STAT 515: RE-DESIGN PROJECT – 2016 PRESIDENTIAL GENERAL ELECTION

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INTRODUCTION

Dave Leip's Atlas of U.S. Presidential Elections provides free resources on the results of the U.S. Presidential Elections. The Atlas aggregates official election results from many official sites and presents it in convenient formats.

The current report gives a summary of the 2016 presidential general election in the United States.

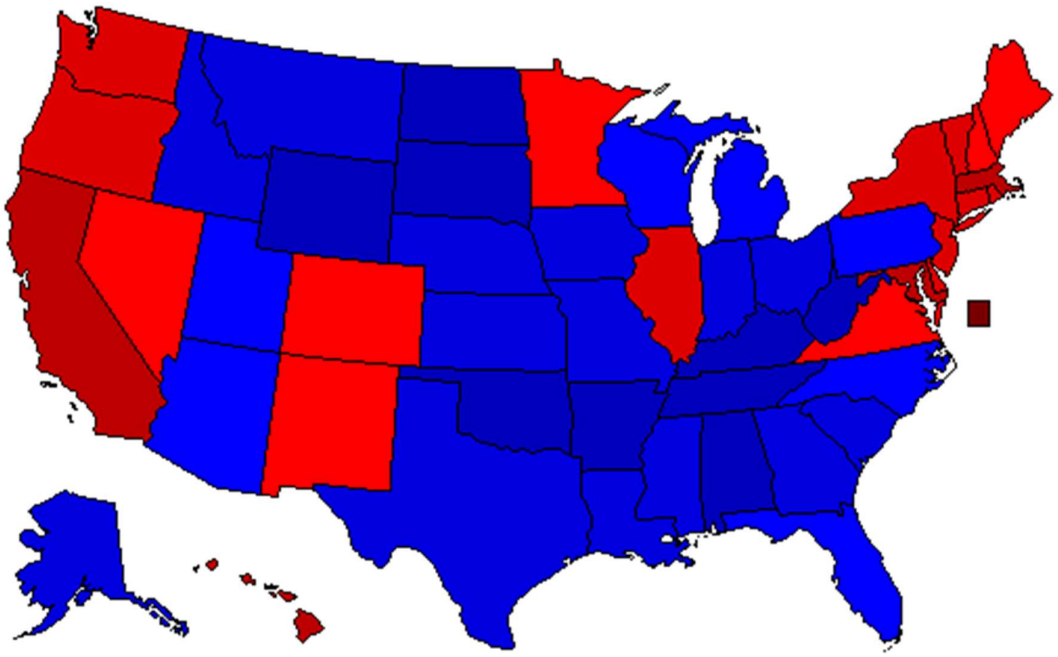

Fig 1.1: Original Graph

In the Atlas, it explains that Fig 1.1 is a representation of the 2016 election results from all 50 states plus District of Columbia. The red in the map represents Democrats and the blue represents Republicans. The different colour gradients represent the margin by which a particular candidate won in each state.

ISSUES IDENTIFIED

1. No information on the kind of data that is represented by the graph.
2. The map shown in Fig 1.1 alone, without the data, does not provide clear information. It does not have a title to explain the basic purpose of the map and neither has a color legend to explain what the colors represent.

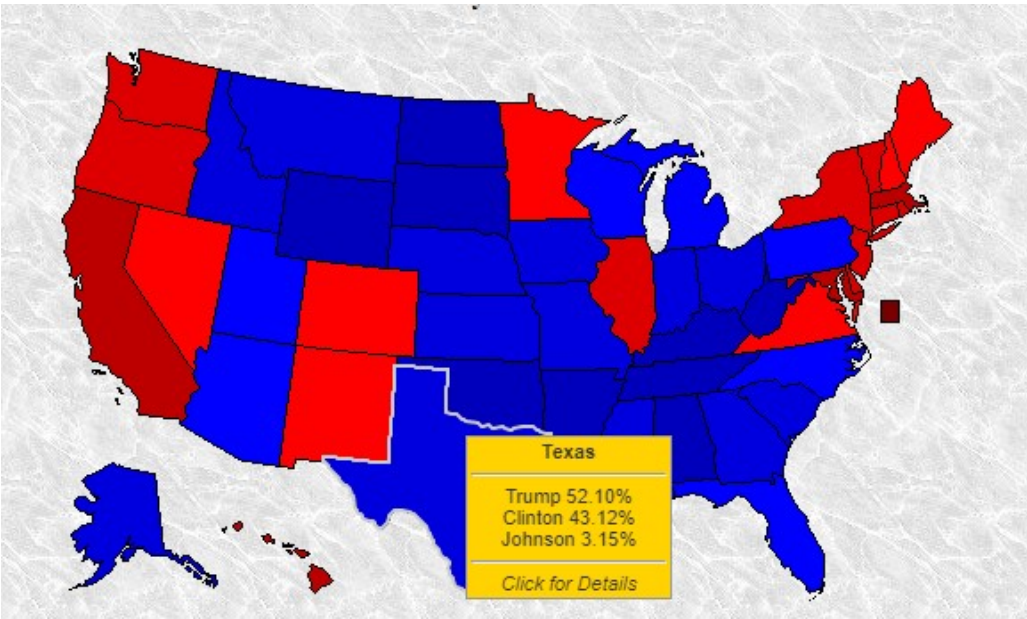

Fig 1.2: Original Graph

3. Fig 1.2 shows the percentage win of each candidate in Texas. The election result of each state is represented as a comparison between multiple candidates and the colour gradients represent the margin by which a candidate wins. The map does not provide any information on what the colours and the gradients represent.

ALTERNATE REPRESENTATION

Fig 1.1 without the data seems like it is the representation of election results of Donald Trump and Hillary Clinton. For the representation of results of the 2 candidates alone, other simpler graphs can be used.

- **LOLLIPOP CHART**

  A lollipop chart is similar to a bar chart which has lines instead of bars which makes it less clustered and gives more importance and focus to the value (dot).

  Fig 1.3 shows a Lollipop chart that represents Trump versus Clinton wins. It plots the 50 states and District of Columbia against the margin of victory.

Margin here is a separate column in the data set that represents the difference between the highest and the second highest number of votes among the candidates across each state. The below graph represents the Margin of victory for candidates that won in each state. It gives a summary on which candidate won in which state and with how many votes. Since, in all the states, its either Trump or Clinton who won, it shows a comparison on what margin did each candidate win and in how many states.

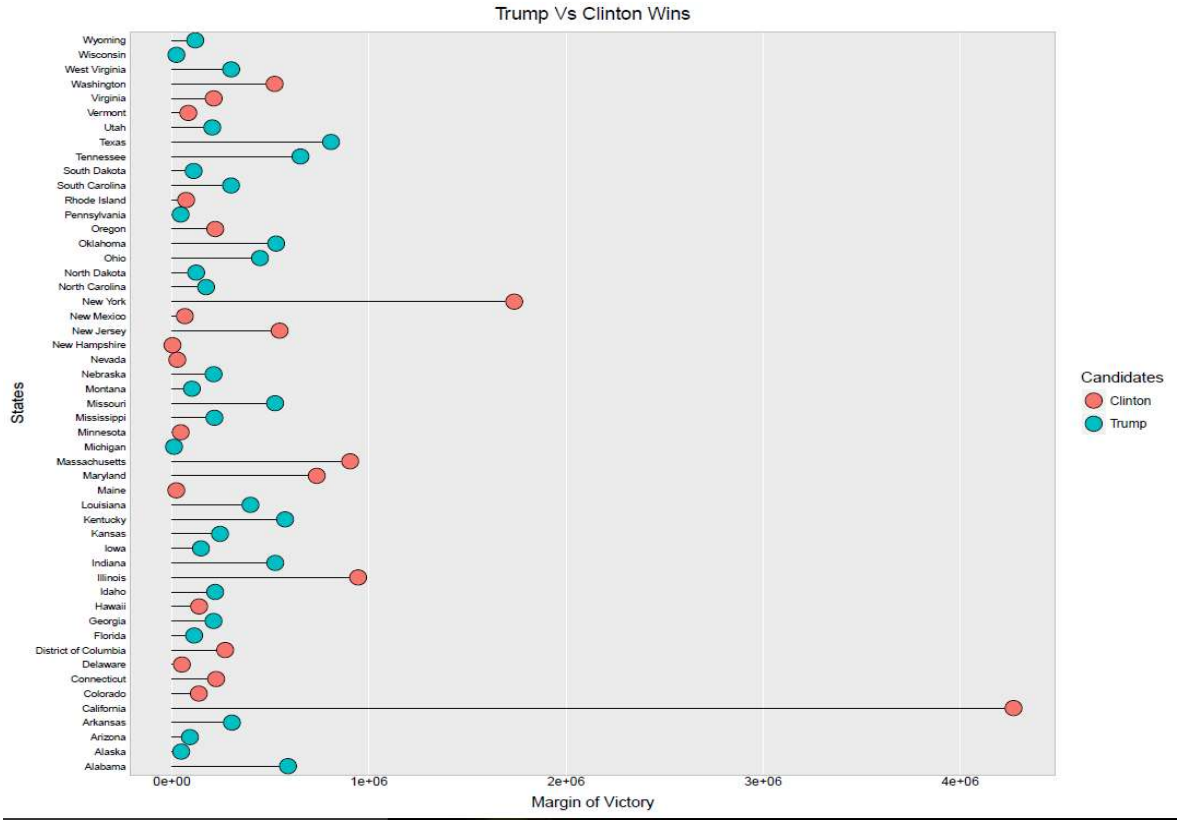

Fig 1.3: Lollipop chart

SOLUTION

The solution aims at representing the data in a more detailed manner in contrast to the existing graph. The resulting map will plot all the candidates participating in the elections and the votes won by each in all the 50 states and District of Columbia. Micromaps sorts the data points of all the states and groups them into 10 groups of 5 states each and 1 group of 1 state(median). This makes it easier to understand the values that are above and below the median.

PRE_MODELLING

The data used in the representation of the map in Fig1.1 contains names of the states, votes won by Hillary Clinton, Donald Trump, Gary Johnson and others, the margin by which a candidate wins and the electoral votes.

For creating the solution, the data was extracted, the column with names of the states was modified to be compatible with those in the micromapST package used in R. The part of the data used to create the solution is the number of votes of each candidate and state names.

MODELLING

- **FACET PLOT**

The below Fig.1.4, is a Facet plot with geom_point with Number of votes Trump won against each U.S. State. States are divided into matrix of panels, and are like ordered subsets of data that are defined by faceting variables number of Votes Trump won and U.S. States. From the graph, we can identify the group of states that follow the same trend or pattern. Also, we can easily get top states where Trump won more votes or bottom states where he won lesser votes.

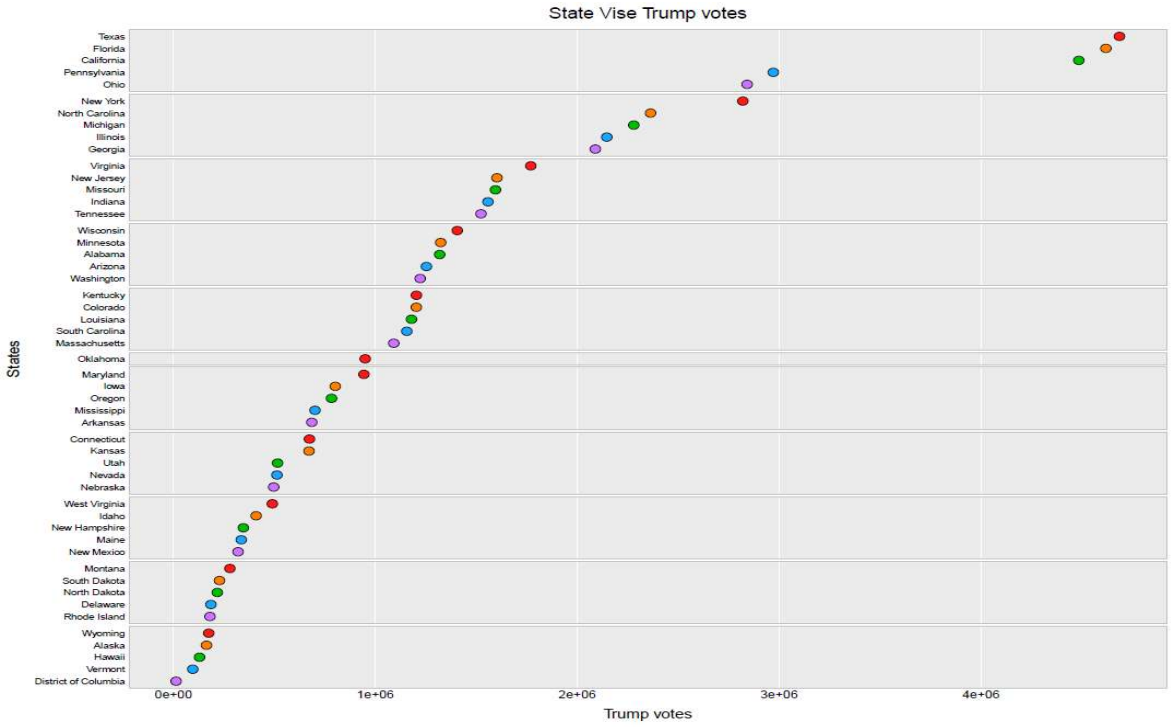

Fig 1.4: Facet Plot

- **MICROMAP**

MicromapST package is used to create linked micromap plots of the 50 U.S. states and District of Columbia. The plot rows represent the states and the plot columns are used to present different variables from the data to get different representations of the data. The data in the columns can be represented in various ways such as bars, dots, arrows and scatter plots. In the Fig.1.5 by considering 5 columns from the data, we have plotted the graph using Micromaps. The graph describes the number of votes each candidate won i.e. Clinton, Johnson and Others with respect to decreasing number of votes won by Trump in each of the US states. Hence, the graph gives a clear comparison on the number of votes won by each candidate. It gives us an insight on how certain

group of states have voted the most/least. It also shows that Oklahoma acts as the median for the sorted matrix of panels.

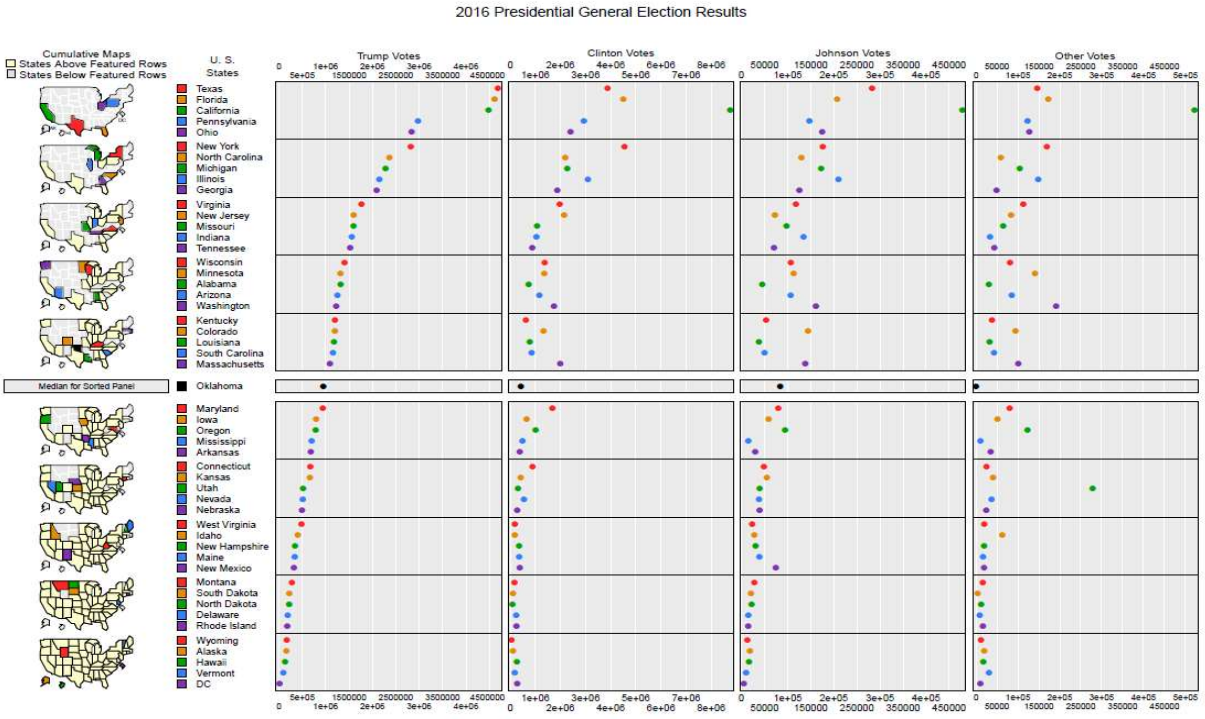

Fig 1.5: Linked Micromaps

REFERENCES

[1].Dave Leip's Atlas of U.S. Presidential Elections (n.d.) *2016 Presidential General Election Data - National* Retrieved from: https://uselectionatlas.org/RESULTS/data.php?year=2016&datatype=national&def=1&f=0&off=0&elect=0

[2]. Carr, D. B., & Pickle, L. W. (2010). *Visualizing data patterns with micromaps*. Boca Raton, FL: Chapman & Hall/CRC.

[3]. Jim Pearson (n.d.) *MicromapST* Retrieved from: https://www.rdocumentation.org/packages/micromapST/versions/1.0.5

Appendix A

R Code

```
-------------------------------------------------

#Title: 2016 Presidential General Election Results"

#Submitted by: Merin Joy and Chandrika Amarkhed

#Date: 03/26/2018

-------------------------------------------------

#Setup using the libraries.

library(ggplot2)

library(tidyverse)

library(micromapST)

-------------------------------------------------

#Read the csv file.

Elections<-read.csv(file="C:/Users/Merin/2016 Elections2.txt",header=TRUE,sep=",")

Elections

head(Elections)

-------------------------------------------------

#Rename the columns.

colnames(Elections)<- c("State","Trump EV","Clinton EV","Other EV","Total Vote","C",

                        "T","J","Margin","Margin%","Clinton%","Trump%","Johnson%","Other%",

                        "Clinton","Trump","Johnson","Other")

head(Elections)

-------------------------------------------------

#Checking for any NA's.

sum(is.na(Elections))

-------------------------------------------------
```

```
#rowTheme

  rowTheme <- theme_gray()+ theme(

    plot.title=element_text(hjust=0.5),

    plot.subtitle=element_text(hjust=0.5),

    plot.caption=element_text(hjust=-.5),

    strip.text.y = element_blank(),

    strip.background=element_rect(fill=rgb(.9,.95,1),

                                  colour=gray(.5), size=.2),

    panel.border=element_rect(fill=FALSE,colour=gray(.75)),

    panel.grid.minor.x = element_blank(),

    panel.grid.minor.y = element_blank(),

    panel.grid.major.y = element_blank(),

    panel.spacing.x = unit(0.07,"cm"),

    panel.spacing.y = unit(0.07,"cm"),

    axis.ticks=element_blank(),

    axis.text=element_text(colour="black"),

    axis.text.y=element_text(size=rel(.78),

                             margin=margin(0,0,0,3)),

    axis.text.x=element_text(margin=margin(-1,0,3,0))

  )

-------------------------------------------------

#Ploting a Lollipop chart.

ggplot(Elections,aes(x=Margin,y=State))+

  geom_segment(aes(x=Margin,

                   xend=0,

                   y=State,
```

```
                yend=State))+
  geom_point(shape=21,size=5,
             aes(fill=ifelse(T==1,"Trump","Clinton")), color="black")+
  labs(x="Margin of Victory",
       y="States",
       title="Trump Vs Clinton Wins",
       fill="Candidates")+rowTheme
```

```
#Order the rows and columns.
Electionsorder<- with(Elections,order(Elections$Trump,decreasing = TRUE))
colorder <- c(1,16,15,17,18,2:14)
colorder
Electionsnew<-Elections[Electionsorder,colorder]
```

```
#Create blocks for ploting rows in the y-axis.
blocks <-as.character(Electionsnew$State)
Electionsnew$State <-factor(blocks,levels=rev(blocks))
levels(Electionsnew$State)
```

```
#Adding groups.
groups <- paste("G",1:11,sep="")
groups
size <- c(5,5,5,5,5,1,5,5,5,5,5)
Electionsnew$Group <- factor(rep(groups, size),level=groups)
Electionsnew$Group
```

```
#Adding row numbers for each group.

order <- rep(1:5,5)

order

seq <- c(order,1,order)

seq

label <- c('1', '2', '3', '4', '5')

temp <- labs[seq]

Electionsnew$Record <- factor(temp,levels = label)

Electionsnew$Record

-----------------------------------------------------

#5 Differenct colour codes.

recordColor<- rgb(

  red  = c(1.00, 1.00, 0.00, 0.10, 0.80),

  green= c(0.10, 0.50, 0.75, 0.65, 0.45),

  blue = c(0.10, 0.00, 0.00, 1.00, 1.00))

-----------------------------------------------------

#Facet plot with geom_point.

ggplot(Electionsnew, aes(x=Trump, y=State,fill=Record,group=Group)) +

  labs(x="Trump votes", y="States",

       title="State Vise Trump votes")+

  geom_point(shape=21,size=3)+

  scale_fill_manual(values=recordColor)+

  guides(fill=FALSE)+

  facet_grid(Group~., scale="free_y", space="free" )+rowTheme

-----------------------------------------------------
```

```
#Micromaps data

Micromapdata<- Electionsnew1[,1:5]

Micromapdata

Micromapdata <- as.data.frame(Micromapdata)

rownames(Micromapdata) <-Micromapdata[,1]

Micromapdata <-Micromapdata[,c(1:5)]

head(Micromapdata)

-----------------------------------------------------

#Creating panels

panel<- data.frame(

  type=c('mapcum','id','dot','dot','dot','dot'),

  lab1=c('','','Trump Votes','Clinton Votes','Johnson Votes','Other Votes'),

  col1=c(NA,NA,2,3,4,5)

)

t(panel)

-----------------------------------------------------

#Micromap plot is produced and saved in pdf

pdf(file= "2016 Election Results.pdf",width = 14, height = 10)

micromapST(Micromapdata,panel,

          rowNamesCol='State',

          rowNames='full',

          plotNames = 'full',

          sortVar='Trump', ascend=FALSE,

          title=c("2016 Presidential General Election Results")

)
```