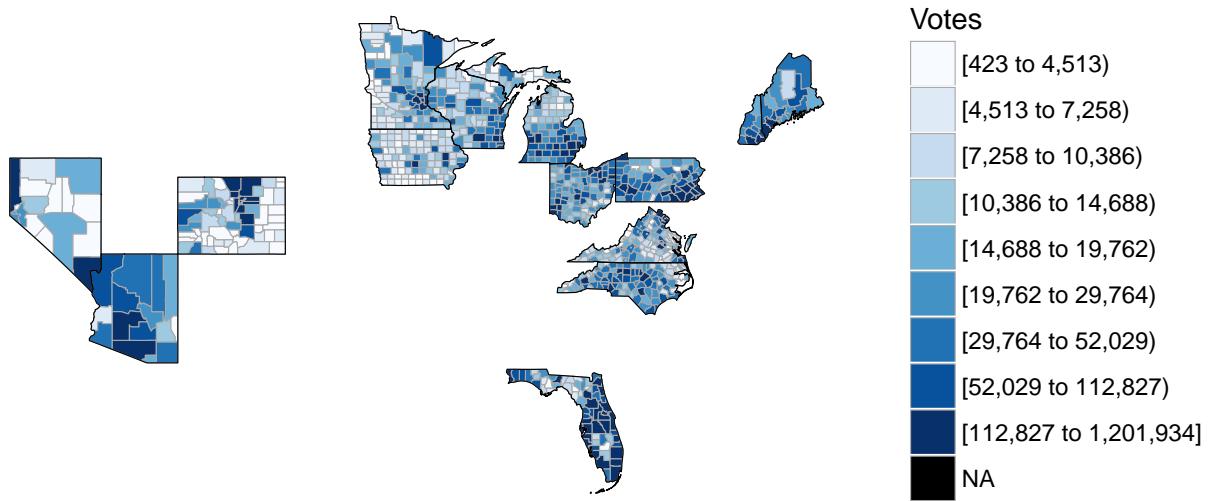
```
#Explore Vote Count by Swing States
vote_count_swing = county_choropleth(total_votes,
                                      legend = "Votes",
                                      num_colors = 9,
                                      title = "Vote Count by County - Swing States",
                                      state_zoom = c("new hampshire","pennsylvania","ohio","michigan","no

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

vote_count_swing
```

## Vote Count by County – Swing States



## Obama to Clinton (2012 to 2016 Change)

```

votes$change_dem_votes = votes$votes_dem_2016 - votes$votes_dem_2012

dem_votes = votes[,c(13,83)]
dem_votes[,3] = NA
colnames(dem_votes) = c('region','votes','value')

for(i in seq(1:dim(dem_votes)[1])){
  if(dem_votes[i,2] > 0 && dem_votes[i,2] < 1000){
    dem_votes[i,3] = "Gain - Small"
  } else if(dem_votes[i,2] > 1000 && dem_votes[i,2] < 10000){
    dem_votes[i,3] = "Gain - Considerable"
  } else if(dem_votes[i,2] >= 10000){
    dem_votes[i,3] = "Gain - Large"
  } else if(dem_votes[i,2] < 0 && dem_votes[i,2] > -1000) {
    dem_votes[i,3] = "Loss - Small"
  } else if(dem_votes[i,2] < -1000 && dem_votes[i,2] > -10000){
    dem_votes[i,3] = "Loss - Considerable"
  } else if(dem_votes[i,2] < -10000){
    dem_votes[i,3] = "Loss - Large"
  } else{
    dem_votes[i,3] = "Equal"
  }
}

```

```
}
```

```
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton where Blue Represents better Clinton Performance"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("white", "blue", "navy", "deepskyblue", "red", "darkred", "lightgreen"))
dem_change_US = c$render() +
  theme(legend.position = "right")
```

```
## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 51515, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185,
## 2195, 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275
```

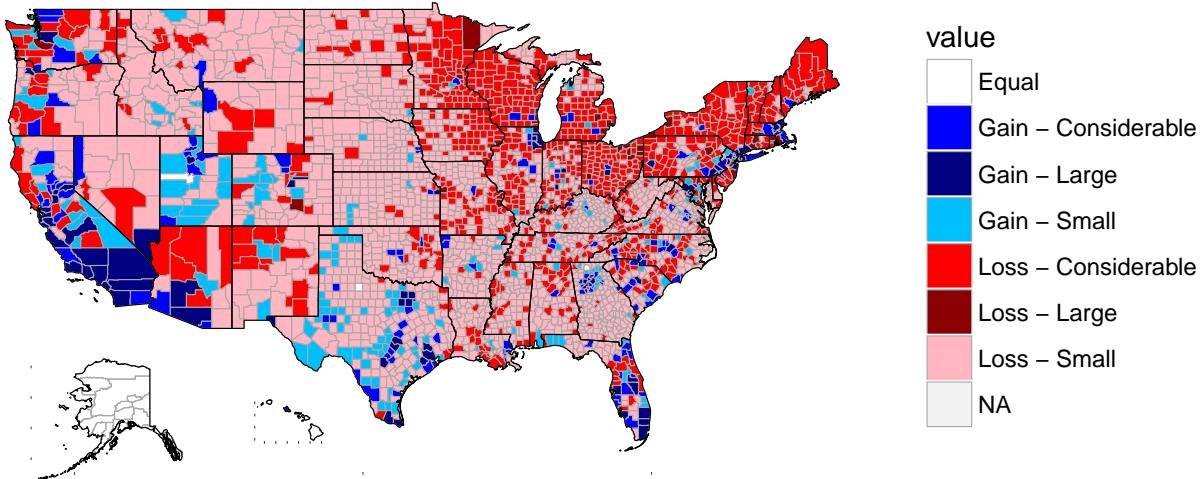
```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
dem_change_US
```

## Change from Obama to Clinton where Blue Represents better Clinton Performance



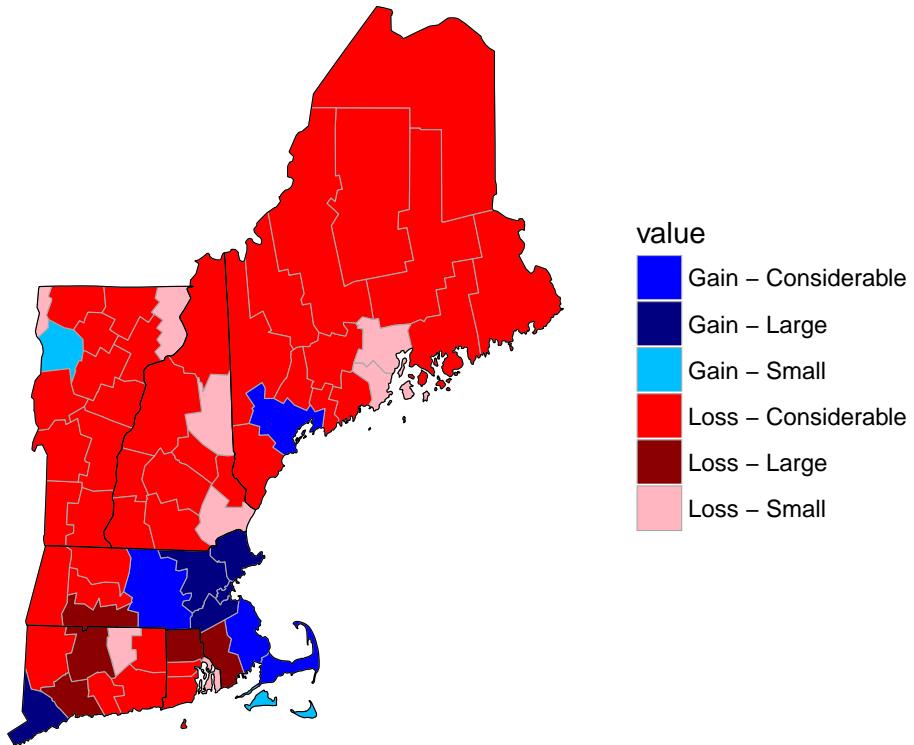
```
#Break down county vote into regions of the US for easier viewing
```

```
##New England Region
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - New England"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("maine", "new hampshire", "vermont", "massachusetts", "connecticut", "rhode island"))
dem_change_NE = c$render() +
  theme(legend.position = "right")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
dem_change_NE
```

## Change from Obama to Clinton (Blue = Better Clinton) – New England

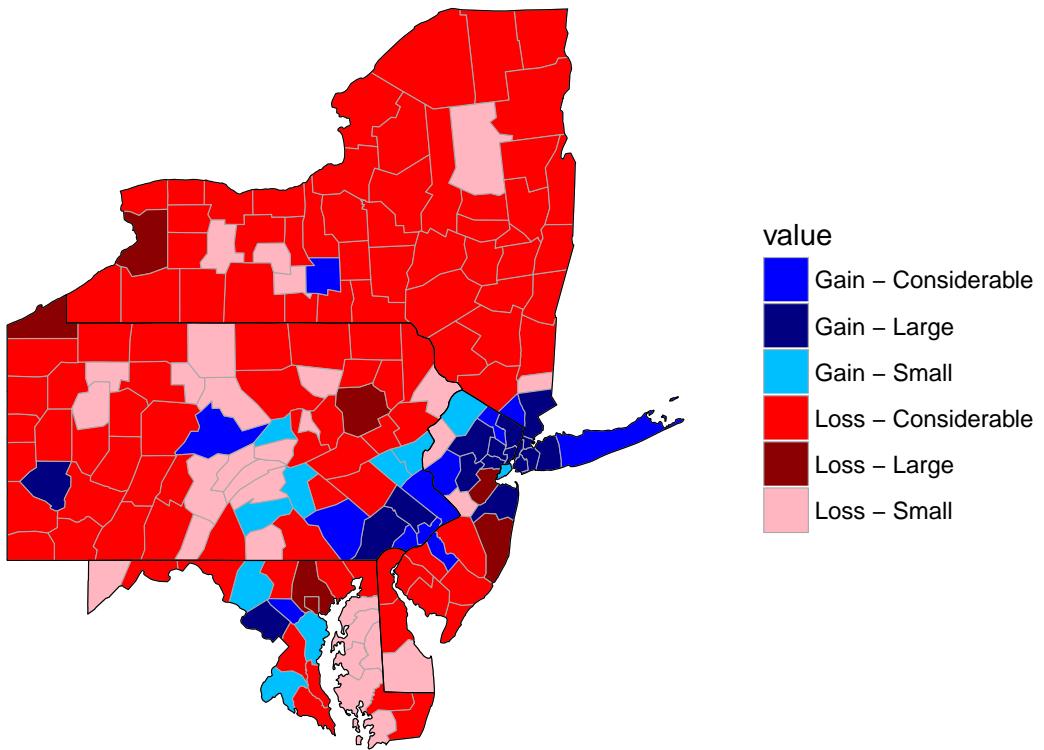


```
##Mid-Atlantic Region
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - Mid-Atlantic"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("new york", "pennsylvania", "new jersey", "maryland", "delaware"))
dem_change_MA = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

dem_change_MA
```

## Change from Obama to Clinton (Blue = Better Clinton) – Mid-Atlantic



```

##South East Region
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - South East"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("white","blue","navy","deepskyblue","red","darkred","lightpink"))
c$set_zoom(c("west virginia","virginia","tennessee","kentucky","north carolina","south carolina","georgia"))
dem_change_SE = c$render() +
  theme(legend.position = "right")

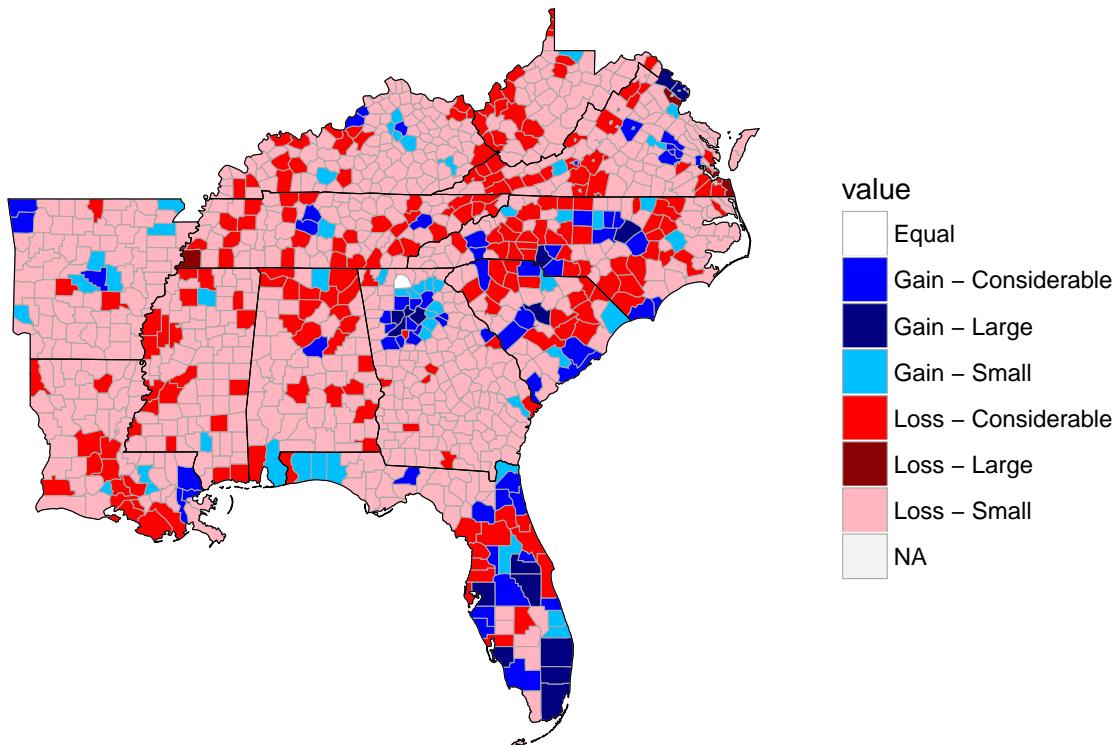
## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

dem_change_SE

```

## Change from Obama to Clinton (Blue = Better Clinton) – South East



```

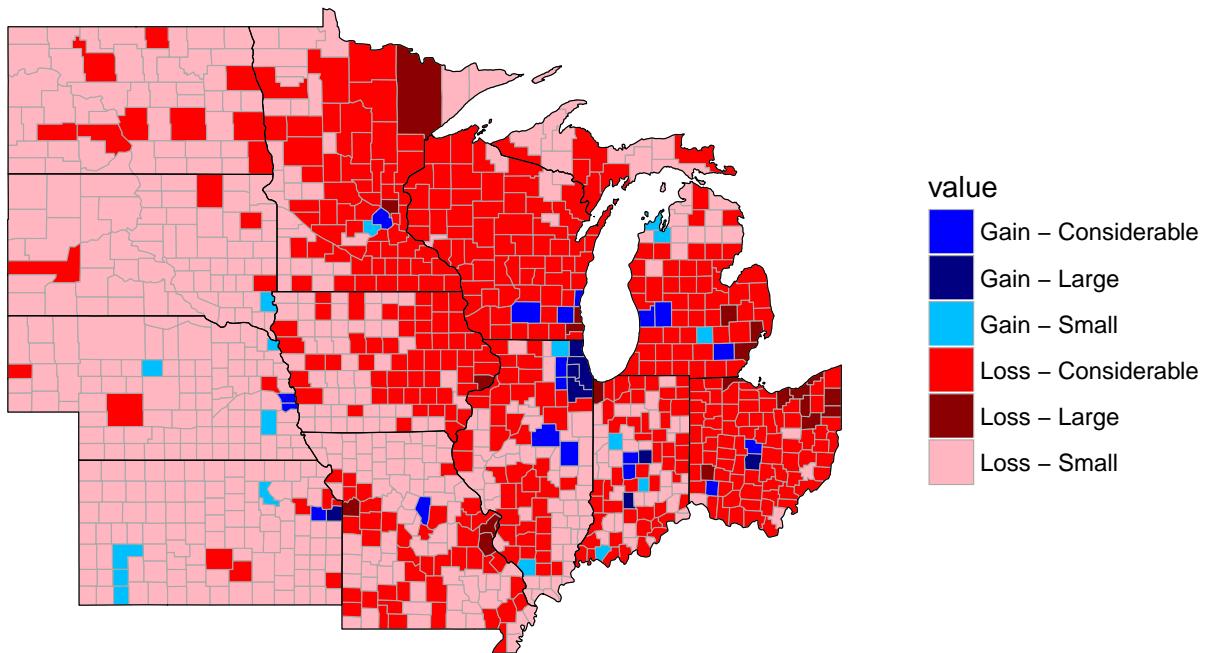
##Mid West Region
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - Mid West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue","navy","deepskyblue","red","darkred","lightpink"))
c$set_zoom(c("ohio","michigan","indiana","illinois","wisconsin","minnesota","iowa","missouri","north dakota"))
dem_change_MW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

dem_change_MW

```

## Change from Obama to Clinton (Blue = Better Clinton) – Mid West

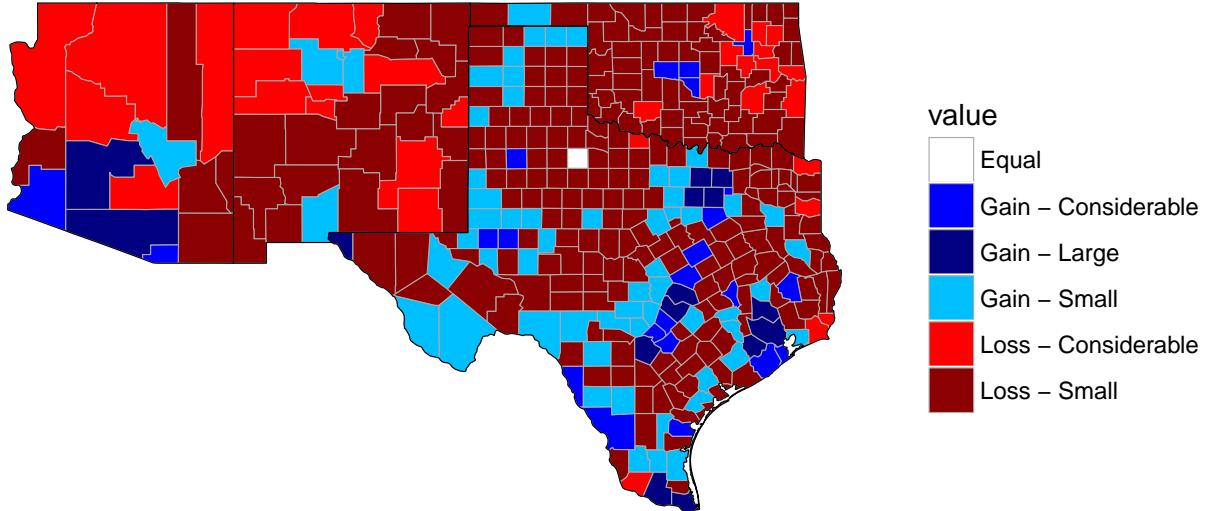


```
##South West Region
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - South West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("white","blue","navy","deepskyblue","red","darkred","lightred"))
c$set_zoom(c("texas","oklahoma","new mexico","arizona"))
dem_change_SW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

dem_change_SW
```

## Change from Obama to Clinton (Blue = Better Clinton) – South West



```

##West Region
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("white","blue","navy","deepskyblue","red","darkred","lightgrey"))
c$set_zoom(c("colorado","wyoming","montana","idaho","utah","nevada","california","oregon","washington",
dem_change_W = c$render() +
    theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185, 2195,
## 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

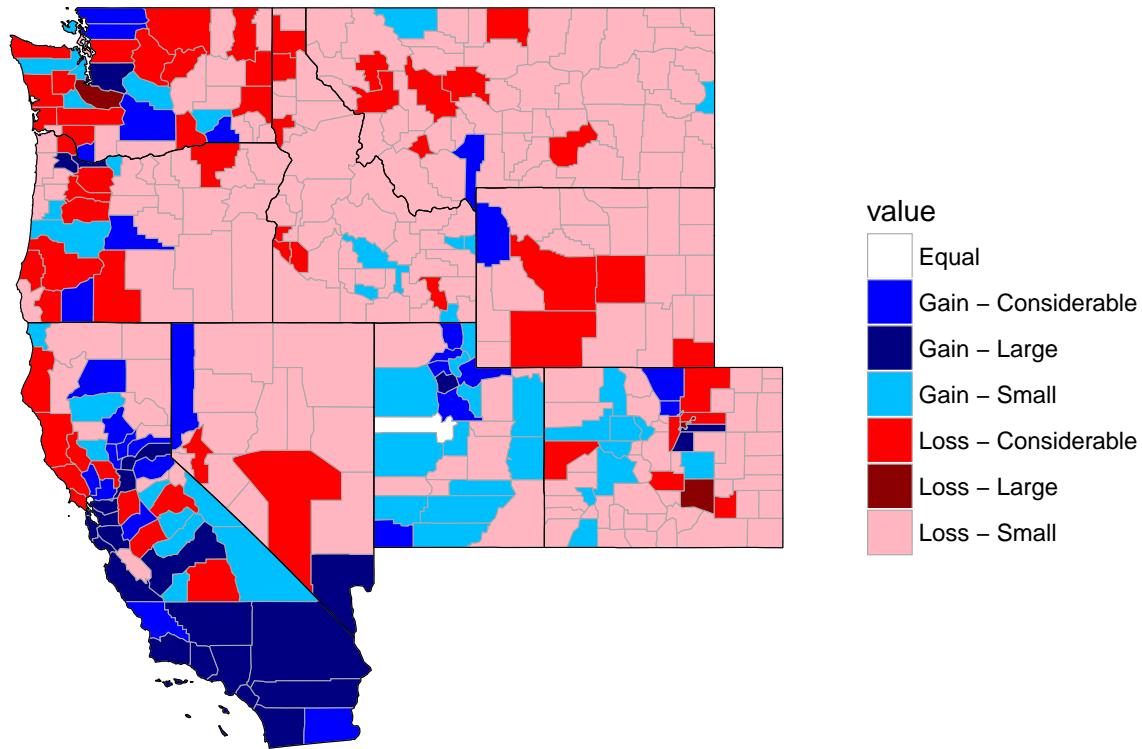
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

```

```
dem_change_W
```

Change from Obama to Clinton (Blue = Better Clinton) – West



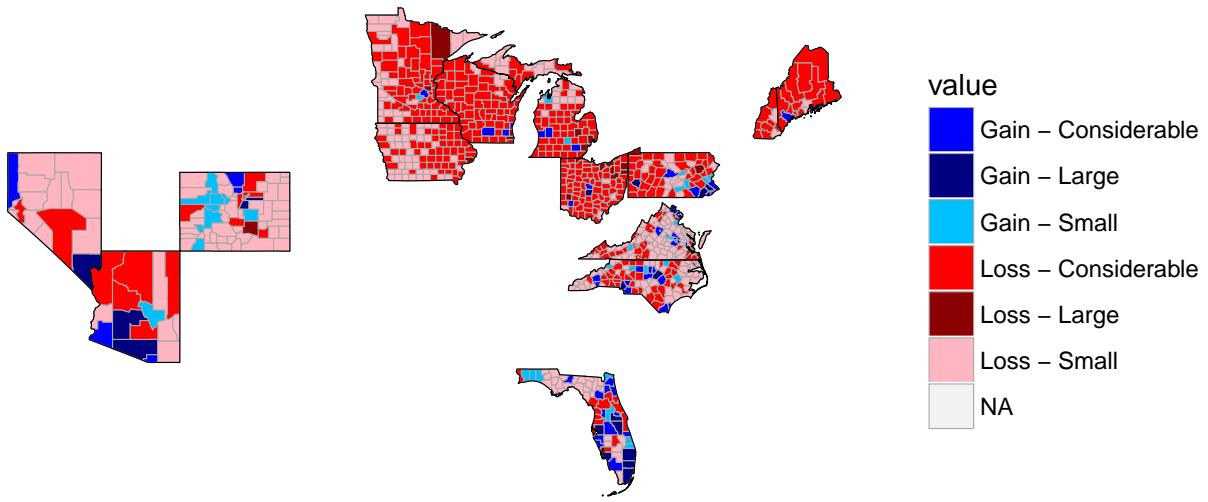
```
#Explore Vote Count by Swing States
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - Swing States"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("new hampshire", "pennsylvania", "ohio", "michigan", "north carolina", "florida", "arizona", "iowa"))
dem_change_swing = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

dem_change_swing
```

## Change from Obama to Clinton (Blue = Better Clinton) – Swing States



## Romney to Trump (2012 to 2016 Change)

```

votes$change_rep_votes = votes$votes_gop_2016 - votes$votes_gop_2012

rep_votes = votes[,c(13,84)]
rep_votes[,3] = NA
colnames(rep_votes) = c('region','votes','value')

for(i in seq(1:dim(rep_votes)[1])){
  if(rep_votes[i,2] > 0 && rep_votes[i,2] < 1000){
    rep_votes[i,3] = "Gain - Small"
  } else if(rep_votes[i,2] > 1000 && rep_votes[i,2] < 10000){
    rep_votes[i,3] = "Gain - Considerable"
  } else if(rep_votes[i,2] >= 10000){
    rep_votes[i,3] = "Gain - Large"
  } else if(rep_votes[i,2] < 0 && rep_votes[i,2] > -1000) {
    rep_votes[i,3] = "Loss - Small"
  } else if(rep_votes[i,2] < -1000 && rep_votes[i,2] > -10000){
    rep_votes[i,3] = "Loss - Considerable"
  } else if(rep_votes[i,2] < -10000){
    rep_votes[i,3] = "Loss - Large"
  } else{
    rep_votes[i,3] = "Equal"
  }
}

```

```

}

c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump where Red Represents better Trump Performance"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("white","red","darkred","lightpink","blue","navy","deepskyblue"))
rep_change_US = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 51515, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185,
## 2195, 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

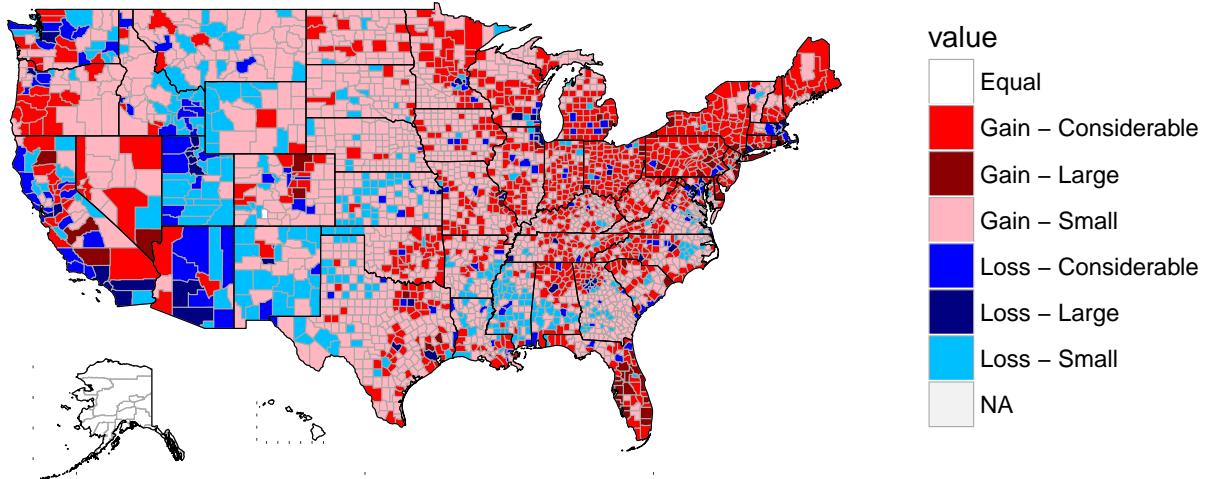
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

rep_change_US

```

## Change from Romney to Trump where Red Represents better Trump Performance



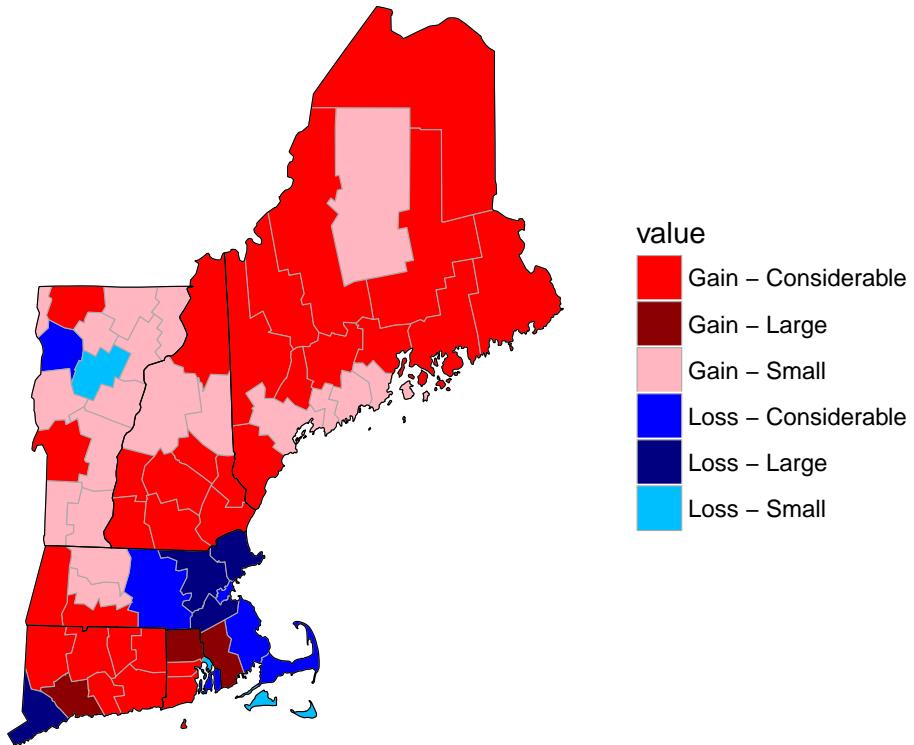
```
#Break down county vote into regions of the US for easier viewing
```

```
##New England Region
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - New England"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("red","darkred","lightpink","blue","navy","deepskyblue"))
c$set_zoom(c("maine", "new hampshire", "vermont", "massachusetts", "connecticut", "rhode island"))
rep_change_NE = c$render() +
  theme(legend.position = "right")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
rep_change_NE
```

## Change from Romney to Trump (Red = Better Trump) – New England

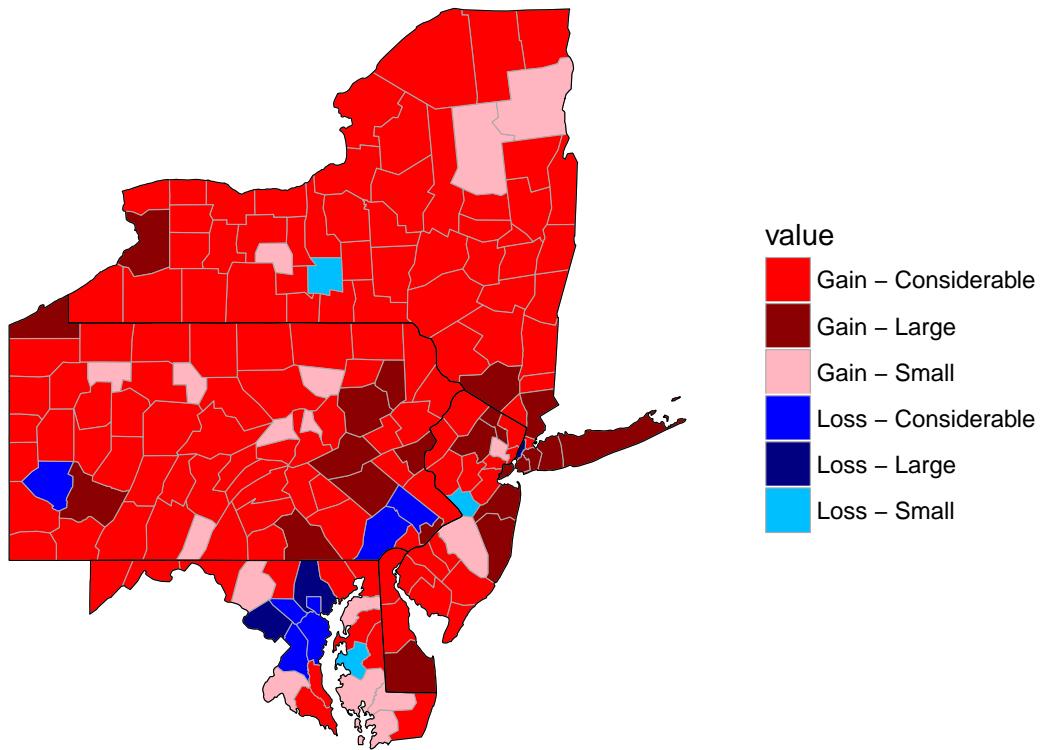


```
##Mid-Atlantic Region
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - Mid-Atlantic"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("red","darkred","lightpink","blue","navy","deepskyblue"))
c$set_zoom(c("new york", "pennsylvania", "new jersey", "maryland","delaware"))
rep_change_MA = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

rep_change_MA
```

## Change from Romney to Trump (Red = Better Trump) – Mid-Atlantic



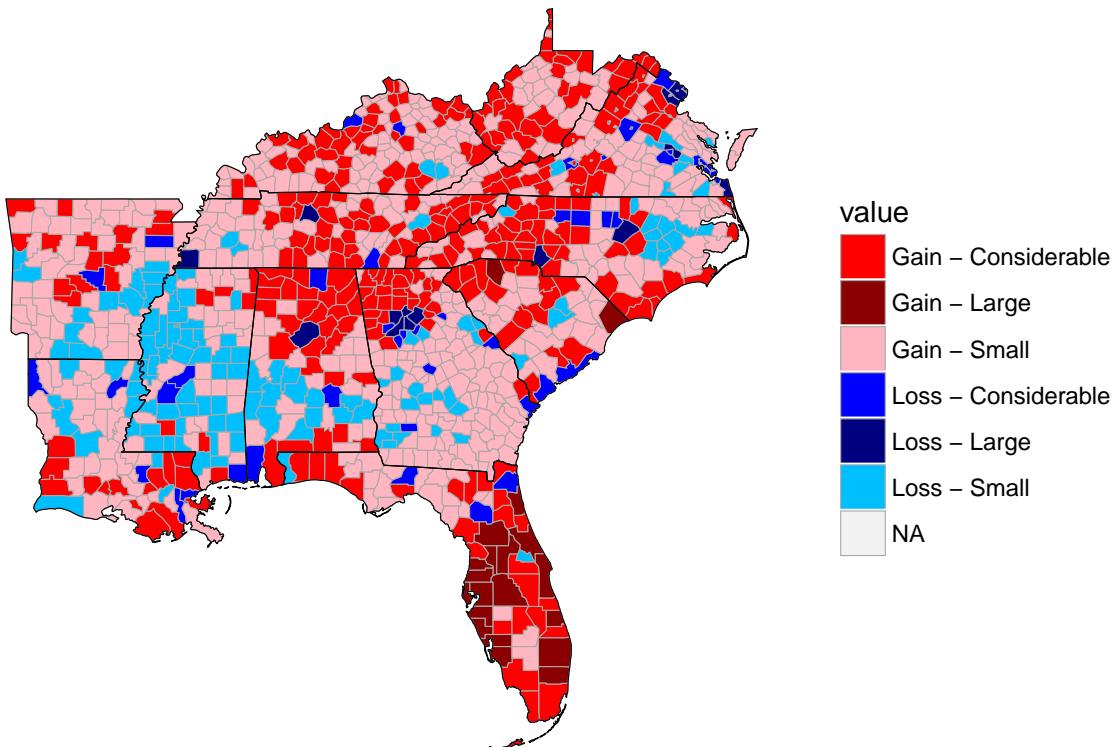
```
##South East Region
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - South East"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("red","darkred","lightpink","blue","navy","deepskyblue"))
c$set_zoom(c("west virginia","virginia","tennessee","kentucky","north carolina","south carolina","georgia"))
rep_change_SE = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

rep_change_SE
```

## Change from Romney to Trump (Red = Better Trump) – South East

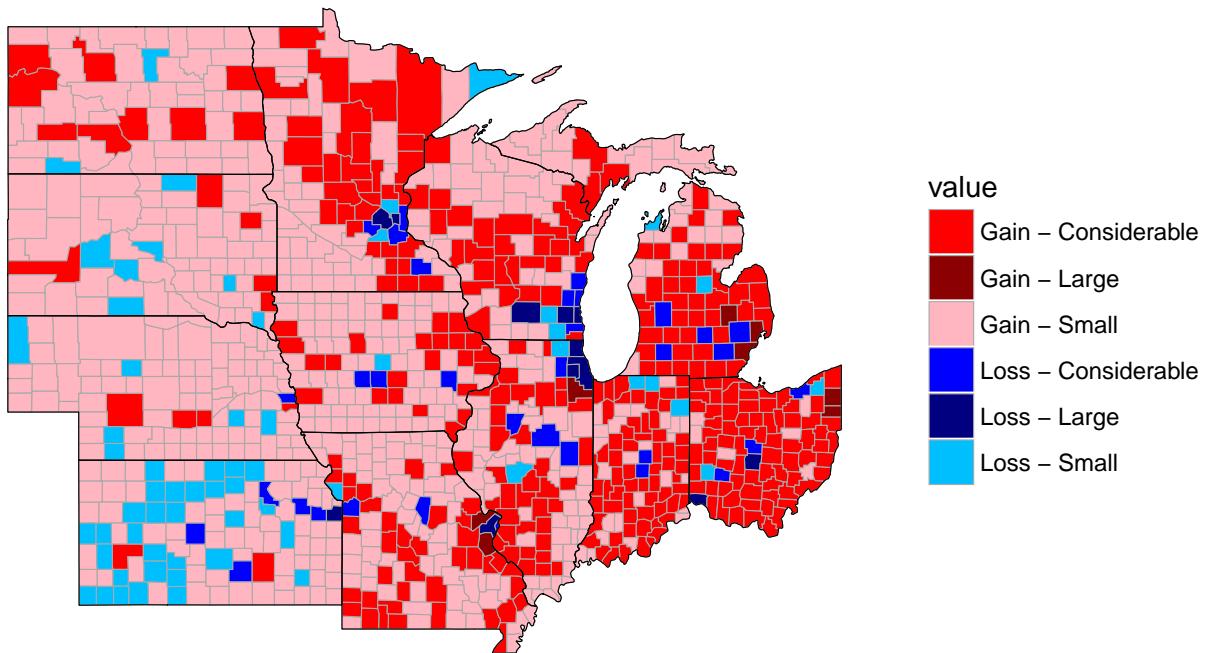


```
##Mid West Region
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - Mid West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("red","darkred","lightpink","blue","navy","deepskyblue"))
c$set_zoom(c("ohio","michigan","indiana","illinois","wisconsin","minnesota","iowa","missouri","north dakota"))
rep_change_MW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

rep_change_MW
```

## Change from Romney to Trump (Red = Better Trump) – Mid West

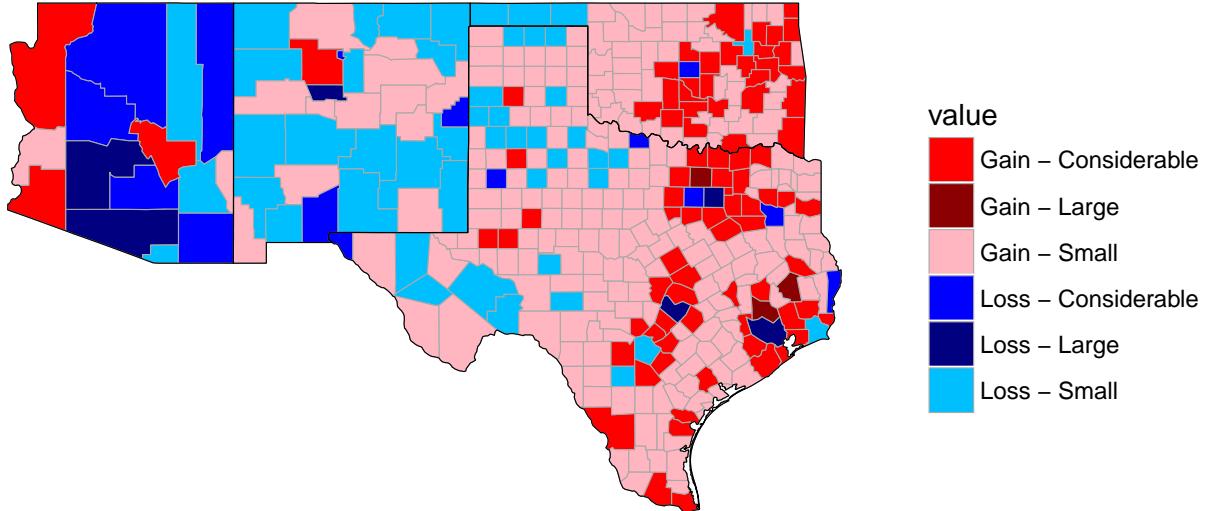


```
##South West Region
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - South West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("red","darkred","lightpink","blue","navy","deepskyblue"))
c$set_zoom(c("texas","oklahoma","new mexico","arizona"))
rep_change_SW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

rep_change_SW
```

## Change from Romney to Trump (Red = Better Trump) – South West



```
##West Region
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("white", "red", "darkred", "lightpink", "blue", "navy", "deepskyblue"))
c$set_zoom(c("colorado", "wyoming", "montana", "idaho", "utah", "nevada", "california", "oregon", "washington",
rep_change_W = c$render() +
    theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185, 2195,
## 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

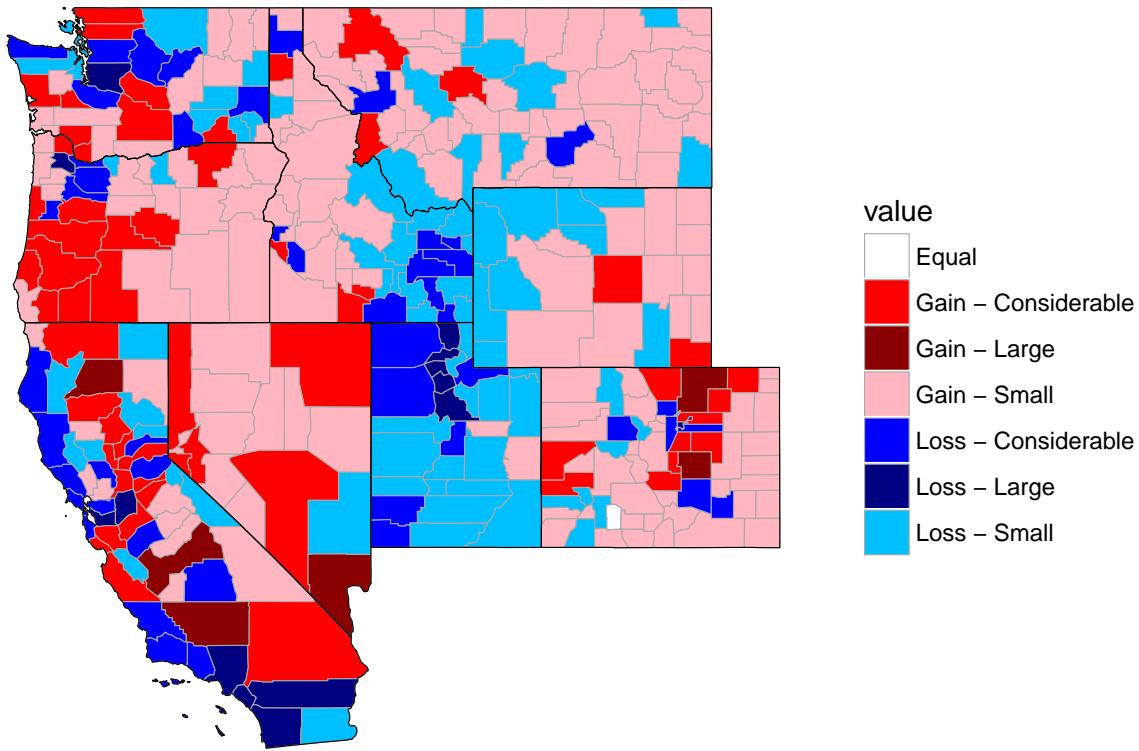
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead
```

```
rep_change_W
```

### Change from Romney to Trump (Red = Better Trump) – West



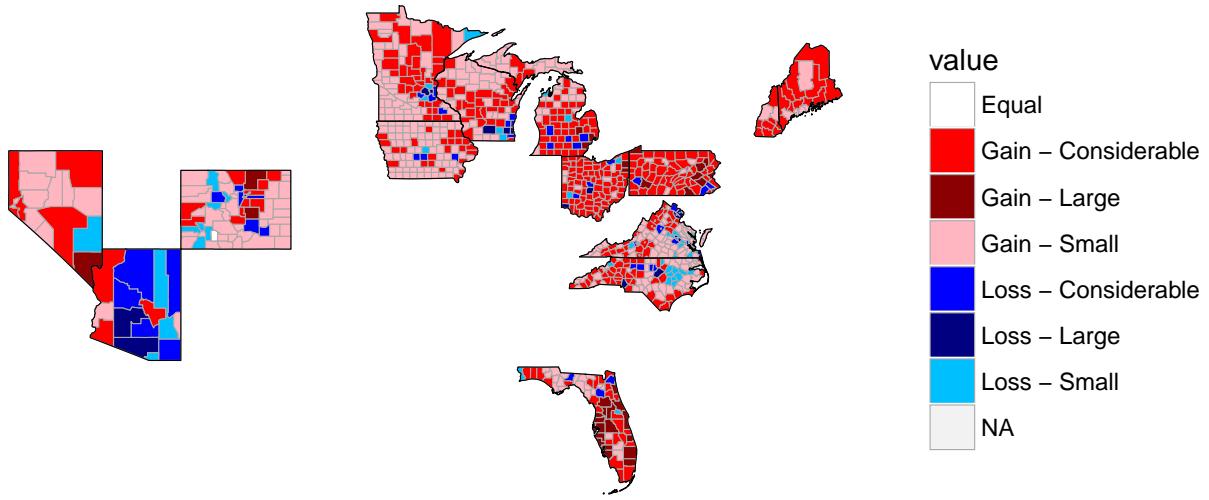
```
#Explore Vote Count by Swing States
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - Swing States"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("white","red","darkred","lightpink","blue","navy","deepskyblue"))
c$set_zoom(c("new hampshire","pennsylvania","ohio","michigan","north carolina","florida","arizona","iowa"))
rep_change_swing = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

rep_change_swing
```

## Change from Romney to Trump (Red = Better Trump) – Swing States



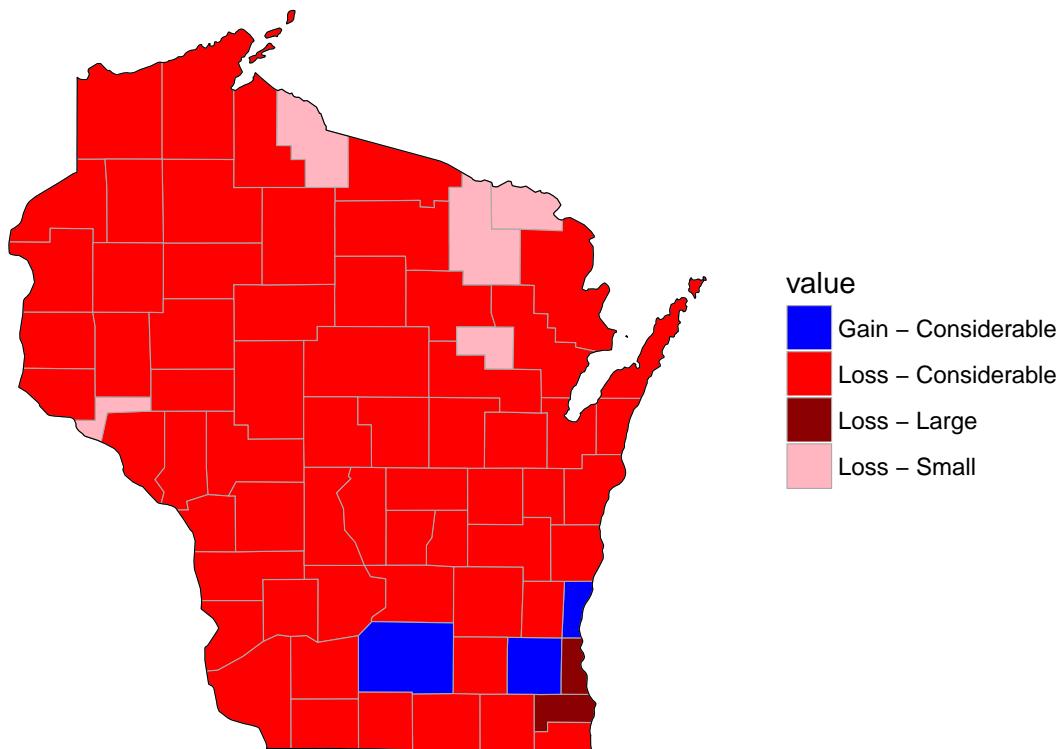
### Examine Wisconsin

```
#Clinton
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - Wisconsin"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(4)
c$ggplot_scale = scale_fill_manual(values = c("blue","red","darkred","lightpink"))
c$set_zoom("wisconsin")
dem_change_WI = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

dem_change_WI
```

## Change from Obama to Clinton (Blue = Better Clinton) – Wisconsin

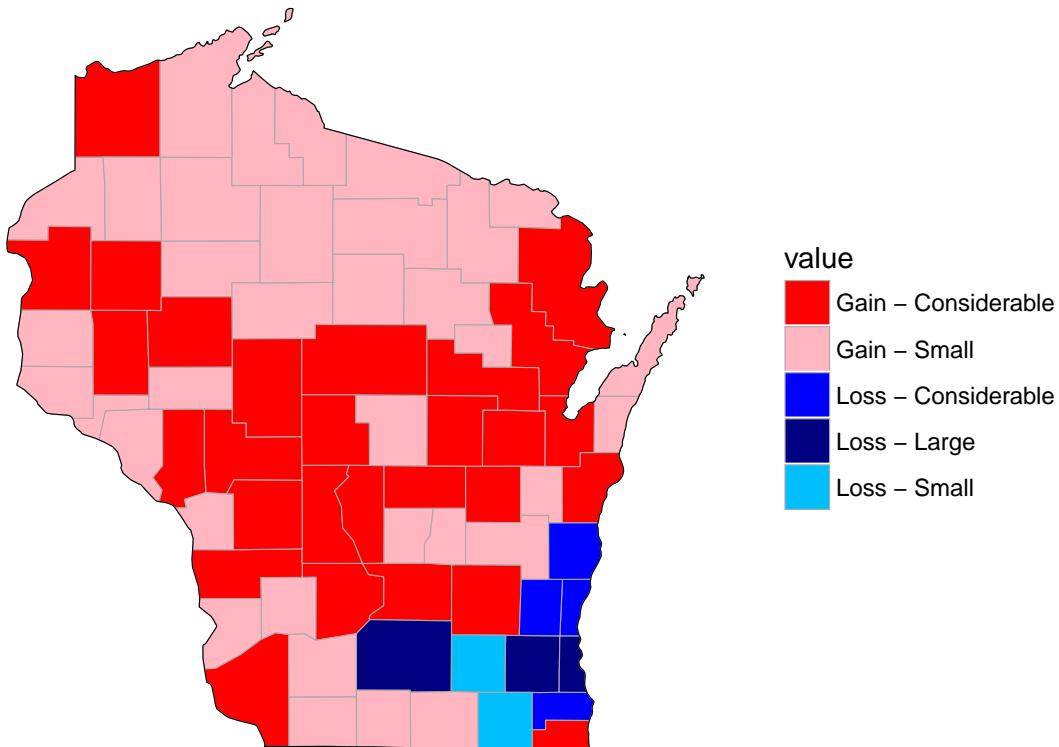


```
#Trump
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - Wisconsin"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(5)
c$ggplot_scale = scale_fill_manual(values = c("red","lightpink","blue","navy","deepskyblue"))
c$set_zoom("wisconsin")
rep_change_WI = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

rep_change_WI
```

## Change from Romney to Trump (Red = Better Trump) – Wisconsin



#Appear to be more significant losses for Clinton than gains for Trump

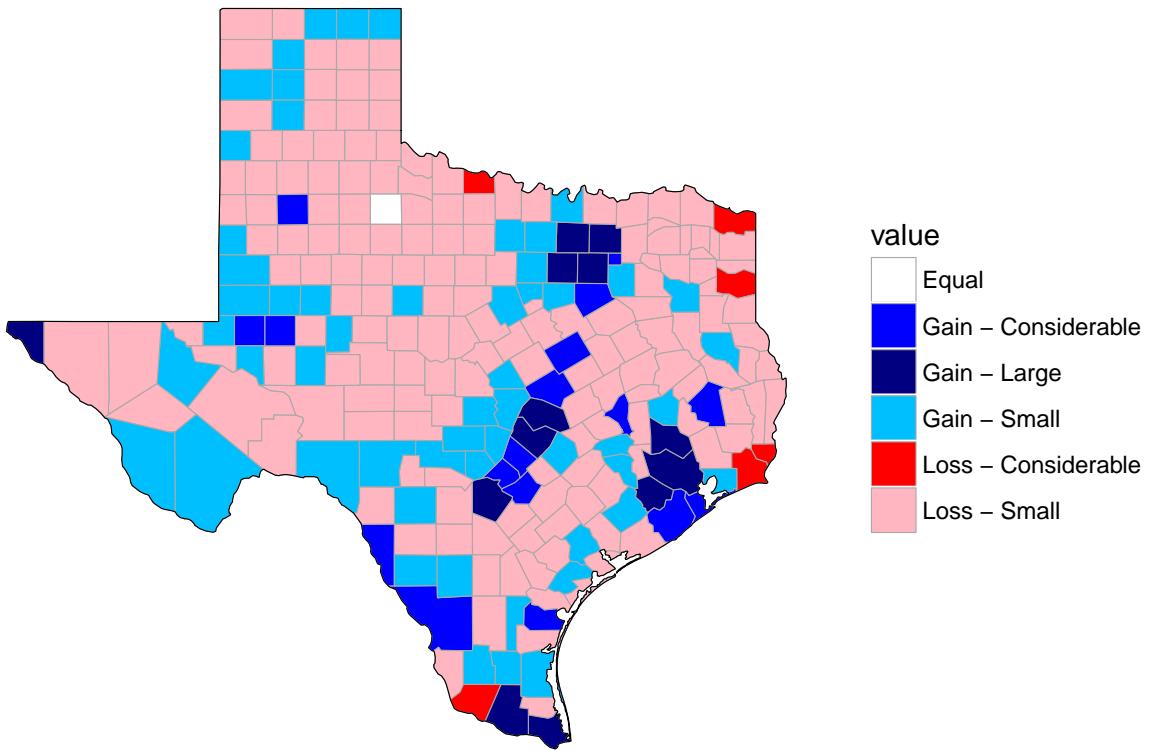
Examine Texas

```
#Clinton
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - Texas"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("white","blue","navy","deepskyblue","red","lightpink"))
c$set_zoom("texas")
dem_change_TX = c$render() +
  theme(legend.position = "right")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
dem_change_TX
```

## Change from Obama to Clinton (Blue = Better Clinton) – Texas

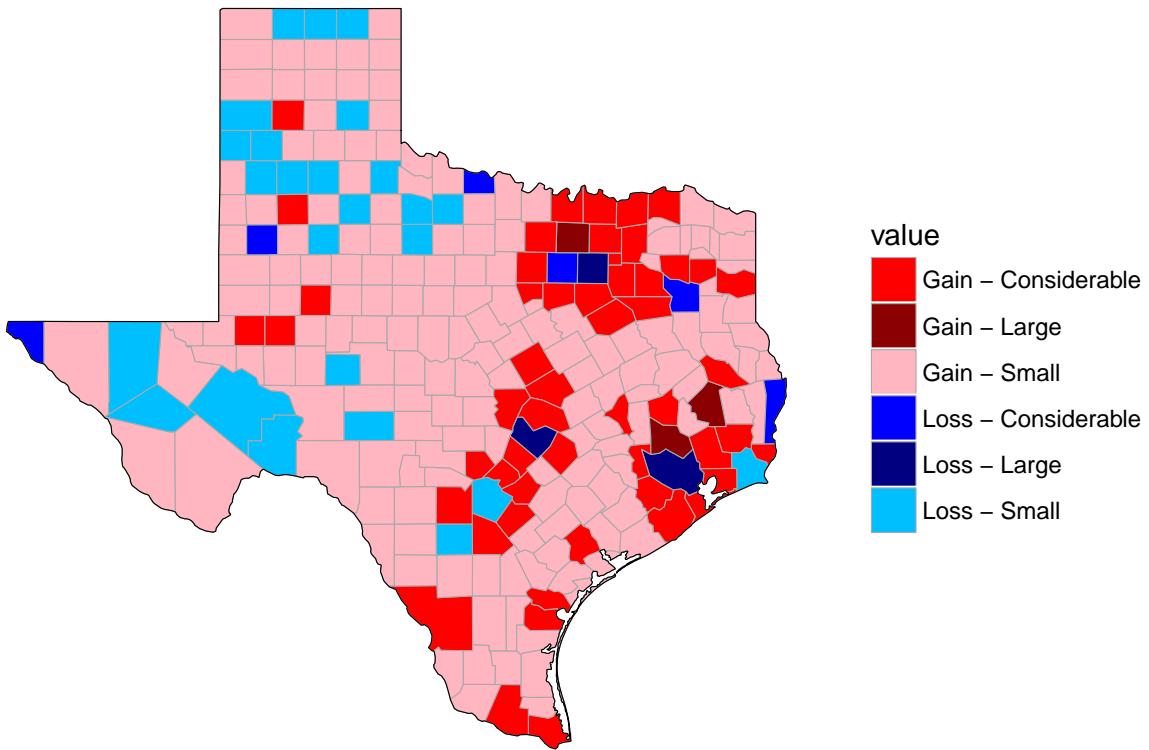


```
#Trump
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - Texas"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("red", "darkred", "lightpink", "blue", "navy", "deepskyblue"))
c$set_zoom("texas")
rep_change_TX = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

rep_change_TX
```

## Change from Romney to Trump (Red = Better Trump) – Texas



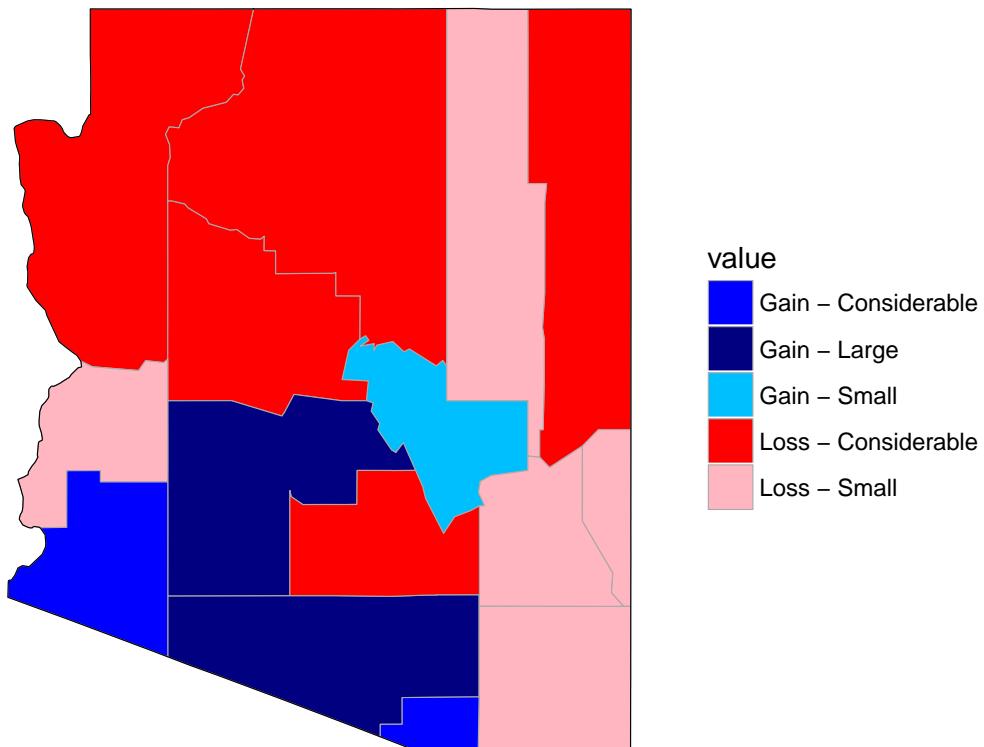
### Examine Arizona

```
#Clinton
c = CountyChoropleth$new(dem_votes)
c$title = "Change from Obama to Clinton (Blue = Better Clinton) - Arizona"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(5)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "lightpink"))
c$set_zoom("arizona")
dem_change_AZ = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

dem_change_AZ
```

## Change from Obama to Clinton (Blue = Better Clinton) – Arizona

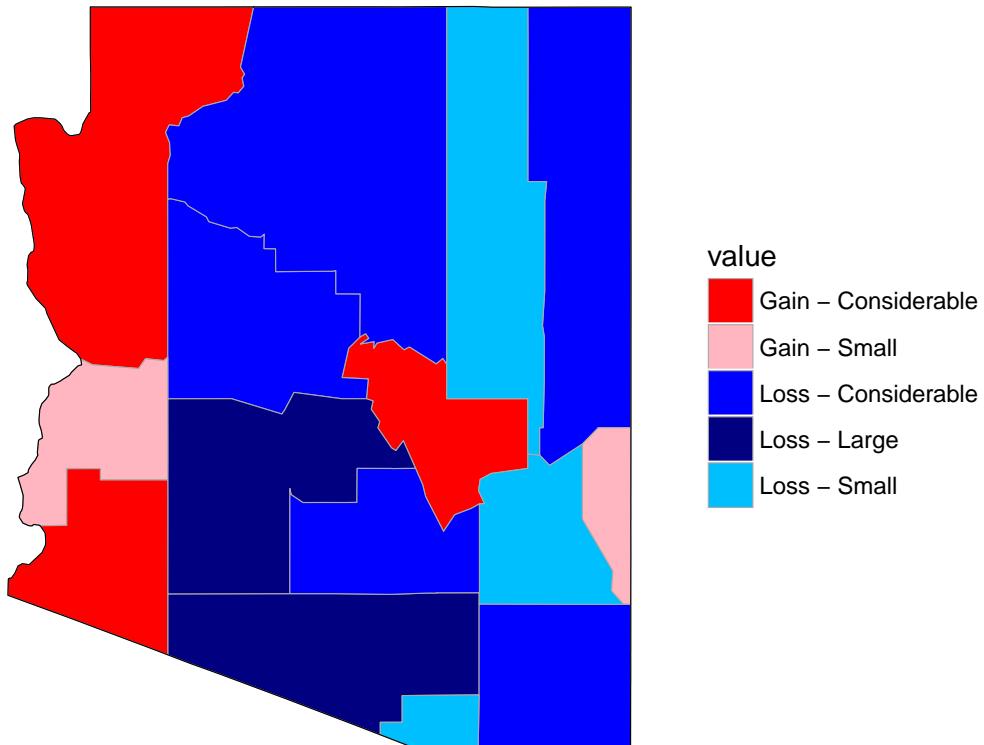


```
#Trump
c = CountyChoropleth$new(rep_votes)
c$title = "Change from Romney to Trump (Red = Better Trump) - Arizona"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(5)
c$ggplot_scale = scale_fill_manual(values = c("red","lightpink","blue","navy","deepskyblue"))
c$set_zoom("arizona")
rep_change_AZ = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

rep_change_AZ
```

## Change from Romney to Trump (Red = Better Trump) – Arizona



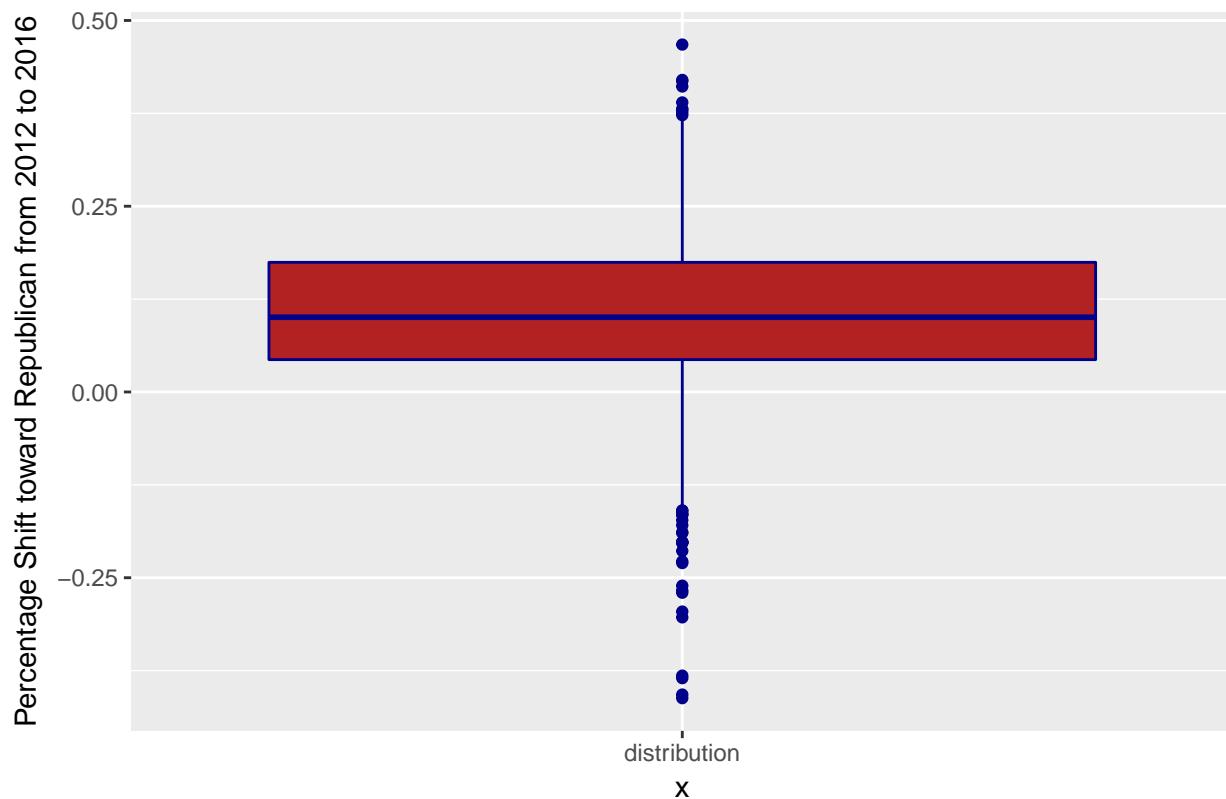
### Percentage Shift from 2012

```
votes$per_shift = votes$Trump_Romney - votes$Clinton_Obama  
shift = votes[,c(13,85)]  
summary(shift$per_shift)
```

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.  
## -0.41210   0.04355   0.10060   0.10620   0.17450   0.46760
```

```
ggplot(shift,aes(x="distribution",y=per_shift)) + geom_boxplot(fill = "firebrick", colour = "darkblue")
```

## County Shifts toward Republican from 2012 to 2016



```

shift[,3] = NA
colnames(shift) = c('region','shift','value')

for(i in seq(1:dim(shift)[1])){
  if(shift[i,2] > 0 && shift[i,2] < .05){
    shift[i,3] = "GOP - Small (<5%)"
  } else if(shift[i,2] > .05 && shift[i,2] < .10){
    shift[i,3] = "GOP - Considerable (<10%)"
  } else if(shift[i,2] >= .10){
    shift[i,3] = "GOP - Large (>10%)"
  } else if(shift[i,2] < 0 && shift[i,2] > -.05) {
    shift[i,3] = "Dem - Small (<5%)"
  } else if(shift[i,2] < -.05 && shift[i,2] > -.10){
    shift[i,3] = "Dem - Considerable (<10%)"
  } else if(shift[i,2] < -.10){
    shift[i,3] = "Dem - Large (>10%)"
  } else{
    shift[i,3] = "Equal"
  }
}

#Entire country
c = CountyChoropleth$new(shift)
c$title = "Shift from 2012 to 2016 by County Percentage"
c$add_state_outline = TRUE
c$legend = "Change in Votes"

```

```

c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
per_change_US = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 51515, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185,
## 2195, 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

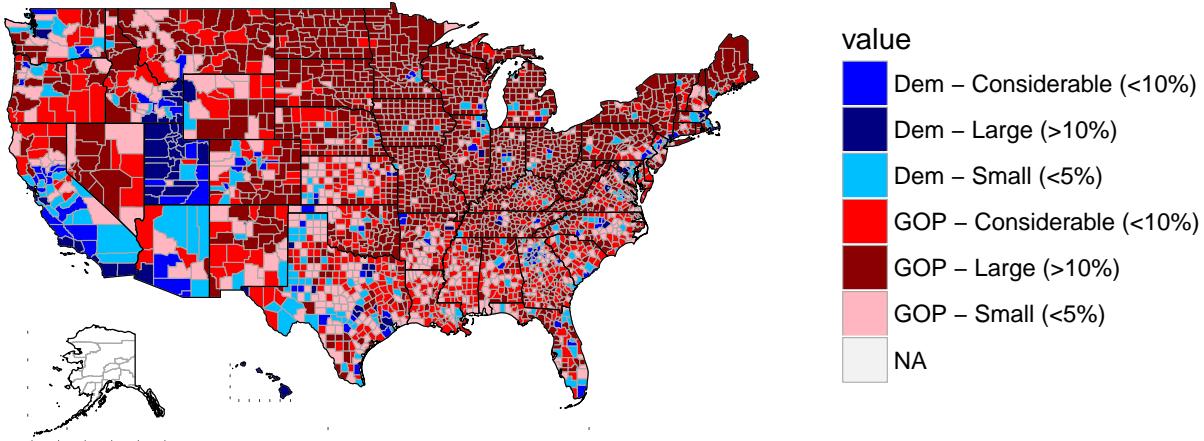
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

per_change_US

```

## Shift from 2012 to 2016 by County Percentage



```
#Break down county vote into regions of the US for easier viewing
```

```
##New England Region
```

```

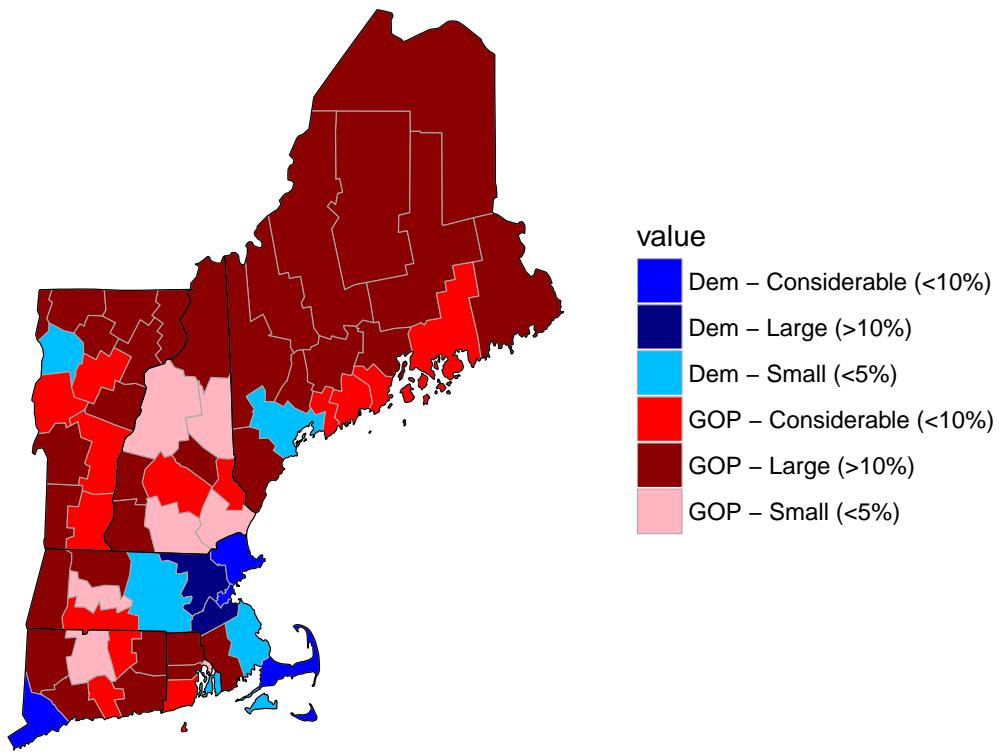
c = CountyChoropleth$new(shift)
c$title = "Percentage Shift from 2012 to 2016 - New England"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("maine", "new hampshire", "vermont", "massachusetts", "connecticut", "rhode island"))
per_change_NE = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

per_change_NE

```

## Percentage Shift from 2012 to 2016 – New England



```

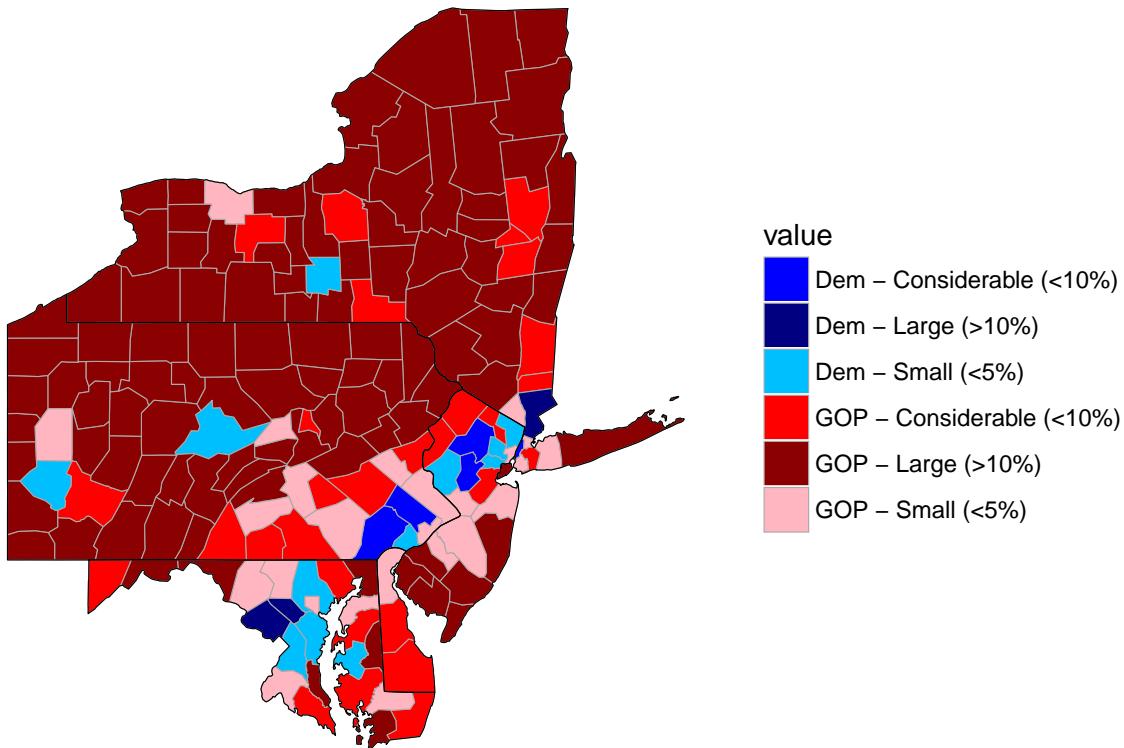
##Mid-Atlantic Region
c = CountyChoropleth$new(shift)
c$title = "Percentage Shift from 2012 to 2016 - Mid-Atlantic"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("new york", "pennsylvania", "new jersey", "maryland", "delaware"))
per_change_MA = c$render() +
  theme(legend.position = "right")

```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
per_change_MA
```

### Percentage Shift from 2012 to 2016 – Mid-Atlantic



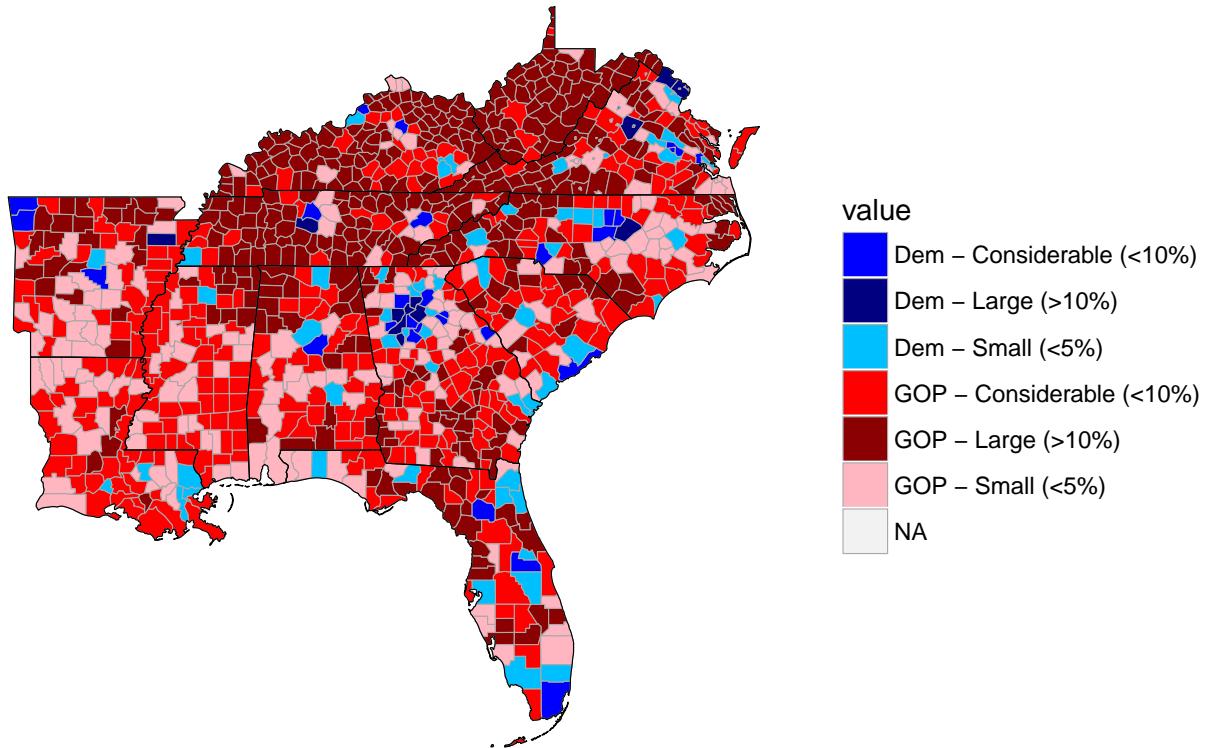
```
##South East Region
c = CountyChoropleth$new(shift)
c$title = "Percentage Shift from 2012 to 2016 - South East"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("west virginia", "virginia", "tennessee", "kentucky", "north carolina", "south carolina", "georgia"))
per_change_SE = c$render() +
  theme(legend.position = "right")
```

```
## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515
```

```
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead
```

```
per_change_SE
```

## Percentage Shift from 2012 to 2016 – South East

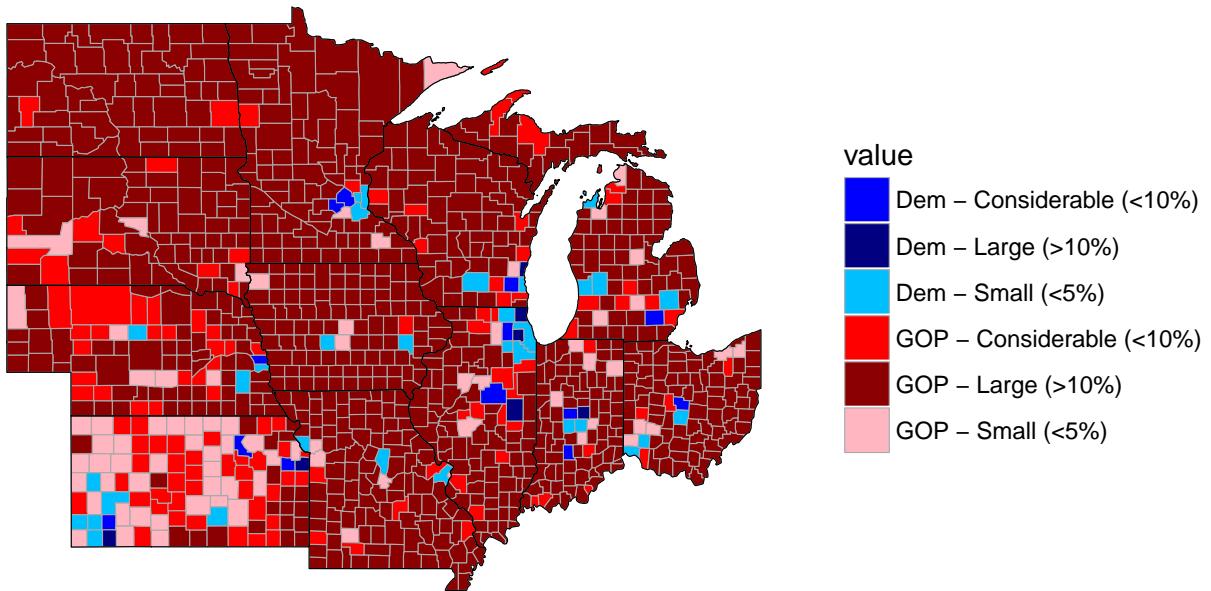


```
##Mid West Region
c = CountyChoropleth$new(shift)
c$title = "Percentage Shift from 2012 to 2016 - Mid West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue","navy","deepskyblue","red","darkred","lightpink"))
c$set_zoom(c("ohio","michigan","indiana","illinois","wisconsin","minnesota","iowa","missouri","north dakota"))
per_change_MW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

per_change_MW
```

## Percentage Shift from 2012 to 2016 – Mid West

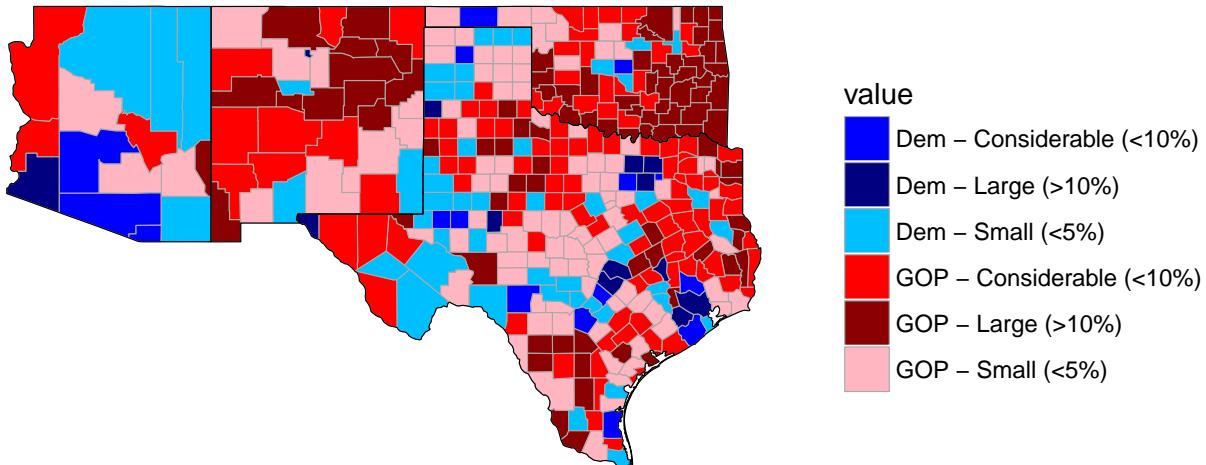


```
##South West Region
c = CountyChoropleth$new(shift)
c$title = "Percentage Shift from 2012 to 2016 – South West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("texas", "oklahoma", "new mexico", "arizona"))
per_change_SW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

per_change_SW
```

## Percentage Shift from 2012 to 2016 – South West



```

##West Region
c = CountyChoropleth$new(shift)
c$title = "Percentage Shift from 2012 to 2016 - West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue","navy","deepskyblue","red","darkred","lightpink"))
c$set_zoom(c("colorado","wyoming","montana","idaho","utah","nevada","california","oregon","washington",
per_change_W = c$render() +
    theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185, 2195,
## 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

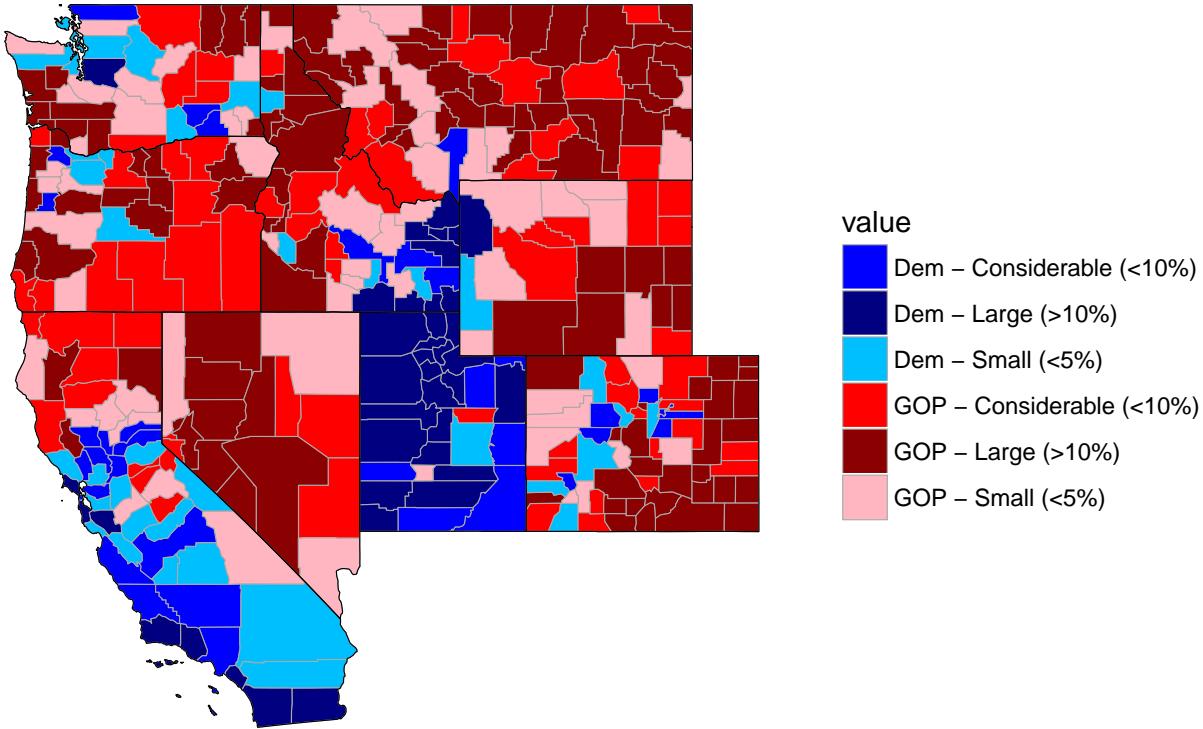
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

```

```
per_change_W
```

## Percentage Shift from 2012 to 2016 – West



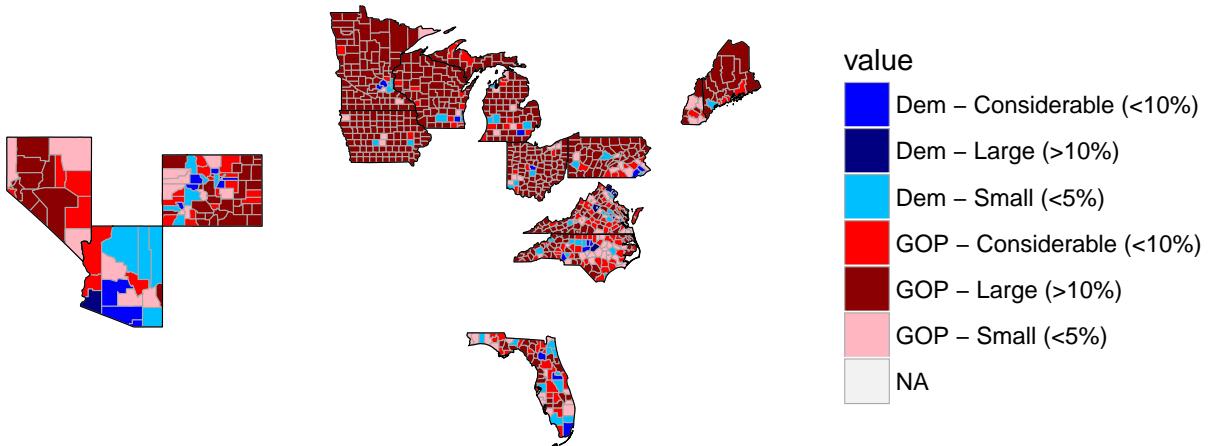
```
#Explore Vote Count by Swing States
c = CountyChoropleth$new(shift)
c$title = "Percentage Shift from 2012 to 2016 - Swing States"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("blue", "navy", "deepskyblue", "red", "darkred", "lightpink"))
c$set_zoom(c("new hampshire", "pennsylvania", "ohio", "michigan", "north carolina", "florida", "arizona", "iowa"))
per_change_swings = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

per_change_swings
```

## Percentage Shift from 2012 to 2016 – Swing States



### Analyze shifts at county level

```

total_shift = merge(x=dem_votes,y=rep_votes,by="region",all=TRUE)
total_shift[,6] = NA
colnames(total_shift) = c("region","dem_votes","dem_gain_loss","rep_votes","rep_gain_loss","value")

for(i in seq(i:dim(total_shift)[1])){
  if(total_shift[i,2] < 0){
    if(total_shift[i,4] < 0){
      total_shift[i,6] = "Dem Loss/GOP Loss"
    } else if(total_shift[i,4] > 0) {
      total_shift[i,6] = "Dem Loss/GOP Gain"
    } else {
      total_shift[i,6] = "Dem Loss/GOP Equal"
    }
  } else if(total_shift[i,2] > 0){
    if(total_shift[i,4] < 0){
      total_shift[i,6] = "Dem Gain/GOP Loss"
    } else if(total_shift[i,4] > 0){
      total_shift[i,6] = "Dem Gain/GOP Gain"
    } else {
      total_shift[i,6] = "Dem Gain/GOP Equal"
    }
  } else {
    total_shift[i,6] = "Dem Equal/GOP Equal"
  }
}
  
```

```

    if(total_shift[i,4] < 0){
      total_shift[i,6] = "Dem Equal/GOP Loss"
    } else if(total_shift[i,4] > 0){
      total_shift[i,6] = "Dem Equal/GOP Gain"
    } else {
      total_shift[i,6] = "Dem Equal/GOP Equal"
    }
  }

#Entire country
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes for Parties"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(7)
c$ggplot_scale = scale_fill_manual(values = c("lightpink", "deepskyblue","yellow","navy","grey","red","purple"))
shift_US = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 51515, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185,
## 2195, 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

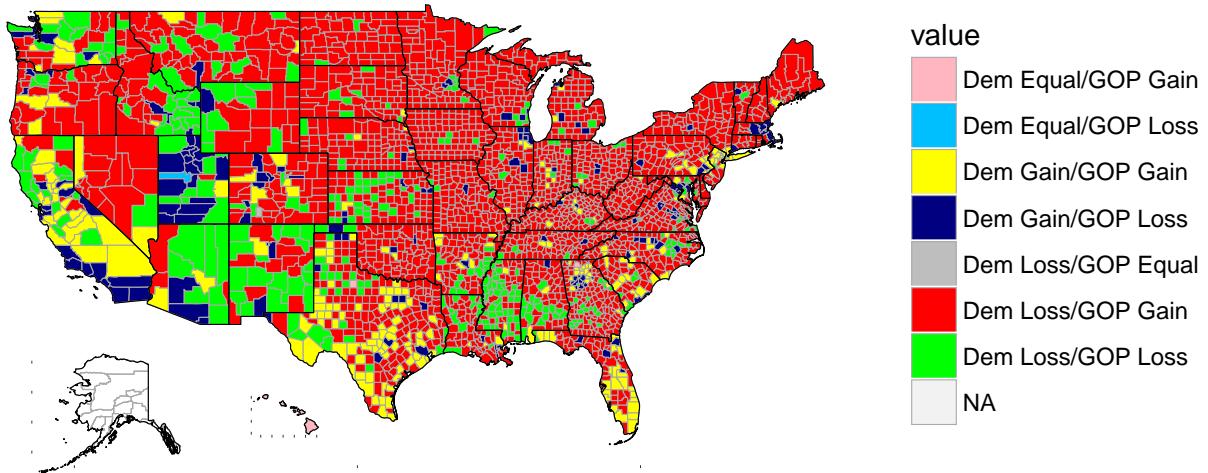
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

shift_US

```

## Shift from 2012 to 2016 by County Total Votes for Parties



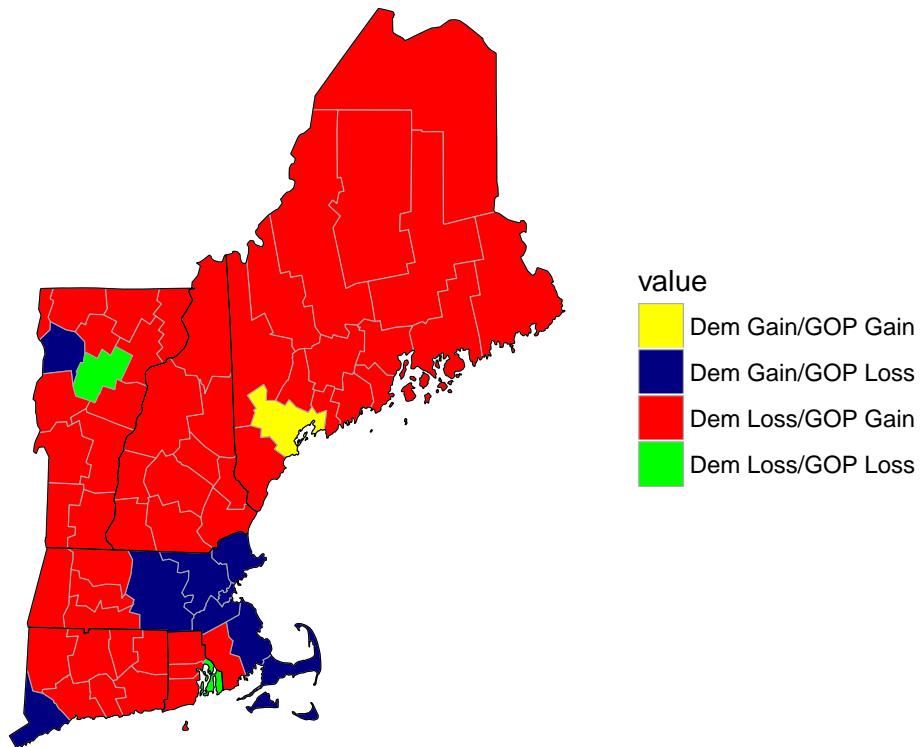
```
#Break down county vote into regions of the US for easier viewing
```

```
#New England Region
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes - New England"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(4)
c$ggplot_scale = scale_fill_manual(values = c("yellow", "navy", "red", "green"))
c$set_zoom(c("maine", "new hampshire", "vermont", "massachusetts", "connecticut", "rhode island"))
shift_NE = c$render() +
  theme(legend.position = "right")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
shift_NE
```

## Shift from 2012 to 2016 by County Total Votes – New England

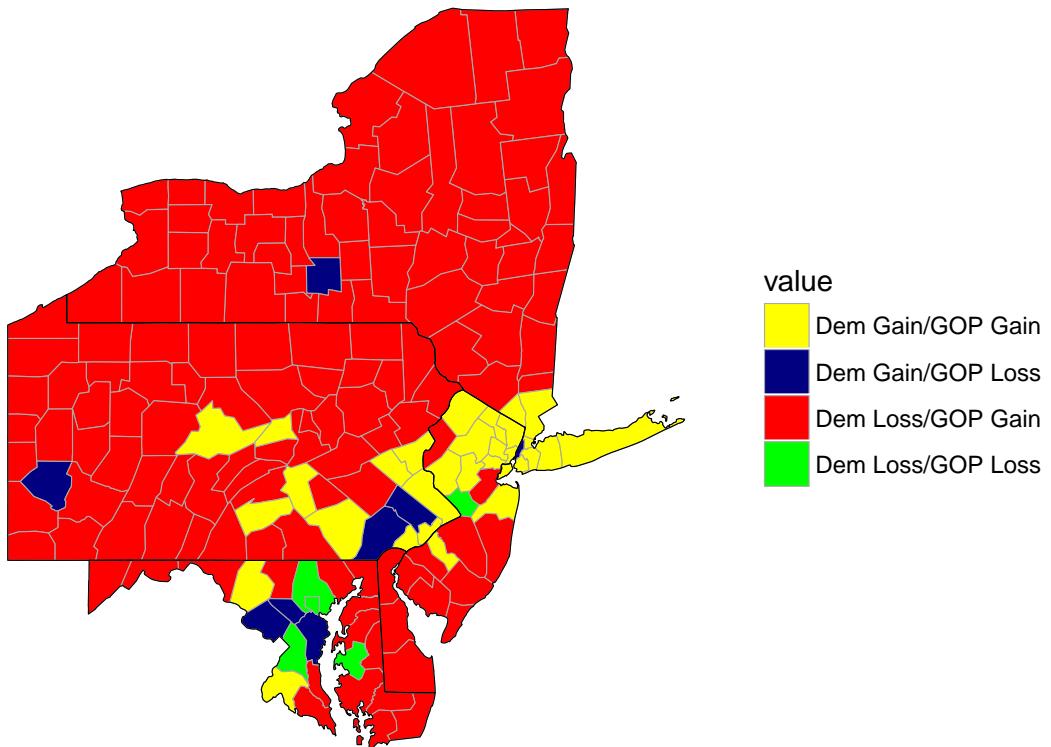


```
##Mid-Atlantic Region
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes - Mid-Atlantic"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(4)
c$ggplot_scale = scale_fill_manual(values = c("yellow", "navy", "red", "green"))
c$set_zoom(c("new york", "pennsylvania", "new jersey", "maryland", "delaware"))
shift_MA = c$render() +
  theme(legend.position = "right")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
shift_MA
```

## Shift from 2012 to 2016 by County Total Votes – Mid-Atlantic



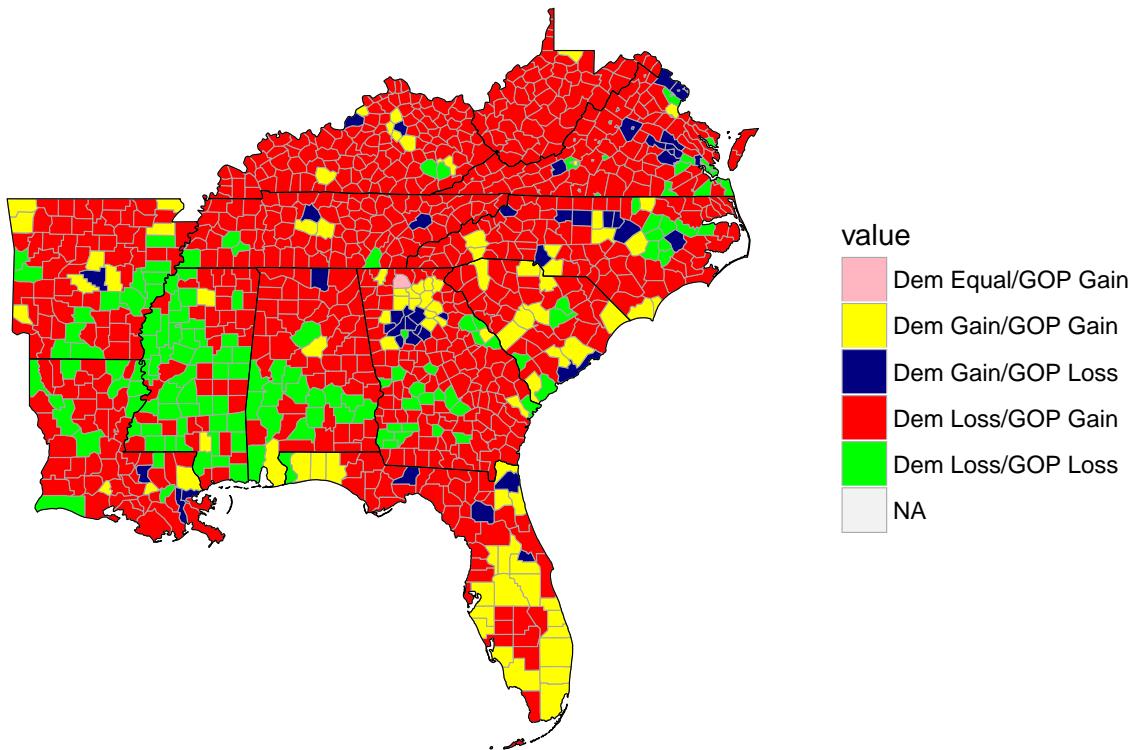
```
##South East Region
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes - South East"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(5)
c$ggplot_scale = scale_fill_manual(values = c("lightpink","yellow","navy","red","green"))
c$set_zoom(c("west virginia","virginia","tennessee","kentucky","north carolina","south carolina","georgia"))
shift_SE = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

shift_SE
```

## Shift from 2012 to 2016 by County Total Votes – South East

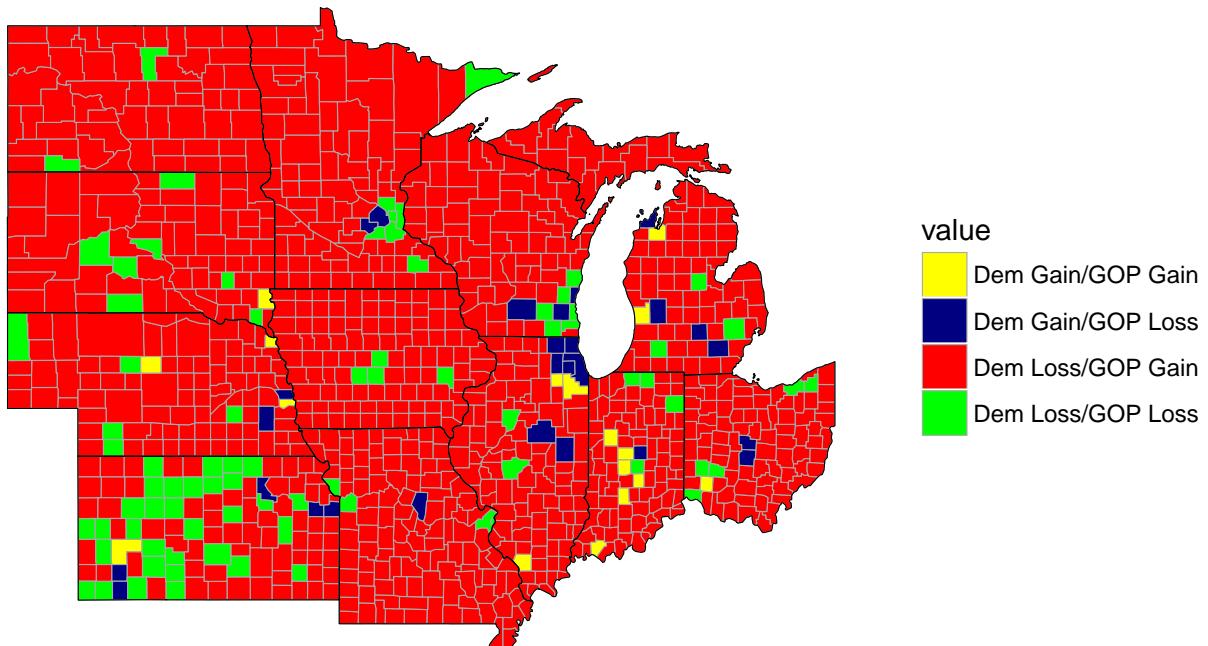


```
##Mid West Region
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes - Mid West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(4)
c$ggplot_scale = scale_fill_manual(values = c("yellow","navy","red","green"))
c$set_zoom(c("ohio","michigan","indiana","illinois","wisconsin","minnesota","iowa","missouri","north dakota"))
shift_MW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

shift_MW
```

## Shift from 2012 to 2016 by County Total Votes – Mid West

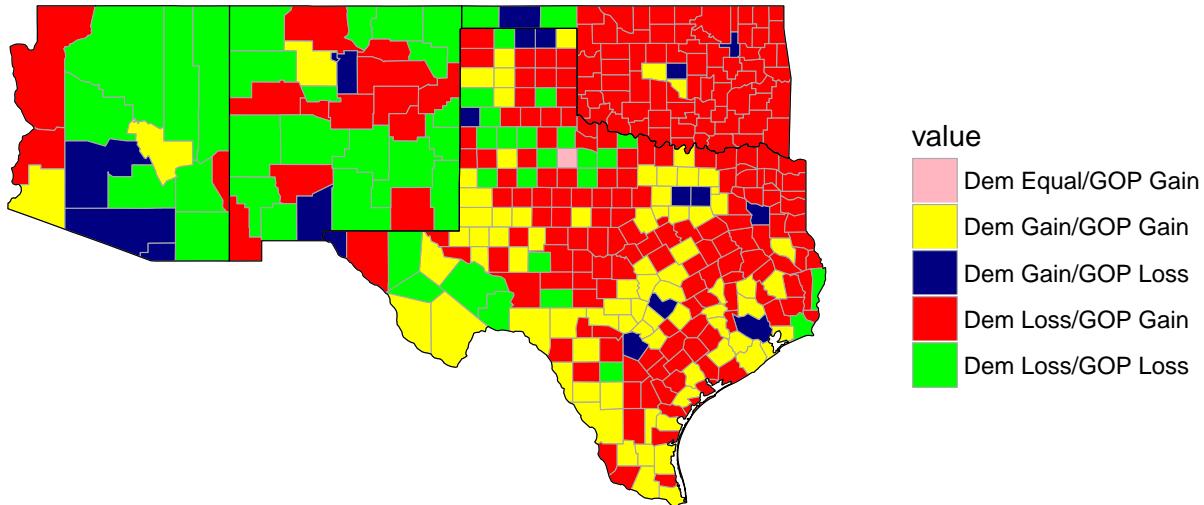


```
##South West Region
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes - South West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(5)
c$ggplot_scale = scale_fill_manual(values = c("lightpink","yellow","navy","red","green"))
c$set_zoom(c("texas","oklahoma","new mexico","arizona"))
shift_SW = c$render() +
  theme(legend.position = "right")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
shift_SW
```

## Shift from 2012 to 2016 by County Total Votes – South West



```
##West Region
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes - West"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("lightpink","yellow","navy","grey","red","green"))
c$set_zoom(c("colorado","wyoming","montana","idaho","utah","nevada","california","oregon","washington",
shift_W = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185, 2195,
## 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

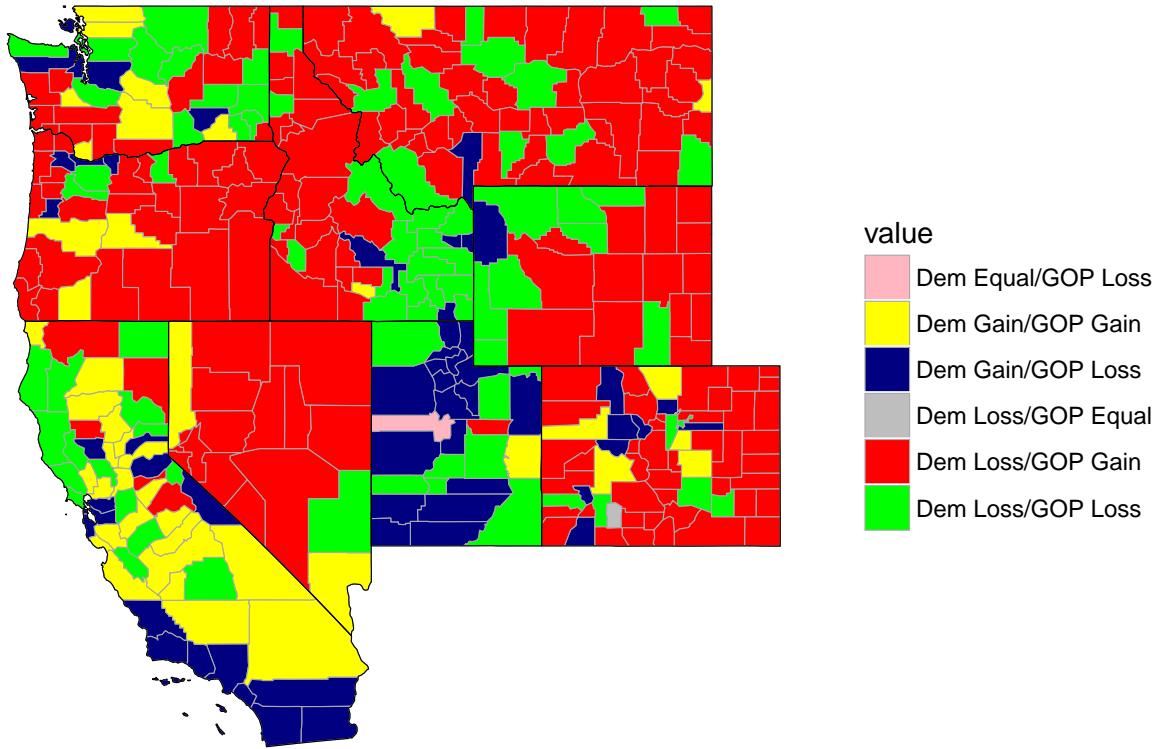
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead
```

```
shift_W
```

### Shift from 2012 to 2016 by County Total Votes – West



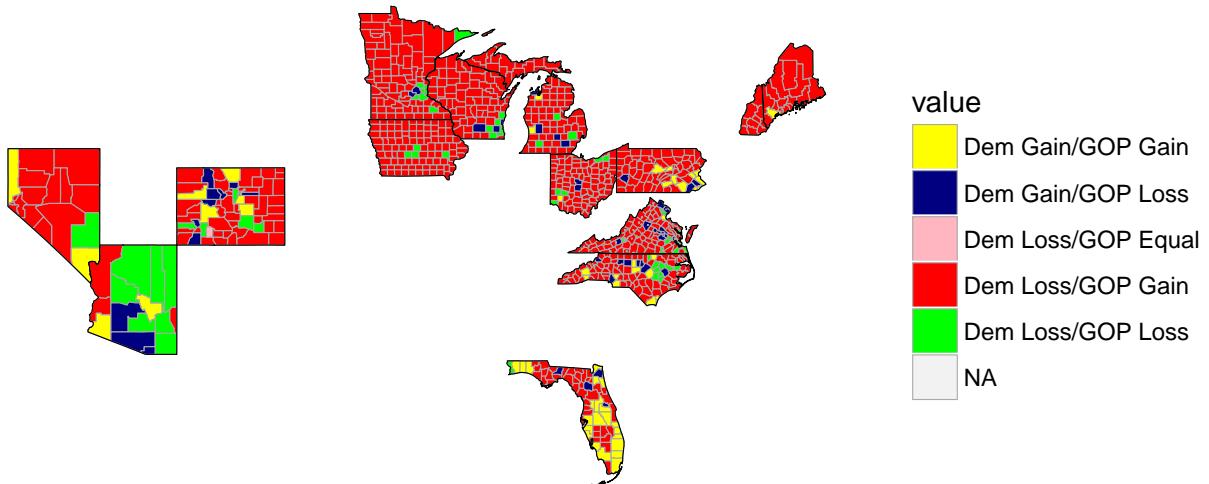
```
#Explore Vote Count by Swing States
c = CountyChoropleth$new(total_shift)
c$title = "Shift from 2012 to 2016 by County Total Votes - Swing States"
c$add_state_outline = TRUE
c$legend = "Change in Votes"
c$set_num_colors(5)
c$ggplot_scale = scale_fill_manual(values = c("yellow", "navy", "lightpink", "red", "green"))
c$set_zoom(c("new hampshire", "pennsylvania", "ohio", "michigan", "north carolina", "florida", "arizona", "iowa"))
shift.swing = c$render() +
  theme(legend.position = "right")
```

```
## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515
```

```
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead
```

```
shift.swing
```

## Shift from 2012 to 2016 by County Total Votes – Swing States



## Vote Share at State Level

```
#create empty vector to store the state fips values
state_levels = vector()

#store unique fips in vector
for(i in seq(1:dim(votes)[1])){
  if(!is.element(votes[i,18],state_levels)){
    state_levels = c(state_levels,votes[i,18])
  }
}

#create dataframe, add state_levels to it, rename it to "fips.numeric" in order to join with state.regions
states = data.frame(state_levels)
states[,c(2:9)] = 0
colnames(states)[1] = "fips.numeric"

#read in data, merge, drop duplicate column, and rename columns
data(state.regions)
states = merge(x=states,y=state.regions,by="fips.numeric")
states = states[,c(1:11)]
colnames(states) = c("fips", "dem_votes_2016", "gop_votes_2016", "total_votes_2016", "dem_votes_2012", "gop_votes_2012", "total_votes_2012", "state", "region", "fips.numeric", "name", "lat", "lon")

for(i in seq(1:dim(votes)[1])){
```

```

for(j in seq(1:dim(states)[1])){
  if(votes[i,11] == states[j,11]){
    states[j,2] = states[j,2] + votes[i,4]
    states[j,3] = states[j,3] + votes[i,5]
    states[j,4] = states[j,4] + votes[i,6]
    states[j,5] = states[j,5] + votes[i,15]
    states[j,6] = states[j,6] + votes[i,16]
    states[j,7] = states[j,7] + votes[i,14]
    states[j,8] = states[j,8] + votes[i,27]
    states[j,9] = states[j,9] + votes[i,26]
  }
}
}

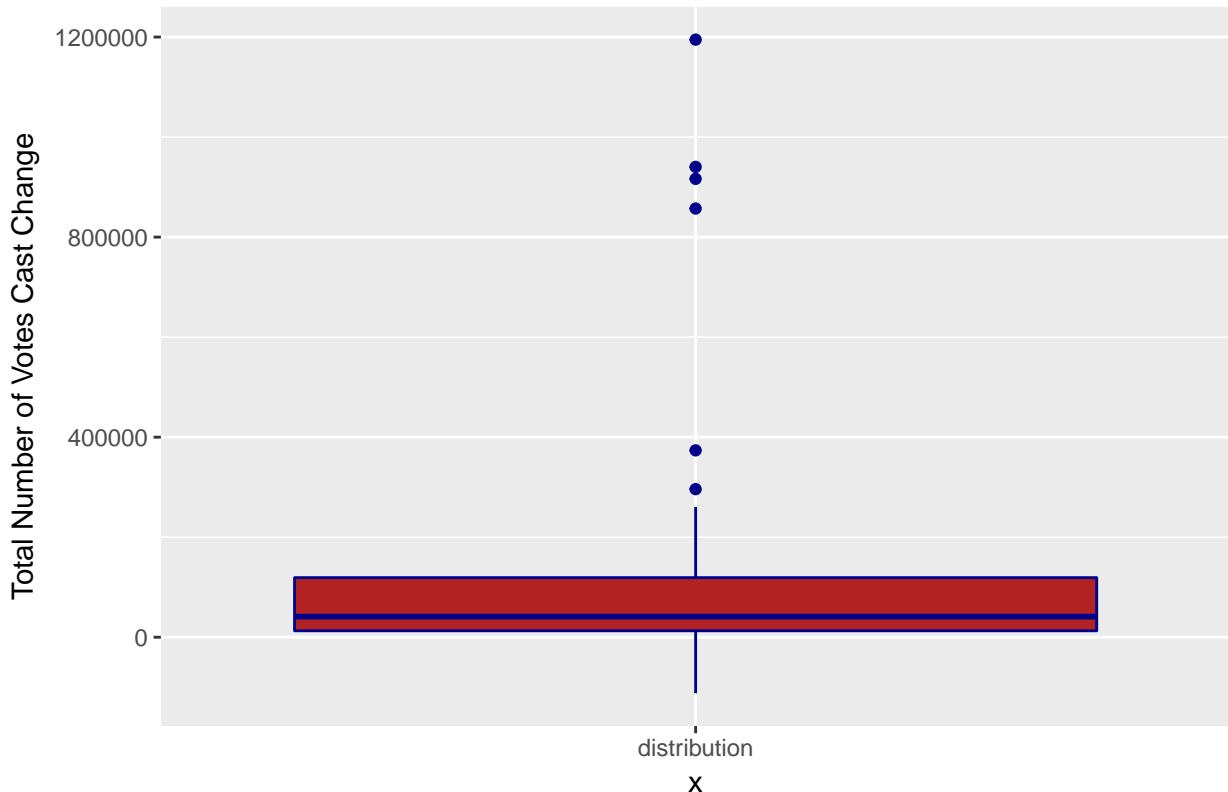
#Plot Voter Participation Changes
states$participation_change = states$total_votes_2016 - states$total_votes_2012

voting_num = states[,c(10,12)]
colnames(voting_num) = c("region","value")

ggplot(voting_num,aes(x="distribution",y=value)) + geom_boxplot(fill = "firebrick", colour = "darkblue")

```

County Shifts in Total Votes Cast from 2012 to 2016



```

c = StateChoropleth$new(voting_num)
c$title = "Shift from 2012 to 2016 by Total Number of Votes Cast"
c$add_state_outline = TRUE

```

```

c$legend = "Change in Votes Cast"
c$set_num_colors(1)
vote_US = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: alaska

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

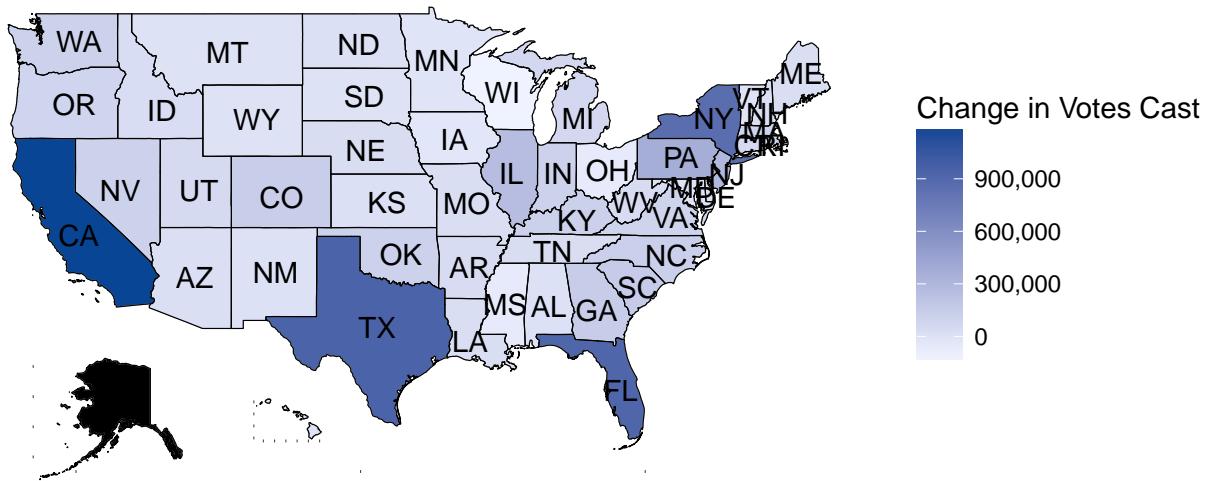
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

vote_US

```

## Shift from 2012 to 2016 by Total Number of Votes Cast



```

states$pop_2012 = states$pop_2010 + (states$pop_2014 - states$pop_2010)

states$pop_2016 = states$pop_2014 + (states$pop_2014 - states$pop_2010)

states$per_vot_change = 100 * ((states$total_votes_2016/states$pop_2016) - (states$total_votes_2012/sta

```

```

per_vote_num = states[,c(10,15)]
colnames(per_vote_num)= c("region","value")

c = StateChoropleth$new(per_vote_num)
c$title = "Shift in Turnout from 2012 to 2016 by Estimated Population Size"
c$add_state_outline = TRUE
c$legend = "% Change in Votes Cast"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("navy","blue","lightblue","white", "lightpink", "red", "f
per_vote_US = c$render() +
    theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: alaska

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

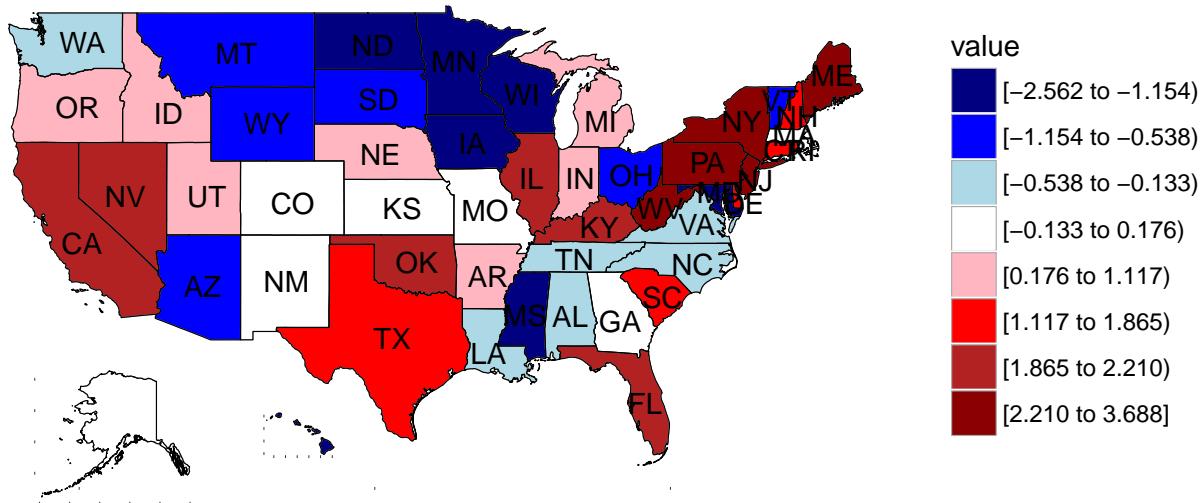
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

per_vote_US

```

## Shift in Turnout from 2012 to 2016 by Estimated Population Size



### #Results

```

states$DT_per = states$gop_votes_2016/states$total_votes_2016

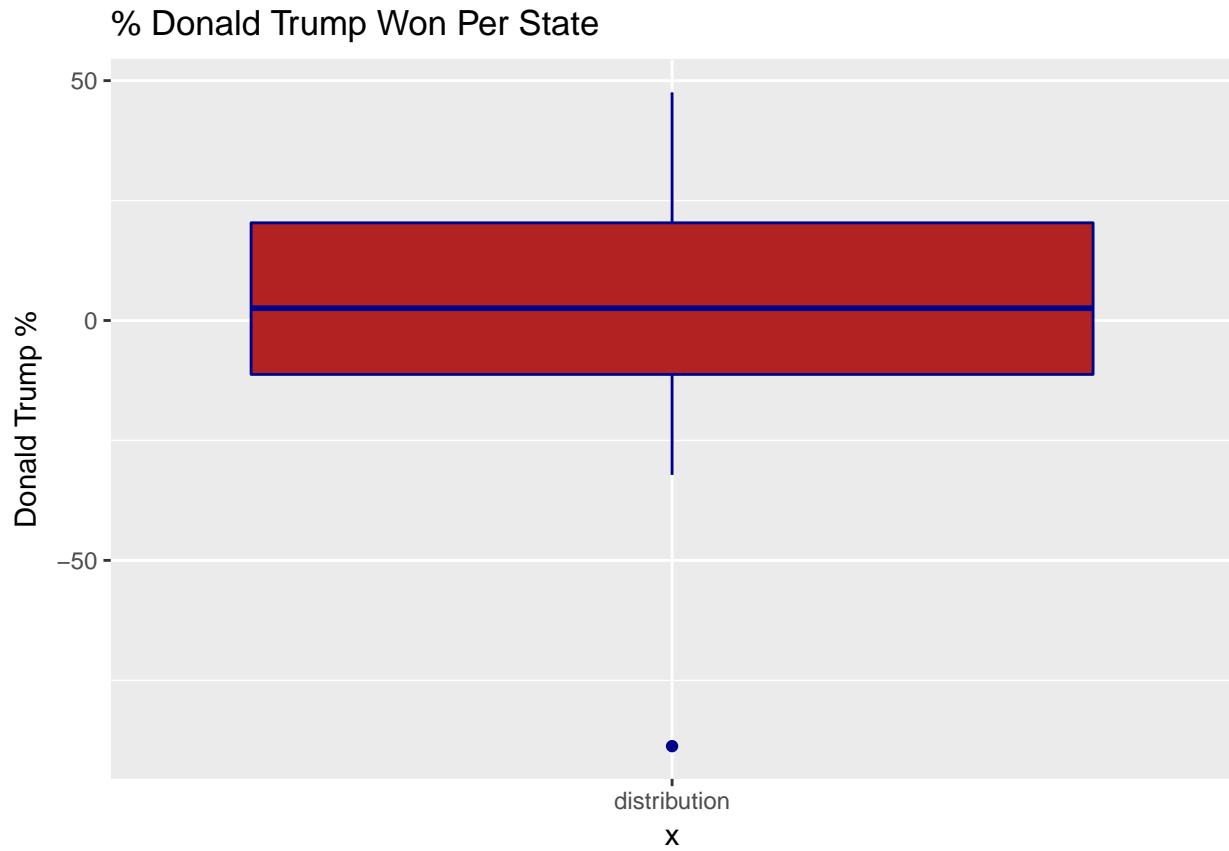
states$HC_per = states$dem_votes_2016/states$total_votes_2016

states$third = (1 - states$DT_per - states$HC_per) * 100

states$DT_margin = (states$DT_per - states$HC_per) * 100

ggplot(states,aes(x="distribution",y=DT_margin)) + geom_boxplot(fill = "firebrick", colour = "darkblue")

```



```

states$winner = NA

for(i in seq(1:dim(states)[1])){
  if(states[i,19] < -10){
    states[i,20] = "Clinton (>10%)"
  }
  if(states[i,19] > -10 && states[i,19] < -5){
    states[i,20] = "Clinton (5% - 10%)"
  }
  if(states[i,19] > -5 && states[i,19] < -2){
    states[i,20] = "Clinton (2% - 5%)"
  }
  if(states[i,19] > -2 && states[i,19] < 0){
    states[i,20] = "Clinton (<2%)"
  }
  if(states[i,19] > 10){
    states[i,20] = "Trump (>10%)"
  }
  if(states[i,19] < 10 && states[i,19] > 5){
    states[i,20] = "Trump (5% - 10%)"
  }
  if(states[i,19] < 5 && states[i,19] > 2){
    states[i,20] = "Trump (2% - 5%)"
  }
  if(states[i,19] < 2 && states[i,19] > 0){
    states[i,20] = "Trump (<2%)"
  }
}

```

```

    }

}

state_winner = states[,c(10,20)]
colnames(state_winner) = c("region","value")

c = StateChoropleth$new(state_winner)
c$title = "2016 State Winner Margin"
c$add_state_outline = TRUE
c$legend = "Win Margin %"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue","navy", "dodgerblue1","blue", "lightpink", "#e6f2ff"))
winner_US = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: alaska

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

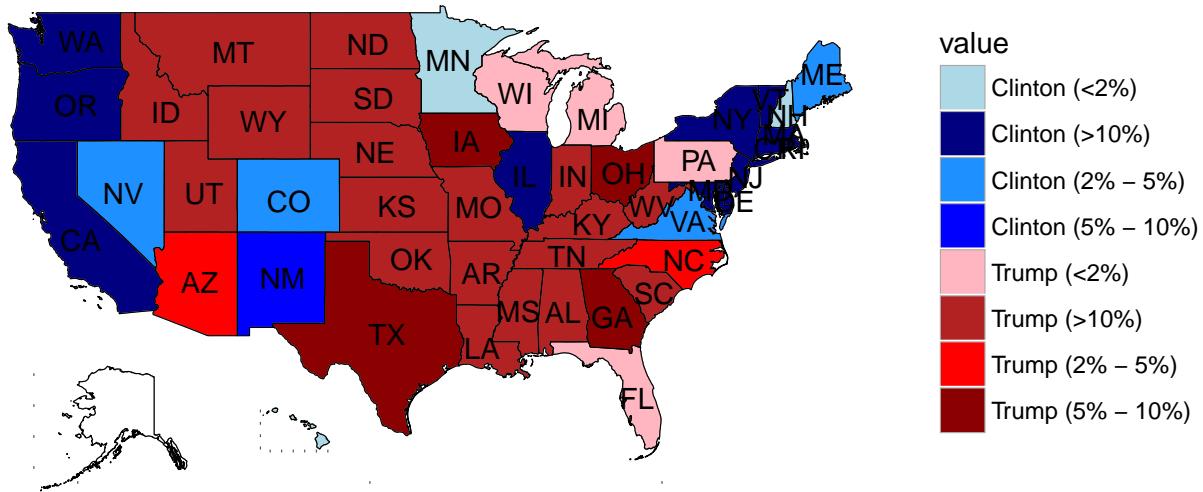
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

winner_US

```

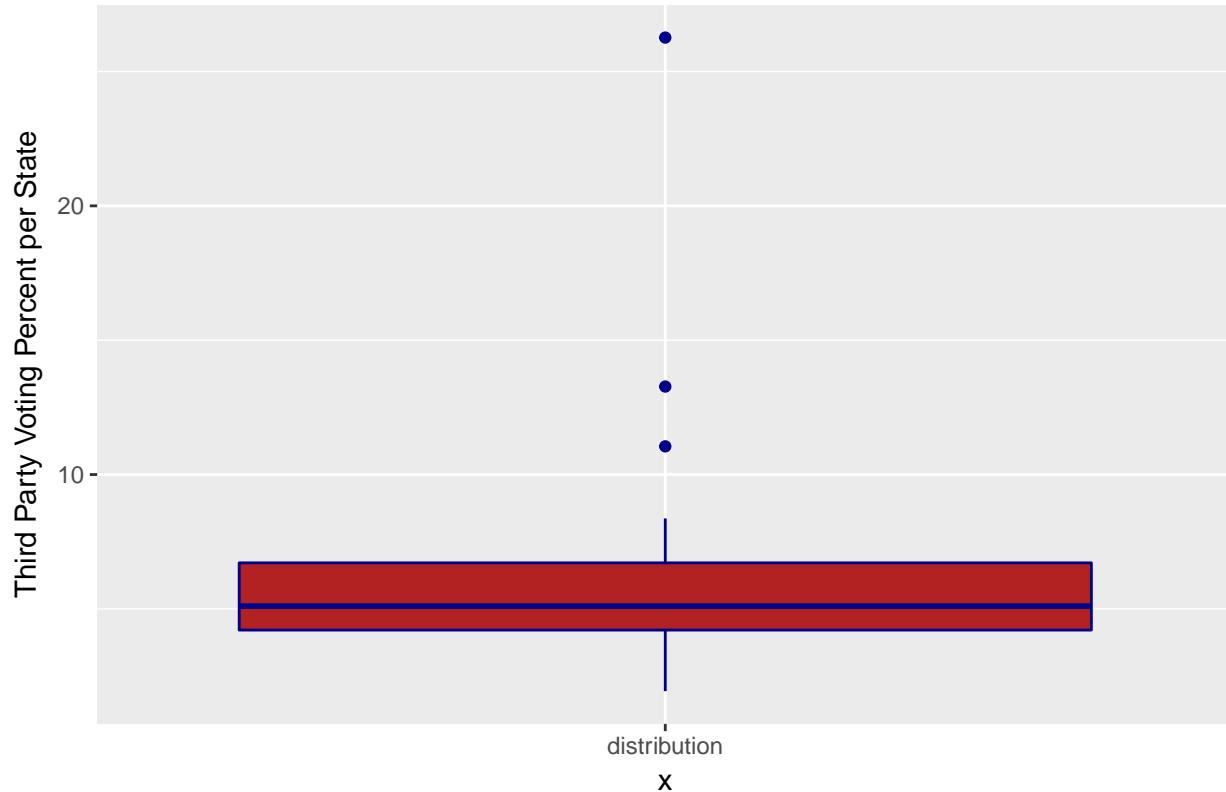
## 2016 State Winner Margin



#Third Party Vote

```
ggplot(states,aes(x="distribution",y=third)) + geom_boxplot(fill = "firebrick", colour = "darkblue") +
```

## % Third Party Per State



```
state_third = states[,c(10,18)]  
  
state_third$category = NA  
  
for(i in seq(1:dim(state_third)[1])){  
  if(state_third[i,2] < 3){  
    state_third[i,3] = "< 3%"  
  }  
  if(state_third[i,2] > 3 && state_third[i,2] < 5){  
    state_third[i,3] = "3% - 5%"  
  }  
  if(state_third[i,2] > 5 && state_third[i,2] < 7){  
    state_third[i,3] = "5% - 7%"  
  }  
  if(state_third[i,2] > 7 && state_third[i,2] < 10){  
    state_third[i,3] = "7% - 10%"  
  }  
  if(state_third[i,2] > 10 && state_third[i,2] < 15){  
    state_third[i,3] = "10% - 15%"  
  }  
  if(state_third[i,2] > 15){  
    state_third[i,3] = "> 15%"  
  }  
}  
  
colnames(state_third) = c("region", "third", "value")
```

```

c = StateChoropleth$new(state_third)
c$title = "2016 Third Party Vote by State"
c$add_state_outline = TRUE
c$legend = "Third Party %"
c$set_num_colors(6)
c$ggplot_scale = scale_fill_manual(values = c("purple", "red", "orange", "blue", "green", "yellow"))
state_third_US = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: alaska

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

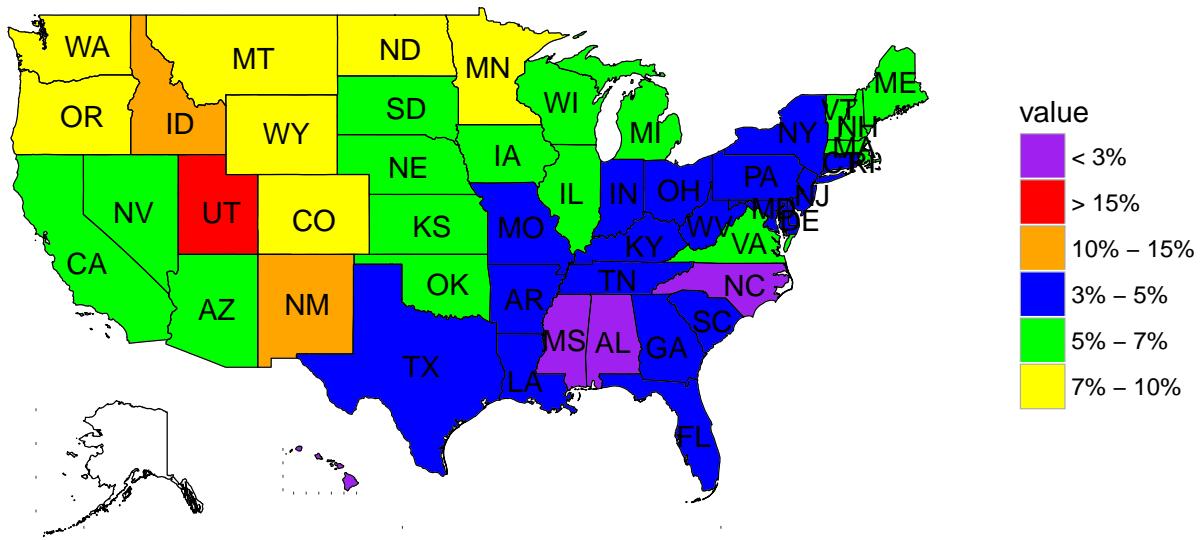
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

state_third_US

```

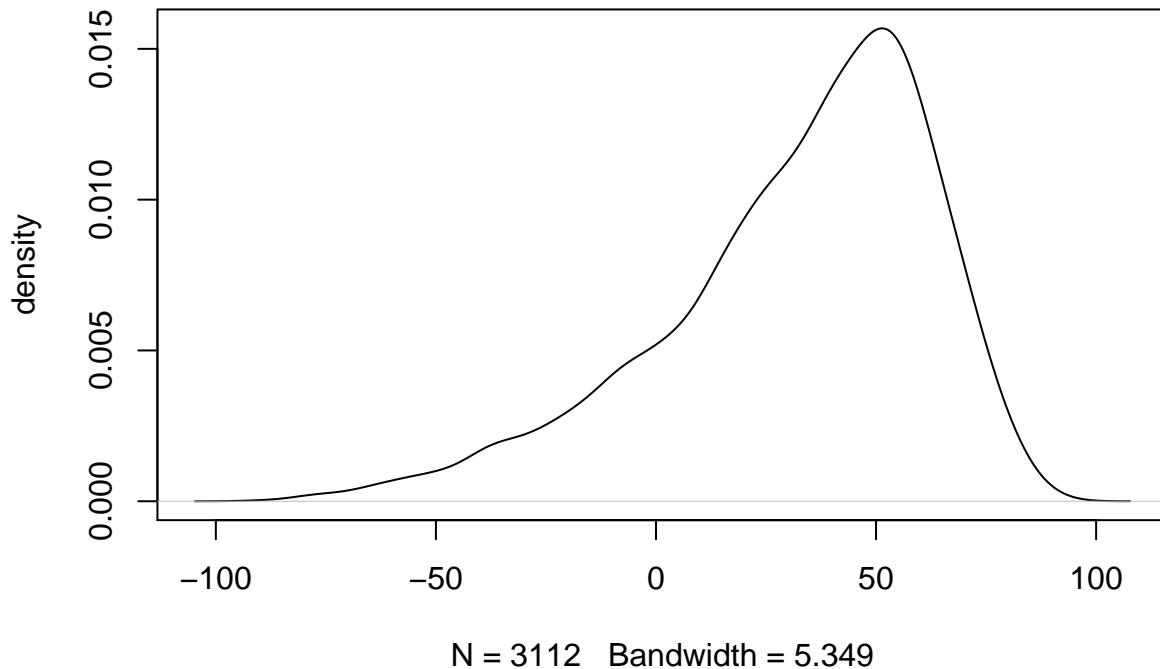
## 2016 Third Party Vote by State



## Examine County Level Winner

```
county_winner = votes[,c(7,8,13)]  
  
county_winner$Trump_margin = (county_winner$Trump - county_winner$Clinton) * 100  
  
for(i in seq(1:dim(county_winner)[1])){  
  if(county_winner[i,4] < -10){  
    county_winner[i,5] = "Clinton (>10%)"  
  }  
  if(county_winner[i,4] > -10 && county_winner[i,4] < -5){  
    county_winner[i,5] = "Clinton (5% - 10%)"  
  }  
  if(county_winner[i,4] > -5 && county_winner[i,4] < -2){  
    county_winner[i,5] = "Clinton (2% - 5%)"  
  }  
  if(county_winner[i,4] > -2 && county_winner[i,4] < 0){  
    county_winner[i,5] = "Clinton (<2%)"  
  }  
  if(county_winner[i,4] > 10){  
    county_winner[i,5] = "Trump (>10%)"  
  }  
  if(county_winner[i,4] < 10 && county_winner[i,4] > 5){  
    county_winner[i,5] = "Trump (5% - 10%)"  
  }  
  if(county_winner[i,4] < 5 && county_winner[i,4] > 2){  
    county_winner[i,5] = "Trump (2% - 5%)"  
  }  
  if(county_winner[i,4] < 2 && county_winner[i,4] > 0){  
    county_winner[i,5] = "Trump (<2%)"  
  }  
}  
  
colnames(county_winner)[3] = "region"  
colnames(county_winner)[5] = "value"  
  
plot(density(county_winner[,4]),  
      main = "Trump County Margin Density Plot",  
      ylab = "density")
```

## Trump County Margin Density Plot



```
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin %"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue", "navy", "dodgerblue1", "blue", "lightpink", "darkred", "darkgreen", "darkorange"))
county_US = c$render() +
  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 51515, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185,
## 2195, 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

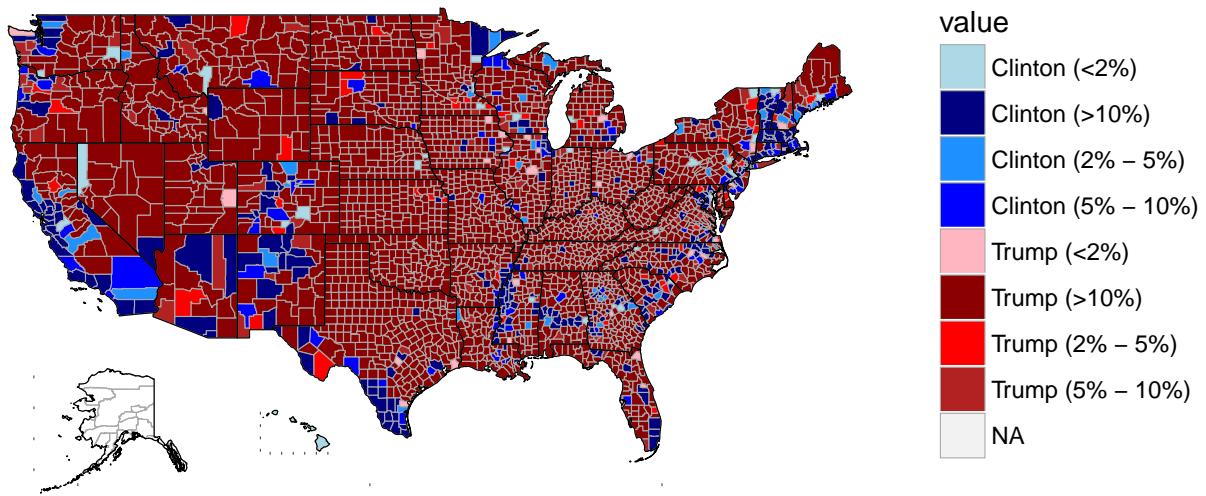
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
county_US
```

## County Winner Margin %



```
#Break Down By Region for Easy Viewing
```

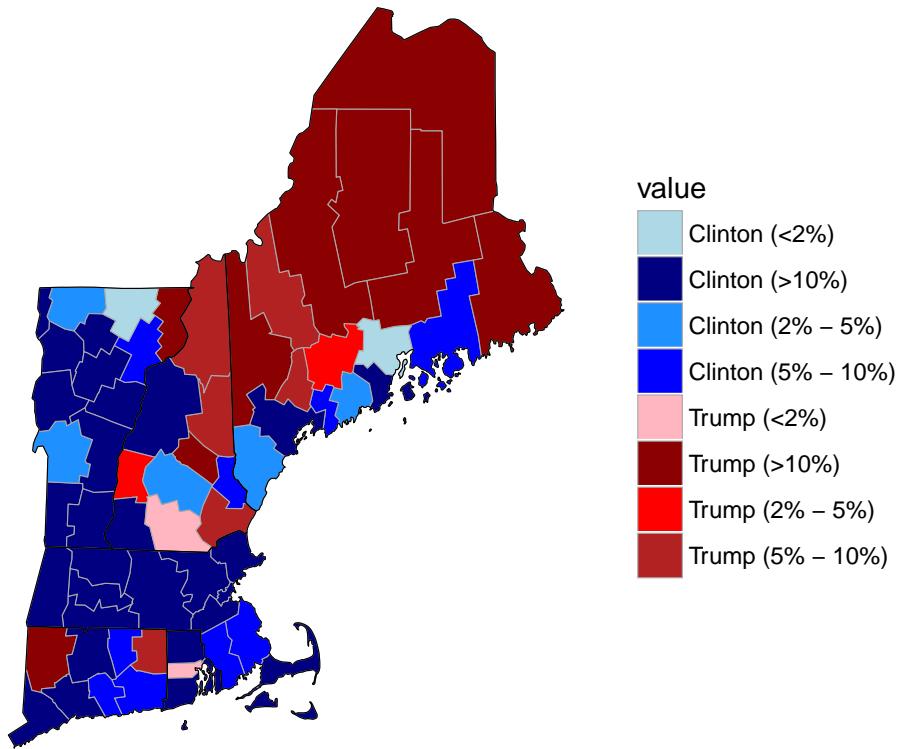
### #New England

```
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin % - New England"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue", "navy", "dodgerblue1", "blue", "lightpink", "darkred", "red", "darkred"))
c$set_zoom(c("maine", "new hampshire", "vermont", "massachusetts", "connecticut", "rhode island"))
county_NE = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
county_NE
```

### County Winner Margin % – New England

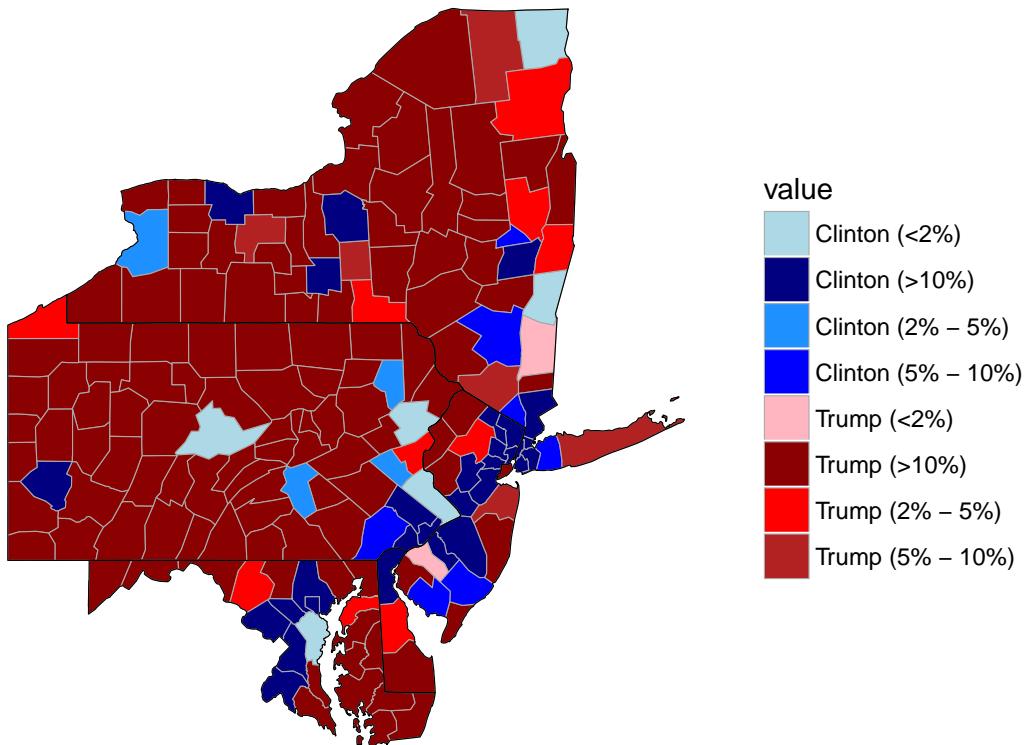


```
##Mid-Atlantic Region
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin % - Mid-Atlantic"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue", "navy", "dodgerblue1", "blue", "lightpink", "darkred", "red", "darkred"))
c$set_zoom(c("new york", "pennsylvania", "new jersey", "maryland", "delaware"))
county_MA = c$render() +
  theme(legend.position = "right")
```

```
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead
```

```
county_MA
```

## County Winner Margin % – Mid-Atlantic



```

##South East Region
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin % - South East"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue", "navy", "dodgerblue1", "blue", "lightpink", "darkred", "red", "darkred"))
c$set_zoom(c("west virginia", "virginia", "tennessee", "kentucky", "north carolina", "south carolina", "georgia"))
county_SE = c$render() +
  theme(legend.position = "right")

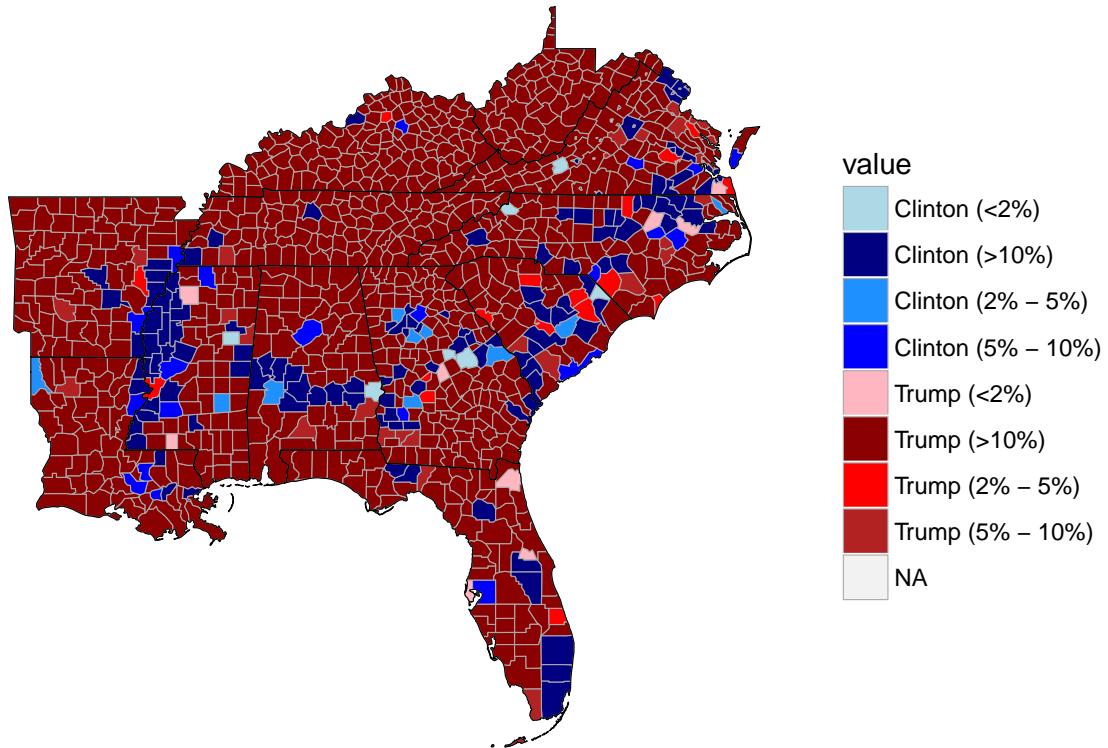
## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

county_SE

```

## County Winner Margin % – South East

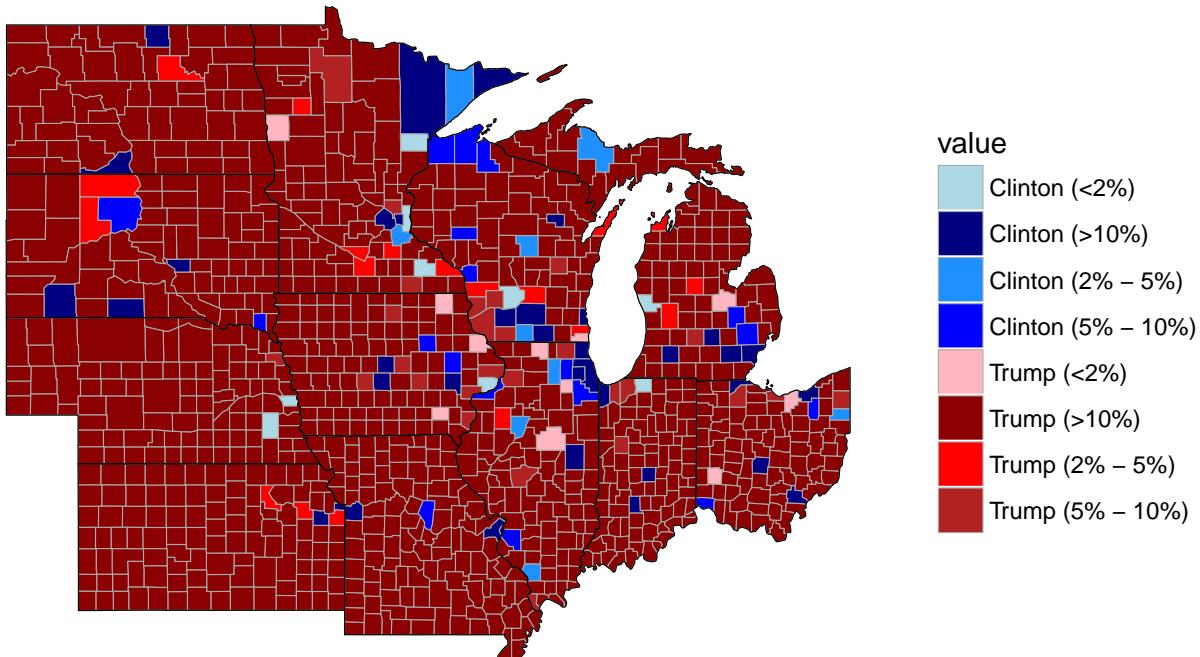


```
##Mid West Region
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin % - Mid West"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue", "navy", "dodgerblue1", "blue", "lightpink", "darkred", "red", "darkblue"))
c$set_zoom(c("ohio", "michigan", "indiana", "illinois", "wisconsin", "minnesota", "iowa", "missouri", "north dakota", "south dakota"))
county_MW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

county_MW
```

## County Winner Margin % – Mid West

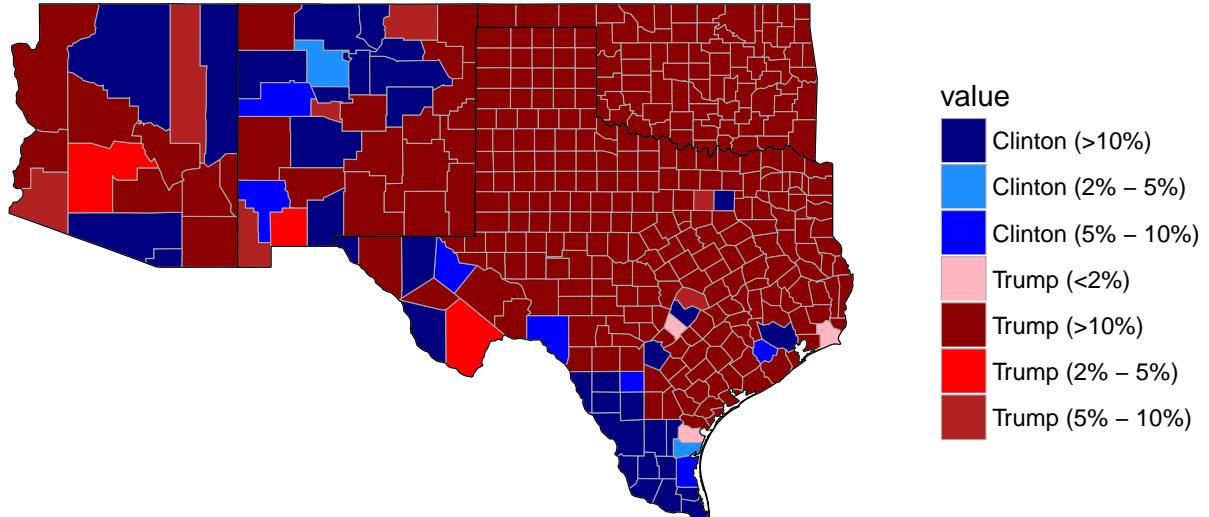


```
##South West Region
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin % - South West"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("navy", "dodgerblue1", "blue", "lightpink", "darkred", "red", "darkblue", "darkgreen"))
c$set_zoom(c("texas", "oklahoma", "new mexico", "arizona"))
county_SW = c$render() +
  theme(legend.position = "right")

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

county_SW
```

## County Winner Margin % – South West



```
##West Region
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin % - West"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue", "navy", "dodgerblue1", "blue", "lightpink", "red", "darkred", "black"))
c$set_zoom(c("colorado", "wyoming", "montana", "idaho", "utah", "nevada", "california", "oregon", "washington",
county_W = c$render() +
    theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185, 2195,
## 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

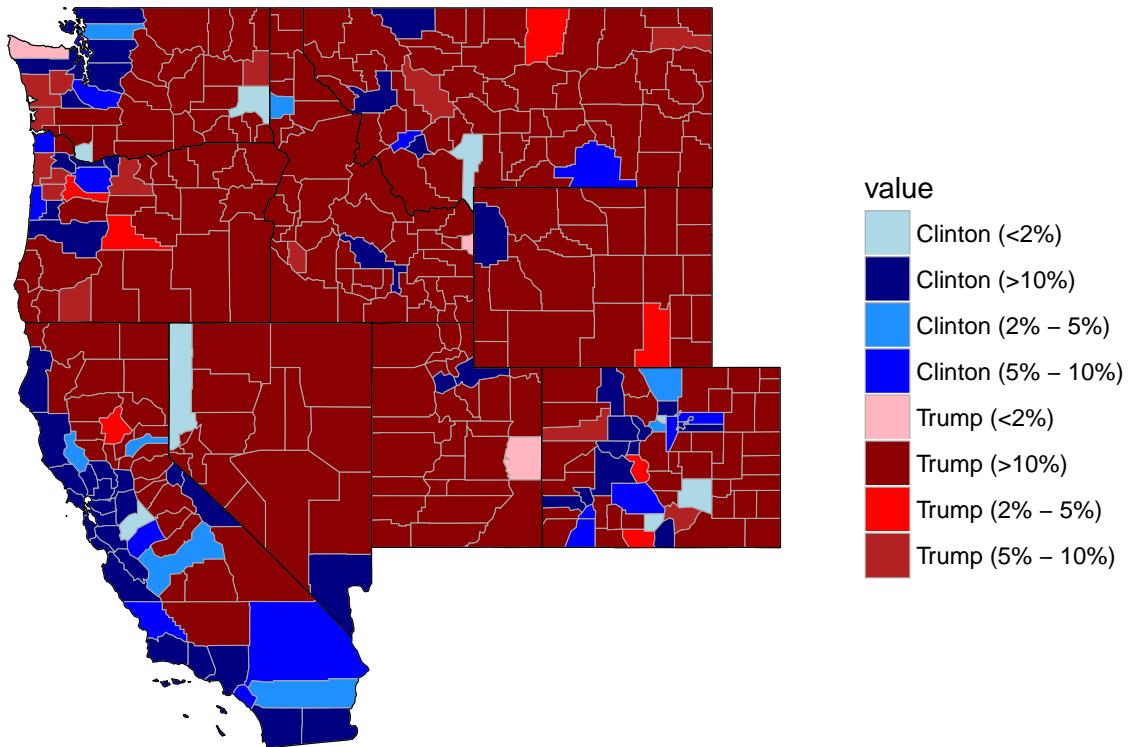
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead

## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead
```

```
county_W
```

## County Winner Margin % – West



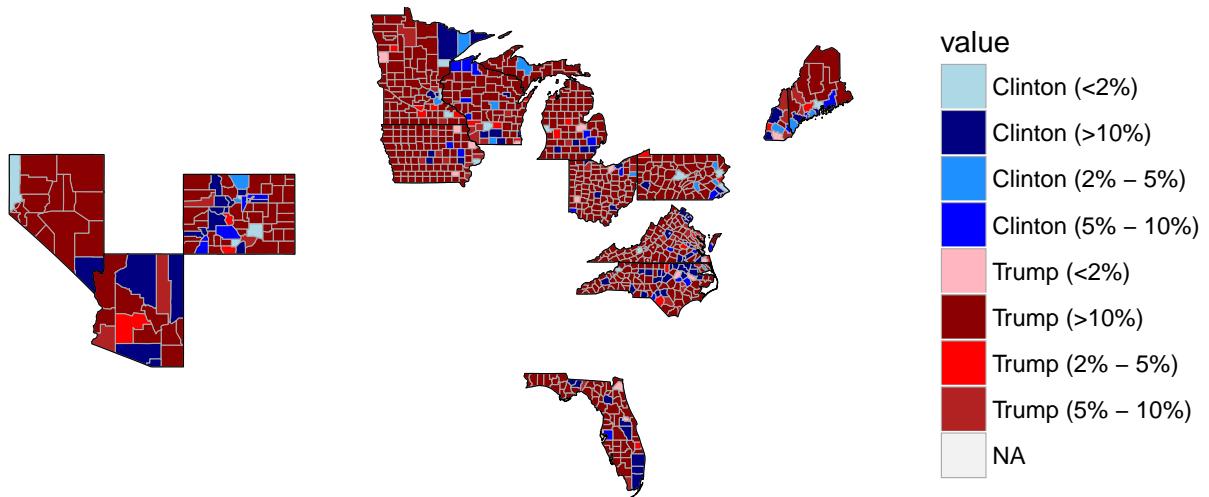
```
#Explore Vote Count by Swing States
c = CountyChoropleth$new(county_winner)
c$title = "County Winner Margin % - Swing States"
c$add_state_outline = TRUE
c$legend = "County Winner Margin"
c$set_num_colors(8)
c$ggplot_scale = scale_fill_manual(values = c("lightblue", "navy", "dodgerblue1", "blue", "lightpink", "orange", "red", "darkred"))
c$set_zoom(c("new hampshire", "pennsylvania", "ohio", "michigan", "north carolina", "florida", "arizona", "iowa"))
county_swing = c$render() +
  theme(legend.position = "right")
```

```
## Warning in self$bind(): The following regions were missing and are being
## set to NA: 51515
```

```
## Warning in self$bind(): `panel.margin` is deprecated. Please use
## `panel.spacing` property instead
```

```
county_swing
```

## County Winner Margin % – Swing States



## Analyze Counties that Flipped 2012 to 2016

```
votes$flips = NA

for(i in seq(1:dim(votes)[1])){
  if(votes[i,8] > votes[i,7] && votes[i,19] > votes[i,20]){
    votes[i,86] = "OBAMA to TRUMP"
  } else if(votes[i,8] < votes[i,7] && votes[i,19] < votes[i,20]){
    votes[i,86] = "ROMNEY to CLINTON"
  } else {
    votes[i,86] = "Solid County"
  }
}

flips = votes[,c(13,86)]
colnames(flips) = c("region","value")

c = CountyChoropleth$new(flips)
c$title = "County Flips from 2012 to 2016"
c$add_state_outline = TRUE
c$legend = "County Status"
c$set_num_colors(3)
c$ggplot_scale = scale_fill_manual(values = c("red","blue","white"))
county_flips = c$render() +
```

```

  theme(legend.position = "right")

## Warning in self$bind(): The following regions were missing and are being
## set to NA: 2050, 2105, 2122, 2150, 2164, 2180, 2188, 2240, 2090, 2198,
## 15005, 2100, 2170, 51515, 2016, 2060, 2290, 2282, 2070, 2110, 2130, 2185,
## 2195, 2220, 2230, 2020, 2068, 2013, 2261, 2270, 2275

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

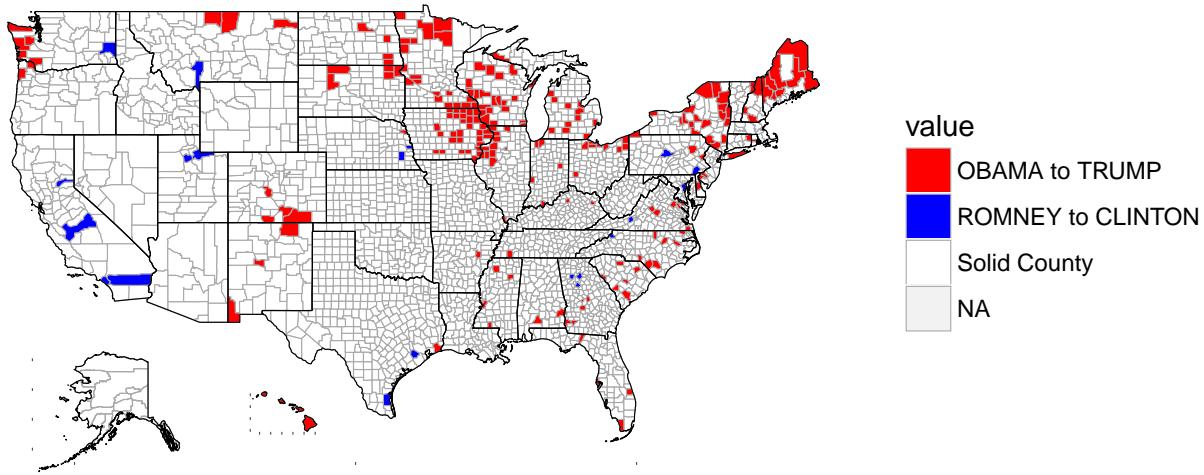
## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

## Warning: `panel.margin` is deprecated. Please use `panel.spacing` property
## instead

county_flips

```

## County Flips from 2012 to 2016



```

#Number of Clinton Flips
length(which(votes$flips == "ROMNEY to CLINTON"))

## [1] 20

```

```
#Number of Trump Flips  
length(which(votes$flips == "OBAMA to TRUMP"))
```

```
## [1] 218
```

```
#Number of counties that did not change  
length(which(votes$flips == "Solid County"))
```

```
## [1] 2874
```

## Exploratory Analysis - Features

```
votes$fips = as.factor(votes$fips)  
votes$FIPS = as.factor(votes$FIPS)  
votes$state_fips = as.factor(votes$state_fips)  
votes$state_abbr = as.factor(votes$state_abbr)  
votes$state_abbreviation = as.factor(votes$state_abbreviation)  
votes$area_name = as.factor(votes$area_name)
```