Mapping the 2020 U.S. Presidential Election

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Building our function

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 3.6.3
```

```
## -- Attaching packages --------------------------------- tidyverse 1.3.0 --
```

```
## v ggplot2 3.3.3     v purrr   0.3.4
## v tibble  3.0.3     v dplyr   1.0.2
## v tidyr   1.1.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.5.0
```

```
## Warning: package 'ggplot2' was built under R version 3.6.3
```

```
## Warning: package 'tibble' was built under R version 3.6.3
```

```
## Warning: package 'tidyr' was built under R version 3.6.3
```

```
## Warning: package 'readr' was built under R version 3.6.3
```

```
## Warning: package 'purrr' was built under R version 3.6.3
```

```
## Warning: package 'dplyr' was built under R version 3.6.3
```

```
## Warning: package 'forcats' was built under R version 3.6.3
```

```
## -- Conflicts ------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(lubridate)
```

```
## Warning: package 'lubridate' was built under R version 3.6.3
```

```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```r
library(usmap)
```

```
## Warning: package 'usmap' was built under R version 3.6.3
```

```r
library(gridExtra)
```

```
## Warning: package 'gridExtra' was built under R version 3.6.3
```

```
##
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     combine
```

```r
# import data
presidential<-read.csv("C:/Users/jonah/Downloads/USElection2020-NYT-Results-master/USElection2020-NYT-R
electiondata=presidential

electoralvotes<-read.csv("C:/Users/jonah/Downloads/electoralvotes.csv")

# Creating our function
plot_election_results<-function(electoral=F,vote_type="total",region=c()) # default arguments
{
  # new data frame

  newdata=electiondata[,c("fips","votes","absentee_votes","results_trumpd","results_bidenj","results_abs
  newdata=dplyr::filter(newdata)%>%arrange(fips)
  newdata=newdata[,c("votes","absentee_votes","results_trumpd","results_bidenj","results_absentee_trumpd
  newdata=aggregate(. ~ state,newdata,sum)


  fips <- statepop$fips
  newdata=cbind(newdata,fips)
  newdata=newdata[,c(8,1,2,3,4,5,6,7)]

  # calculate in person, absentee, and total percentages for Biden and Trump, respectively
  # Then add those new variables to data frame

  newdata = transform(newdata, pct_tot_biden = results_bidenj / votes)
  newdata = transform(newdata, pct_tot_trump = results_trumpd / votes)
  newdata = transform(newdata, pct_absentee_biden = results_absentee_bidenj / absentee_votes)
  newdata = transform(newdata, pct_absentee_trump = results_absentee_trumpd / absentee_votes)
  newdata = transform(newdata, pct_inperson_biden = (results_bidenj - results_absentee_bidenj) / (votes
  newdata = transform(newdata, pct_inperson_trump = (results_trumpd - results_absentee_trumpd) / (votes

  newdata=cbind(newdata,electoralvotes$number.of.votes)
  names(newdata)[15] <- "electoral_votes"


  state_centers=usmap_transform(tibble(state.center$x,state.center$y,state.name))
```

```
head(state_centers)
ecdata=newdata
ecdata=ecdata[-9,] # Removes value for Washington, D.C for state coordinate purposes
ecdata=mutate(ecdata,center_long=state_centers$state.center.x.1,center_lat=state_centers$state.center

ecdata[2,16]=-1203560
ecdata[2,17]=-1837070
ecdata[11,16]=-450000
ecdata[11,17]=-2130070

x=c(1:50)
x
ec_tot_winner = vector()
for (val in x)
{
  if((ecdata$results_bidenj[val]) > (ecdata$results_trumpd[val]))
  {
    ec_tot_winner[val]="Biden"
  }
  else
  {
    ec_tot_winner[val]="Trump"
  }
}
ecdata=cbind(ecdata,ec_tot_winner)


ec_abs_winner = vector()
for (val in x)
{
  if((ecdata$results_absentee_bidenj[val]) > (ecdata$results_absentee_trumpd[val]))
  {
    ec_abs_winner[val]="Biden"
  }
  else
  {
    ec_abs_winner[val]="Trump"
  }
}
ecdata=cbind(ecdata,ec_abs_winner)


ec_ip_winner = vector()
for (val in x)
{
  if((ecdata$pct_inperson_biden[val]) > (ecdata$pct_inperson_trump[val]))
  {
    ec_ip_winner[val]="Biden"
  }
  else
  {
    ec_ip_winner[val]="Trump"
  }
```

```
}
ecdata=cbind(ecdata,ec_ip_winner)

evotestot=aggregate(ecdata$electoral_votes,by=list(ecdata$ec_tot_winner),FUN=sum)
evotesabs=aggregate(ecdata$electoral_votes,by=list(ecdata$ec_abs_winner),FUN=sum)
evotesip=aggregate(ecdata$electoral_votes,by=list(ecdata$ec_ip_winner),FUN=sum)

if(!(electoral))
{
  if(vote_type=="total")
  {
    plot_usmap(data = newdata, values = "pct_tot_biden", regions="states", include=region) +
      scale_fill_continuous(
        low = "red", high = "blue", name = "Percent for Biden", label = scales::comma
      ) + theme(legend.position = "right") +
      ggtitle("Percent of Popular Vote") +
      theme(plot.title = element_text(size=14))
  }
  else if(vote_type=="absentee")
  {
    plot_usmap(data = newdata, values = "pct_absentee_biden", regions="states", include=region) +
      scale_fill_continuous(
        low = "red", high = "blue", name = "Percent for Biden", label = scales::comma
      ) + theme(legend.position = "right") +
      ggtitle("Percent of Absentee Votes") +
      theme(plot.title = element_text(size=14))
  }
  else if(vote_type=="in-person")
  {
    plot_usmap(data = newdata, values = "pct_inperson_biden", regions="states", include=region) +
      scale_fill_continuous(
        low = "red", high = "blue", name = "Percent for Biden", label = scales::comma
      ) + theme(legend.position = "right") +
      ggtitle("Percent of In-Person Votes") +
      theme(plot.title = element_text(size=14))
  }
  else
  {
    stop("Invalid input")
  }
}
else if(electoral)
{
  if(vote_type=="total")
  {
    plot_usmap(data=ecdata,values="ec_tot_winner", regions="states",include=region) +
      scale_fill_manual(values = c(`Biden` = "blue", `Trump` = "red"), name = "Candidate",labels=c("B
      theme(legend.position = "right") +
      geom_text(data=ecdata,aes(x=center_long,y=center_lat,label=electoral_votes)) +
      ggtitle("Electoral College Results \nBiden: 306 Electoral Votes \nTrump: 232 Electoral Votes") +
      theme(plot.title = element_text(size=14))
  }
  else if(vote_type=="absentee")
```

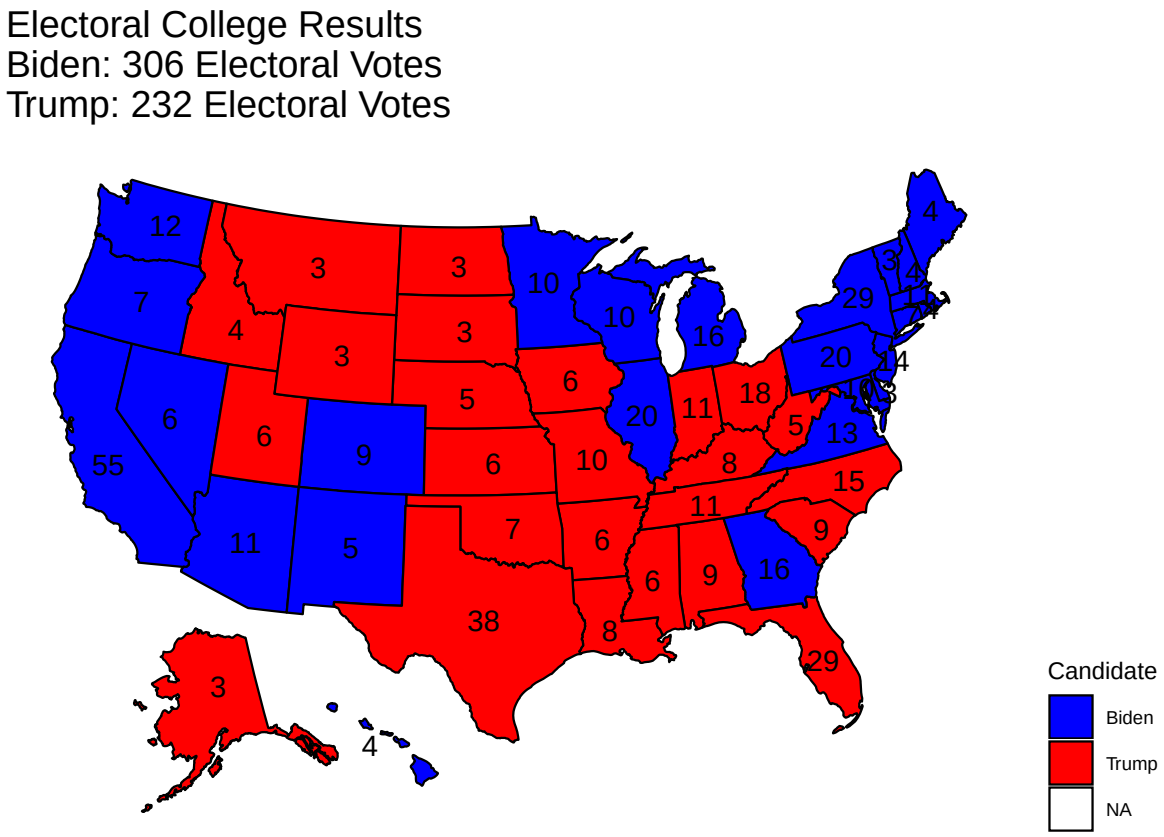
```
    {
      plot_usmap(data=ecdata,values="ec_abs_winner", regions="states",include=region) +
        scale_fill_manual(values = c(`Biden` = "blue", `Trump` = "red"), name = "Candidate",labels=c("B
        theme(legend.position = "right") +
        geom_text(data=ecdata,aes(x=center_long,y=center_lat,label=electoral_votes)) +
        ggtitle("Electoral College Results Based on Absentee Votes \nBiden: 354 Electoral Votes \nTrump
        theme(plot.title = element_text(size=14))
    }
    else if(vote_type=="in-person")
    {
      plot_usmap(data=ecdata,values="ec_ip_winner", regions="states",include=region) +
        scale_fill_manual(values = c(`Biden` = "blue", `Trump` = "red"), name = "Candidate",labels=c("B
        theme(legend.position = "right") +
        geom_text(data=ecdata,aes(x=center_long,y=center_lat,label=electoral_votes)) +
        ggtitle("Electoral College Results Based on In-Person Votes \nBiden: 230 Electoral Votes \nTrump
        theme(plot.title = element_text(size=14))
    }
    else
    {
      stop("Invalid input")
    }
  }



}
```

Testing our function

Case 1: Electoral College Map for all 50 States

```
plot_election_results(electoral=T,vote_type = "total")
```

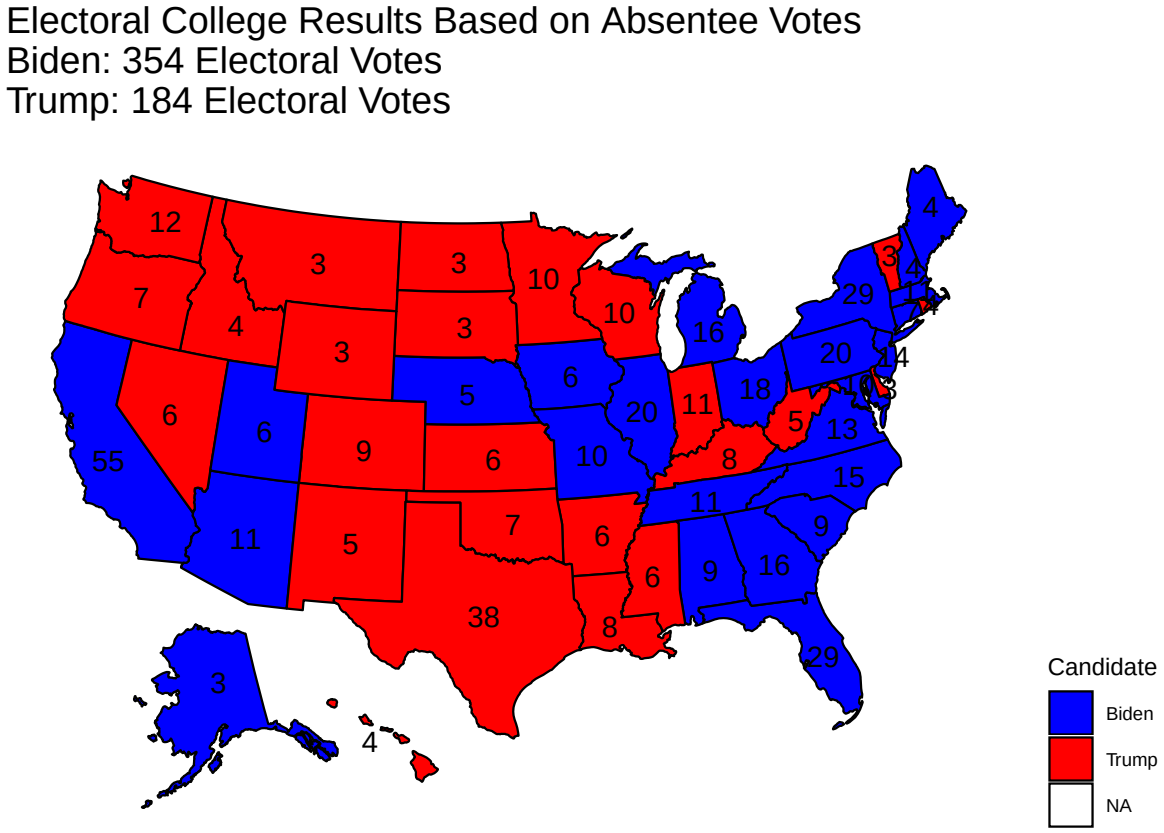
```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO",
## prefer_proj = prefer_proj): Discarded datum unknown in CRS definition
```



Case 2: Electoral College Map based on Absentee Votes for all 50 States

```
plot_election_results(electoral=T,vote_type = "absentee")
```

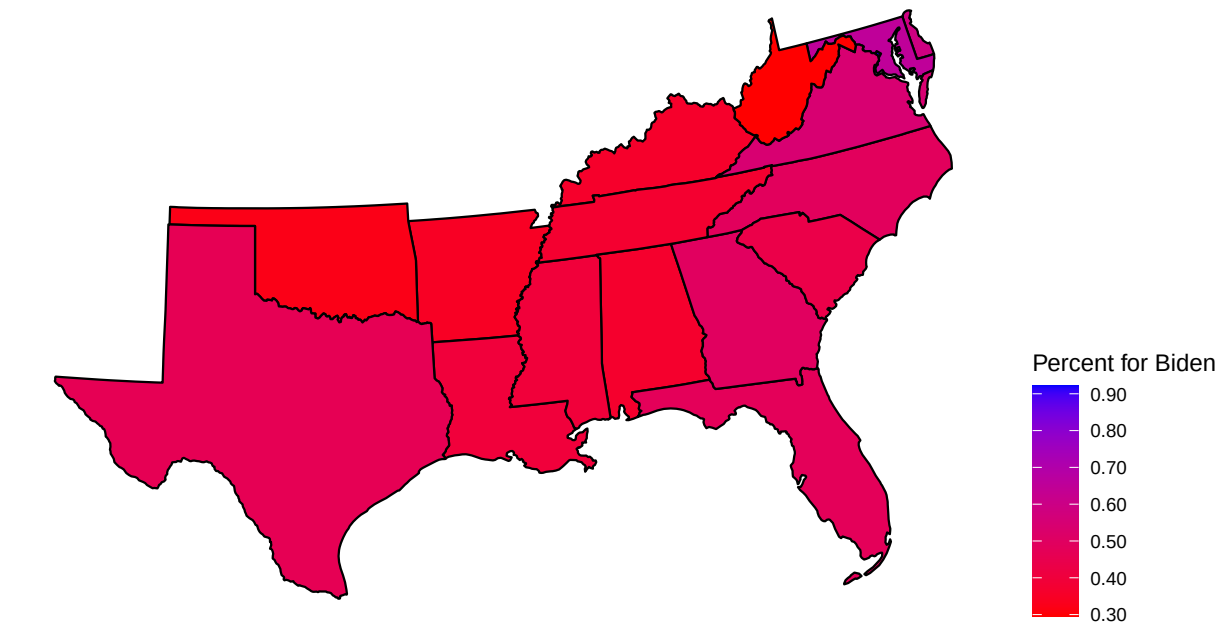
```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO",
## prefer_proj = prefer_proj): Discarded datum unknown in CRS definition
```



Case 3: Popular Vote Percentage for Southern Region

```
plot_election_results(electoral=F,vote_type = "total",region=.south_region)
```

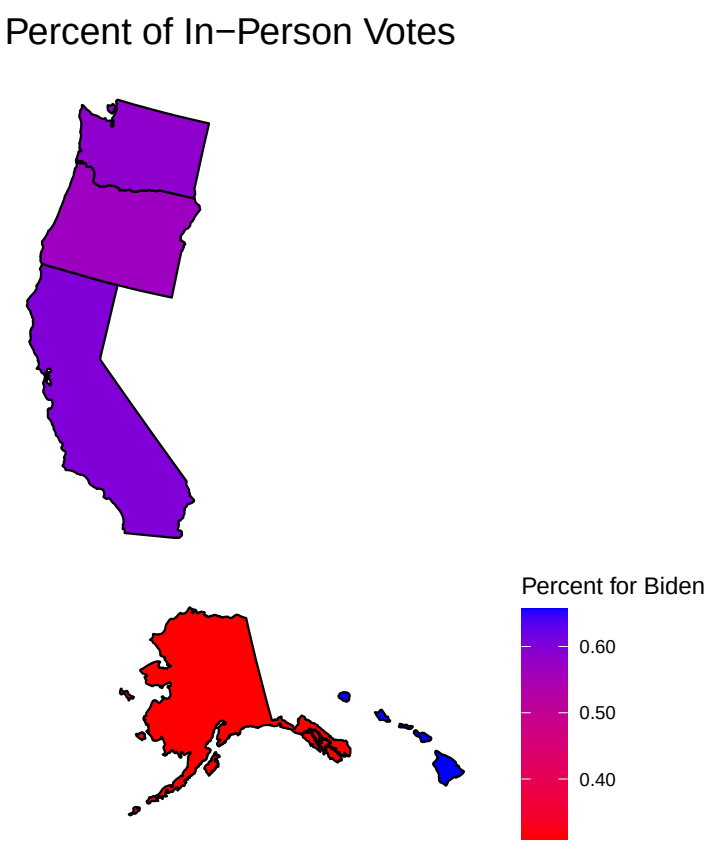
```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO",
## prefer_proj = prefer_proj): Discarded datum unknown in CRS definition
```



Case 4: Popular Vote Percentage based on In-Person Votes for Pacific Region

```
plot_election_results(electoral=F,vote_type = "in-person",region=.pacific)
```

```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO",
## prefer_proj = prefer_proj): Discarded datum unknown in CRS definition
```


Percent of In−Person Votes
Percent for Biden
0.60
0.50
0.40