Fill US Maps

Ben Goldstone

10/30/2023

Filled US Maps

```
# Election Data
data("election")
head(election)
```

```
## # A tibble: 6 x 22
##   state      st     fips total_vote vote_margin winner party pct_margin r_points
##   <chr>      <chr> <dbl>      <dbl>       <dbl> <chr>  <chr>      <dbl>    <dbl>
## 1 Alabama    AL        1    2123372      588708 Trump  Repu~     0.277     27.7
## 2 Alaska     AK        2     318608       46933 Trump  Repu~     0.147     14.7
## 3 Arizona    AZ        4    2604657       91234 Trump  Repu~     0.035      3.5
## 4 Arkansas   AR        5    1130635      304378 Trump  Repu~     0.269     26.9
## 5 California CA        6   14237893     4269978 Clint~ Demo~     0.300    -30.0
## 6 Colorado   CO        8    2780247      136386 Clint~ Demo~     0.0491    -4.91
## # ... with 13 more variables: d_points <dbl>, pct_clinton <dbl>,
## #   pct_trump <dbl>, pct_johnson <dbl>, pct_other <dbl>, clinton_vote <dbl>,
## #   trump_vote <dbl>, johnson_vote <dbl>, other_vote <dbl>, ev_dem <dbl>,
## #   ev_rep <dbl>, ev_oth <dbl>, census <chr>
```

```
# State Data
States = map_data("state")
head(States)
```

```
##        long      lat group order  region subregion
## 1 -87.46201 30.38968     1     1 alabama      <NA>
## 2 -87.48493 30.37249     1     2 alabama      <NA>
## 3 -87.52503 30.37249     1     3 alabama      <NA>
## 4 -87.53076 30.33239     1     4 alabama      <NA>
## 5 -87.57087 30.32665     1     5 alabama      <NA>
## 6 -87.58806 30.32665     1     6 alabama      <NA>
```

```
election$region = tolower(election$state)

FullData = left_join(States,election)
```

```
## Joining, by = "region"
```

```
head(FullData)
```

```
##        long      lat group order  region subregion   state st fips total_vote
## 1 -87.46201 30.38968     1     1 alabama      <NA> Alabama AL    1    2123372
## 2 -87.48493 30.37249     1     2 alabama      <NA> Alabama AL    1    2123372
## 3 -87.52503 30.37249     1     3 alabama      <NA> Alabama AL    1    2123372
```

```
## 4 -87.53076 30.33239     1     4 alabama      <NA> Alabama AL    1    2123372
## 5 -87.57087 30.32665     1     5 alabama      <NA> Alabama AL    1    2123372
## 6 -87.58806 30.32665     1     6 alabama      <NA> Alabama AL    1    2123372
##   vote_margin winner      party pct_margin r_points d_points pct_clinton
## 1      588708  Trump Republican     0.2773    27.72   -27.72       34.36
## 2      588708  Trump Republican     0.2773    27.72   -27.72       34.36
## 3      588708  Trump Republican     0.2773    27.72   -27.72       34.36
## 4      588708  Trump Republican     0.2773    27.72   -27.72       34.36
## 5      588708  Trump Republican     0.2773    27.72   -27.72       34.36
## 6      588708  Trump Republican     0.2773    27.72   -27.72       34.36
##   pct_trump pct_johnson pct_other clinton_vote trump_vote johnson_vote
## 1     62.08         2.09      1.46       729547    1318255        44467
## 2     62.08         2.09      1.46       729547    1318255        44467
## 3     62.08         2.09      1.46       729547    1318255        44467
## 4     62.08         2.09      1.46       729547    1318255        44467
## 5     62.08         2.09      1.46       729547    1318255        44467
## 6     62.08         2.09      1.46       729547    1318255        44467
##   other_vote ev_dem ev_rep ev_oth census
## 1      31103      0      9      0  South
## 2      31103      0      9      0  South
## 3      31103      0      9      0  South
## 4      31103      0      9      0  South
## 5      31103      0      9      0  South
## 6      31103      0      9      0  South
```

```r
# Graph 1
gf_polygon(lat~long,data=FullData,group=~group,fill=~winner,color="grey50",size=0.05) %>%
  gf_theme(theme_map()) %>%
  gf_refine(scale_fill_manual(values = c("royalblue","red"))) %>%
  gf_labs(fill="Winner", title="\n\tTrump Wins the 2016 Election")
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x9

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## width unknown for character 0x9

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font width unknown for character 0x9
```

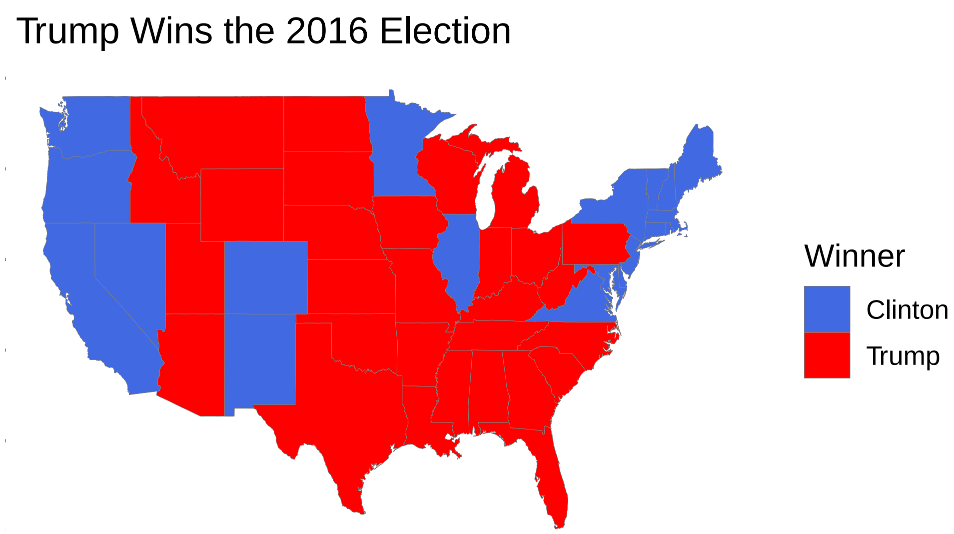


```r
# Graph 2
gf_polygon(lat~long,data=FullData,group=~group,fill=~total_vote/100000,color="grey50",size=0.05) %>%
  gf_theme(theme_map()) %>%
  gf_refine(scale_fill_gradient2(low="gray30", mid="gray",high="black"),
            coord_equal())%>%
  gf_theme(legend.position="bottom") %>%
  gf_labs(fill="Votes (in hundred-thousands)", title="\n\tCalifornia Has the Most Votes in the 2016 Ele
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## width unknown for character 0x9

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font width unknown for character 0x9
```

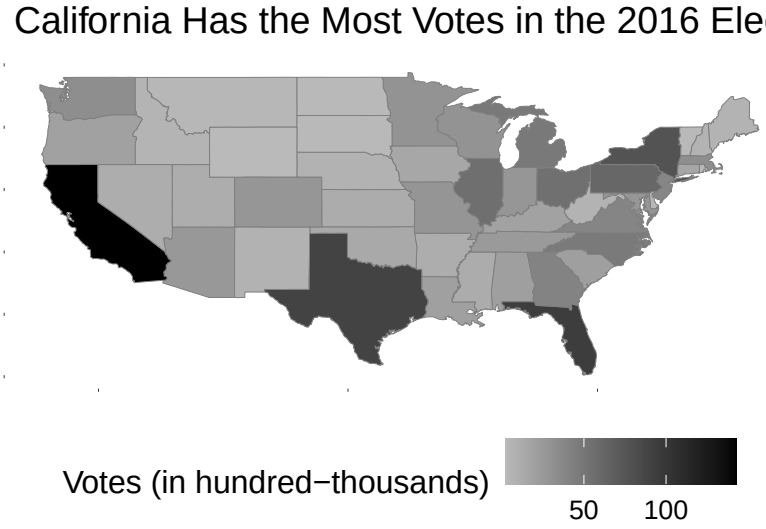


```
# Graph 3

head(county_map)
```

```
##      long      lat order  hole piece            group    id
## 1 1225889 -1275020     1 FALSE     1 0500000US01001.1 01001
## 2 1235324 -1274008     2 FALSE     1 0500000US01001.1 01001
## 3 1244873 -1272331     3 FALSE     1 0500000US01001.1 01001
## 4 1244129 -1267515     4 FALSE     1 0500000US01001.1 01001
## 5 1272010 -1262889     5 FALSE     1 0500000US01001.1 01001
## 6 1276797 -1295514     6 FALSE     1 0500000US01001.1 01001
```

```
head(county_data)
```

```
##      id           name state census_region      pop_dens   pop_dens4
## 1     0           <NA>  <NA>          <NA> [   50,  100) [ 45,  118)
## 2 01000              1    AL         South [   50,  100) [ 45,  118)
## 3 01001 Autauga County    AL         South [   50,  100) [ 45,  118)
## 4 01003 Baldwin County    AL         South [  100,  500) [118,71672]
## 5 01005 Barbour County    AL         South [   10,   50) [ 17,   45)
## 6 01007    Bibb County    AL         South [   10,   50) [ 17,   45)
##     pop_dens6   pct_black       pop female white black travel_time  land_area
## 1 [ 82,  215) [10.0,15.0) 318857056   50.8  77.7  13.2        25.5 3531905.43
## 2 [ 82,  215) [25.0,50.0)   4849377   51.5  69.8  26.6        24.2   50645.33
## 3 [ 82,  215) [15.0,25.0)     55395   51.5  78.1  18.4        26.2     594.44
## 4 [ 82,  215) [ 5.0,10.0)    200111   51.2  87.3   9.5        25.9    1589.78
## 5 [ 25,   45) [25.0,50.0)     26887   46.5  50.2  47.6        24.6     884.88
## 6 [ 25,   45) [15.0,25.0)     22506   46.0  76.3  22.1        27.6     622.58
##   hh_income su_gun4 su_gun6 fips votes_dem_2016 votes_gop_2016 total_votes_2016
## 1     53046    <NA>    <NA>    0             NA             NA               NA
## 2     43253    <NA>    <NA> 1000             NA             NA               NA
## 3     53682 [11,54] [10,12) 1001           5908          18110            24661
## 4     50221 [11,54] [10,12) 1003          18409          72780            94090
## 5     32911 [ 5, 8) [ 7, 8) 1005           4848           5431            10390
## 6     36447 [11,54] [10,12) 1007           1874           6733             8748
##   per_dem_2016 per_gop_2016 diff_2016 per_dem_2012 per_gop_2012 diff_2012
## 1           NA           NA        NA           NA           NA        NA
## 2           NA           NA        NA           NA           NA        NA
```

```
## 3    0.2395685    0.7343579     12202    0.2657577    0.7263374     11012
## 4    0.1956531    0.7735147     54371    0.2156657    0.7738975     47443
## 5    0.4666025    0.5227141       583    0.5125229    0.4833755       334
## 6    0.2142204    0.7696616      4859    0.2621857    0.7306638      3931
##   winner partywinner16 winner12 partywinner12 flipped
## 1   <NA>          <NA>     <NA>          <NA>    <NA>
## 2   <NA>          <NA>     <NA>          <NA>    <NA>
## 3  Trump    Republican   Romney    Republican      No
## 4  Trump    Republican   Romney    Republican      No
## 5  Trump    Republican    Obama      Democrat     Yes
## 6  Trump    Republican   Romney    Republican      No
```

```
all_county_data = left_join(county_map,county_data)
```

```
## Joining, by = "id"
```

```
head(all_county_data)
```

```
##      long      lat order  hole piece            group    id           name
## 1 1225889 -1275020     1 FALSE     1 0500000US01001.1 01001 Autauga County
## 2 1235324 -1274008     2 FALSE     1 0500000US01001.1 01001 Autauga County
## 3 1244873 -1272331     3 FALSE     1 0500000US01001.1 01001 Autauga County
## 4 1244129 -1267515     4 FALSE     1 0500000US01001.1 01001 Autauga County
## 5 1272010 -1262889     5 FALSE     1 0500000US01001.1 01001 Autauga County
## 6 1276797 -1295514     6 FALSE     1 0500000US01001.1 01001 Autauga County
##   state census_region      pop_dens   pop_dens4   pop_dens6   pct_black   pop
## 1    AL         South [   50,  100) [ 45,  118) [ 82,  215) [15.0,25.0) 55395
## 2    AL         South [   50,  100) [ 45,  118) [ 82,  215) [15.0,25.0) 55395
## 3    AL         South [   50,  100) [ 45,  118) [ 82,  215) [15.0,25.0) 55395
## 4    AL         South [   50,  100) [ 45,  118) [ 82,  215) [15.0,25.0) 55395
## 5    AL         South [   50,  100) [ 45,  118) [ 82,  215) [15.0,25.0) 55395
## 6    AL         South [   50,  100) [ 45,  118) [ 82,  215) [15.0,25.0) 55395
##   female white black travel_time land_area hh_income su_gun4 su_gun6 fips
## 1   51.5  78.1  18.4        26.2    594.44     53682 [11,54] [10,12) 1001
## 2   51.5  78.1  18.4        26.2    594.44     53682 [11,54] [10,12) 1001
## 3   51.5  78.1  18.4        26.2    594.44     53682 [11,54] [10,12) 1001
## 4   51.5  78.1  18.4        26.2    594.44     53682 [11,54] [10,12) 1001
## 5   51.5  78.1  18.4        26.2    594.44     53682 [11,54] [10,12) 1001
## 6   51.5  78.1  18.4        26.2    594.44     53682 [11,54] [10,12) 1001
##   votes_dem_2016 votes_gop_2016 total_votes_2016 per_dem_2016 per_gop_2016
## 1           5908          18110            24661    0.2395685    0.7343579
## 2           5908          18110            24661    0.2395685    0.7343579
## 3           5908          18110            24661    0.2395685    0.7343579
## 4           5908          18110            24661    0.2395685    0.7343579
## 5           5908          18110            24661    0.2395685    0.7343579
## 6           5908          18110            24661    0.2395685    0.7343579
##   diff_2016 per_dem_2012 per_gop_2012 diff_2012 winner partywinner16 winner12
## 1     12202    0.2657577    0.7263374     11012  Trump    Republican   Romney
## 2     12202    0.2657577    0.7263374     11012  Trump    Republican   Romney
## 3     12202    0.2657577    0.7263374     11012  Trump    Republican   Romney
## 4     12202    0.2657577    0.7263374     11012  Trump    Republican   Romney
## 5     12202    0.2657577    0.7263374     11012  Trump    Republican   Romney
## 6     12202    0.2657577    0.7263374     11012  Trump    Republican   Romney
##   partywinner12 flipped
## 1    Republican      No
```

```
## 2     Republican      No
## 3     Republican      No
## 4     Republican      No
## 5     Republican      No
## 6     Republican      No
```

```
gf_polygon(lat~long,data=all_county_data, group=~group,fill=~winner)%>%
  gf_refine(scale_fill_manual(values = c("royalblue","red"))) %>%
  gf_labs(fill="Winner", title="\n\tTrump Wins the 2016 Election")
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x9

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font width unknown for character 0x9
```

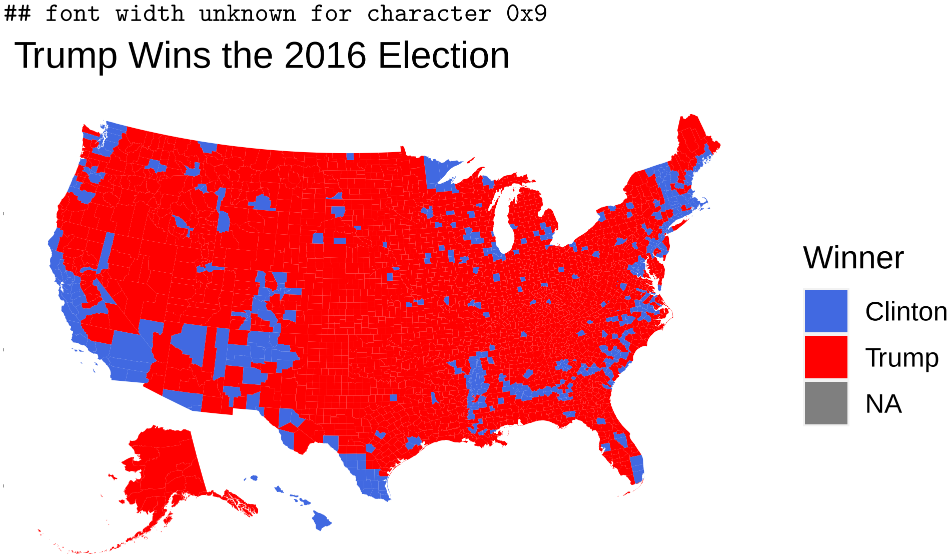


```
# Graph 4
gf_polygon(lat~long,data=all_county_data, group=~group,fill=~travel_time)%>%
  gf_refine(scale_fill_distiller(direction=1,limits=c(0,50), breaks = c(0,5,10,15,20,25,30,35,40,45,50)
  gf_labs(fill="Travel Times", title="\n\tAlaska has shorter travel times")
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
```

```
## width unknown for character 0x9

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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```

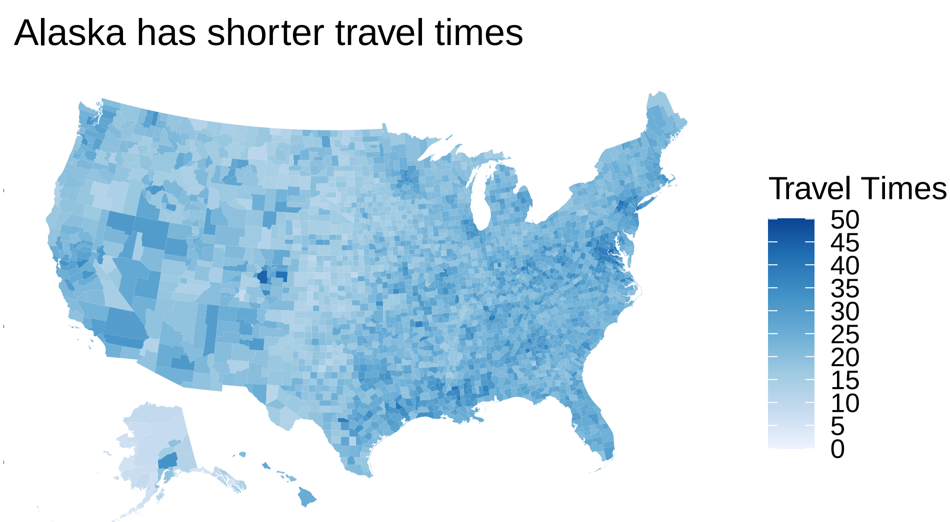


```
# Graph 5
require(plotly)
```

```
## Loading required package: plotly

##
## Attaching package: 'plotly'

## The following object is masked from 'package:mosaic':
##
##     do

## The following object is masked from 'package:ggplot2':
##
##     last_plot

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

```
##     filter
```

```
## The following object is masked from 'package:graphics':
##
##     layout
```

```
california = subset(all_county_data, state == "CA")
head(california)
```

```
##           long       lat order  hole piece            group    id
## 23841 -1922167 -581787.3 23841 FALSE     1 0500000US06001.1 06001
## 23842 -1924754 -579042.1 23842 FALSE     1 0500000US06001.1 06001
## 23843 -1926594 -576241.4 23843 FALSE     1 0500000US06001.1 06001
## 23844 -1926936 -575248.8 23844 FALSE     1 0500000US06001.1 06001
## 23845 -1926473 -575121.5 23845 FALSE     1 0500000US06001.1 06001
## 23846 -1925950 -572798.5 23846 FALSE     1 0500000US06001.1 06001
##                 name state census_region      pop_dens   pop_dens4   pop_dens6
## 23841 Alameda County    CA          West [ 1000, 5000) [118,71672] [215,71672]
## 23842 Alameda County    CA          West [ 1000, 5000) [118,71672] [215,71672]
## 23843 Alameda County    CA          West [ 1000, 5000) [118,71672] [215,71672]
## 23844 Alameda County    CA          West [ 1000, 5000) [118,71672] [215,71672]
## 23845 Alameda County    CA          West [ 1000, 5000) [118,71672] [215,71672]
## 23846 Alameda County    CA          West [ 1000, 5000) [118,71672] [215,71672]
##         pct_black     pop female white black travel_time land_area hh_income
## 23841 [10.0,15.0) 1610921     51    52  12.4        28.8    739.02     72112
## 23842 [10.0,15.0) 1610921     51    52  12.4        28.8    739.02     72112
## 23843 [10.0,15.0) 1610921     51    52  12.4        28.8    739.02     72112
## 23844 [10.0,15.0) 1610921     51    52  12.4        28.8    739.02     72112
## 23845 [10.0,15.0) 1610921     51    52  12.4        28.8    739.02     72112
## 23846 [10.0,15.0) 1610921     51    52  12.4        28.8    739.02     72112
##       su_gun4 su_gun6 fips votes_dem_2016 votes_gop_2016 total_votes_2016
## 23841 [ 0, 5) [ 0, 4) 6001         486351          91189           613195
## 23842 [ 0, 5) [ 0, 4) 6001         486351          91189           613195
## 23843 [ 0, 5) [ 0, 4) 6001         486351          91189           613195
## 23844 [ 0, 5) [ 0, 4) 6001         486351          91189           613195
## 23845 [ 0, 5) [ 0, 4) 6001         486351          91189           613195
## 23846 [ 0, 5) [ 0, 4) 6001         486351          91189           613195
##       per_dem_2016 per_gop_2016 diff_2016 per_dem_2012 per_gop_2012 diff_2012
## 23841    0.7931425    0.1487113    395162    0.7845666    0.1868421    333761
## 23842    0.7931425    0.1487113    395162    0.7845666    0.1868421    333761
## 23843    0.7931425    0.1487113    395162    0.7845666    0.1868421    333761
## 23844    0.7931425    0.1487113    395162    0.7845666    0.1868421    333761
## 23845    0.7931425    0.1487113    395162    0.7845666    0.1868421    333761
## 23846    0.7931425    0.1487113    395162    0.7845666    0.1868421    333761
##        winner partywinner16 winner12 partywinner12 flipped
## 23841 Clinton      Democrat    Obama      Democrat      No
## 23842 Clinton      Democrat    Obama      Democrat      No
## 23843 Clinton      Democrat    Obama      Democrat      No
## 23844 Clinton      Democrat    Obama      Democrat      No
## 23845 Clinton      Democrat    Obama      Democrat      No
## 23846 Clinton      Democrat    Obama      Democrat      No
```

```
gf_polygon(lat~long,data=california,group=~group, fill=~hh_income) %>%
  gf_refine(coord_equal()) %>%
  gf_labs(fill="Household Income", title="\n\tSan Mateo County has the Highest Household
        Income in California")
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x9

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x9

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## font width unknown for character 0x9
```

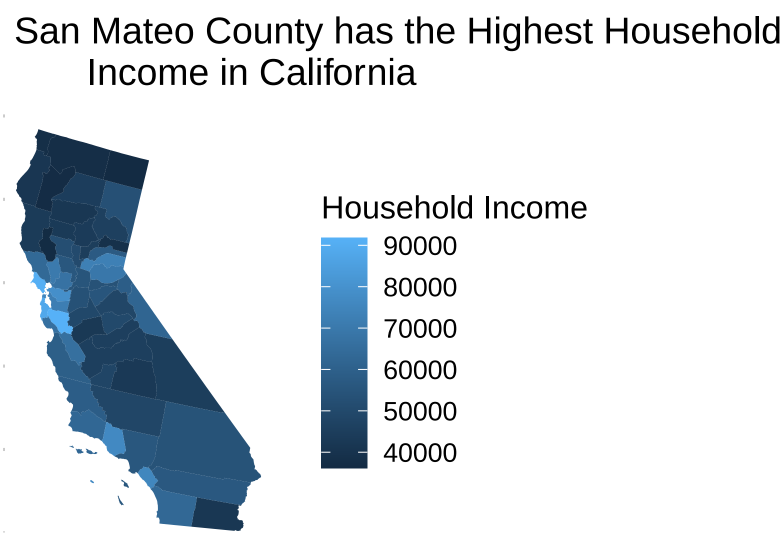


```r
cali_housing = gf_polygon(lat~long,data=california,group=~group, fill=~hh_income,color=~name) %>%
  gf_refine(coord_equal())
# ggplotly(cali_housing)
```

```r
# Graph 6
# data("opiates")
# head(opiates)
# opiates$state = tolower(opiates$state)
# opiates
# States$state = States$region
# opiates_state = full_join(opiates,States, by="state")
# opiates_state
# opiates_state_grouped = opiates_state %>% group_by(year)
# opiates_state$avg = mean(opiates_state_grouped$deaths)
# opiates_state_grouped
```

```
# gf_polygon(lat~long|year, data=opiates_state,group=~group, fill=~avg)
```