Fundamentals of Computing and Data Display

Term paper template

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Contents

Introduction

In 2018, Initiative 1631 was on the ballot in Washington state. It asked voters:

"This measure would charge pollution fees on sources of greenhouse gas pollutants and use the revenue to reduce pollution, promote clean energy, and address climate impacts, under oversight of a public board.

Should this measure be enacted into law?""

The Initiative would have enacted a fee a $15 per ton of carbon emitted in 2020 and rise $2 per year until 2035. The revenue would have been invested in “clean air and energy”, “clean water and health forests”, and “healthy communities”. Initiative 1631 was supported by a variety of climate groups, and received endorsements from many activist groups. There was a broad coalition supporting the measure in a state with left-leaning Washington politics, which gave supporters hope that it would pass. However, like many other tax increases, carbon taxes proved unpopular with voters. The referendum did not pass (56% to 44%). (Source: https://www.vox.com/energy-and-environment/2018/9/28/17899804/washington-1631-results-carbon-fee-green-new-deal)

While this referendum was a defeat for climate activists, it is an interesting case study to compare the online support for a ballot initiative with actual voting results. For our analysis, we collect Twitter data about Initiative 1631 and compare it to the actual voting results in Washington state.

Data

First, we begin by collecting Twitter data. We each applied and obtained Twitter Enterprise accounts, which allowed us to access the entire Twitter archive. (For future researchers, each account is allowed free access to 5,000 Tweets. Once the limit is reached, Twitter will charge for further access.)

We pulled the Tweets by the four weeks before the election. We pulled more tweets closer to Election Day (November 06, 2018) because interest in an election generally increases as the date gets closer.

Trying to do a final pull We are doing one more pull to determine we get a natural sample of tweets, so we pull an extra 500 tweets that just mention Initiative 1631 to ensure that we have a more representative sample. This pull results in 490 tweets.

We take the new tweets and combine it with our other 1689 tweets.

We check for duplicates by status_id, which is unique to each tweet. No duplicates were found.

With the lat_lng function, we can also get the latitude and longitude of the tweet. This function from rtweet pulls all available latitude and longitude information for each tweet. However, this pull only results in two tweets with location information. This is because Twitter users need to allow Twitter to pull their geolocation and the vast majority of users opt out.

We do not want to keep running the Twitter search_fullarchive function because it will eventually charge us money to pull more data, so we saved the data in CSV file. Then we removed duplicate tweets. There were about 400 duplicate tweets in the file.

We also obtained the user data that was associated with the Twitter accounts in the file above. The "users_data" function in rtweet pulls information about the individual users which we stored in a new file.

All location data in Twitter is input by the user, so it lacks uniformity and is difficult to work with. However, we start by trying to isolate the city from the user location data. Of note, this information is entered by the user and may be not accurate, but there is no way to verify location.

To match the Twitter-user entered city, we need to match that with the relevant county information. We obtained a list of Washington cities and their respective counties from the Washington Court System Website (https://www.courts.wa.gov/court_dir/?fa=court_dir.countycityref). The Washington Court system lists each city and their county in alphabetically order, and we created a CSV from this information.

We conduct more cleaning on the file.

To obtain the voting results, we went to the Washington Secretary of State webpage and downloaded the "All Counties" file to obtain the results of each election broken down by county. (source: https://results.vote.wa.gov/results/20181106/Export.html)

Results

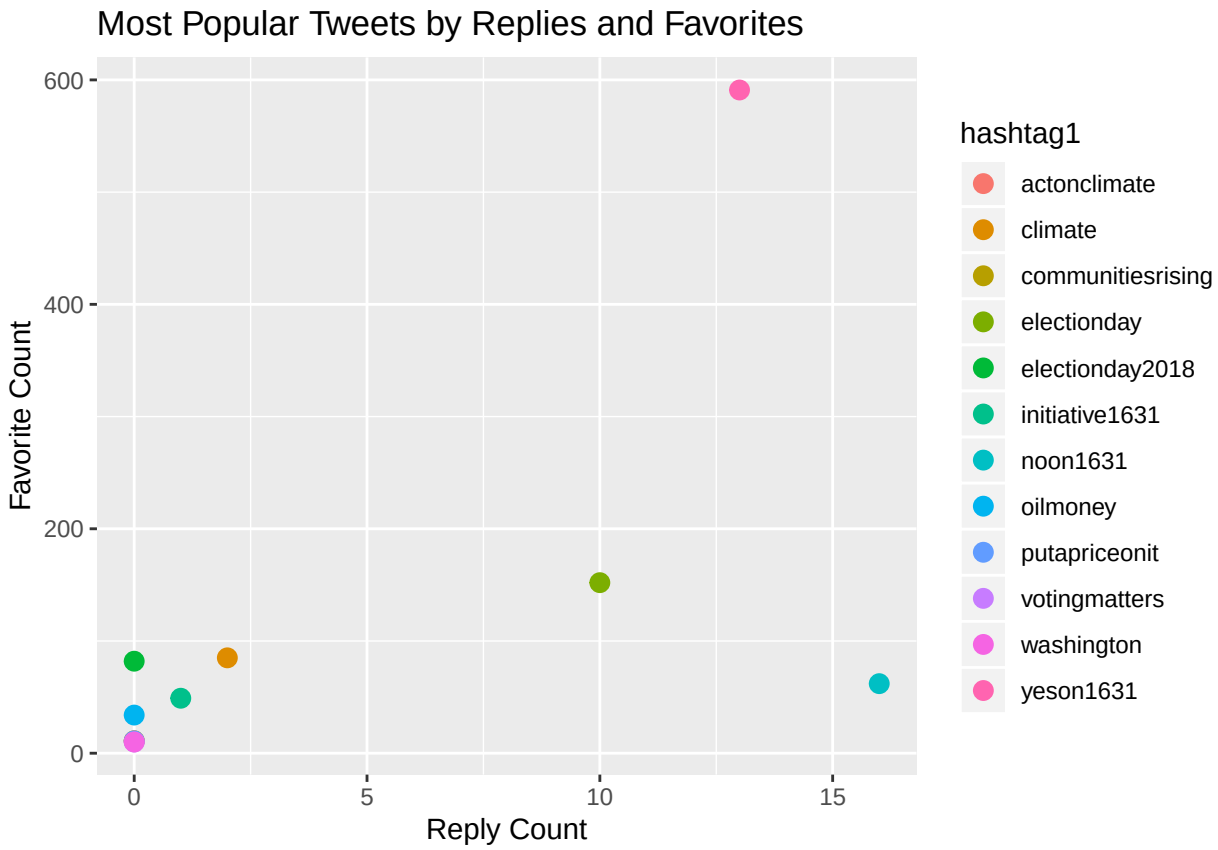
This section presents the main results.

Results

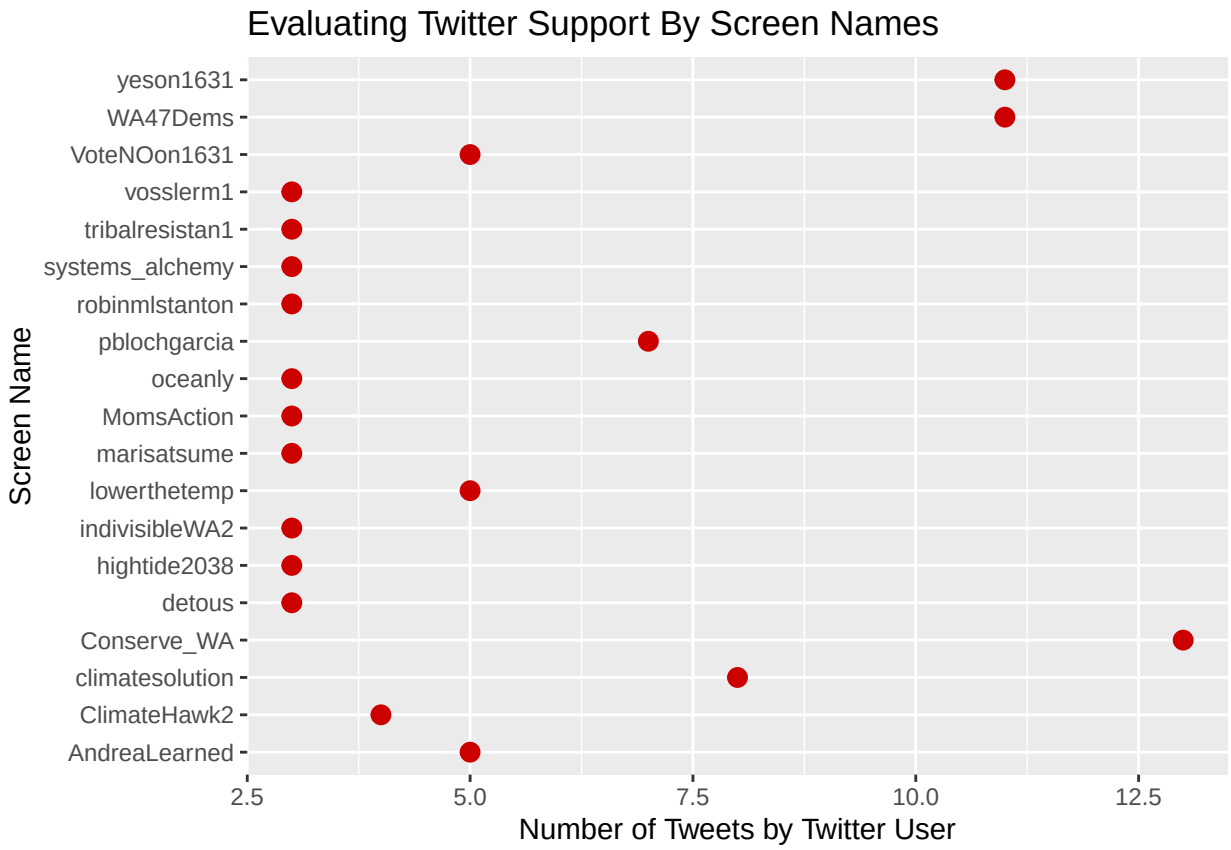
Tweet Results

We created an graph that shows the reply count and favorite count of the primary hashtags used by twitter users. Top 6 hashtags were extracted from 1686 tweets and their primary hashtags were the summed up for total favorite count and reply count.

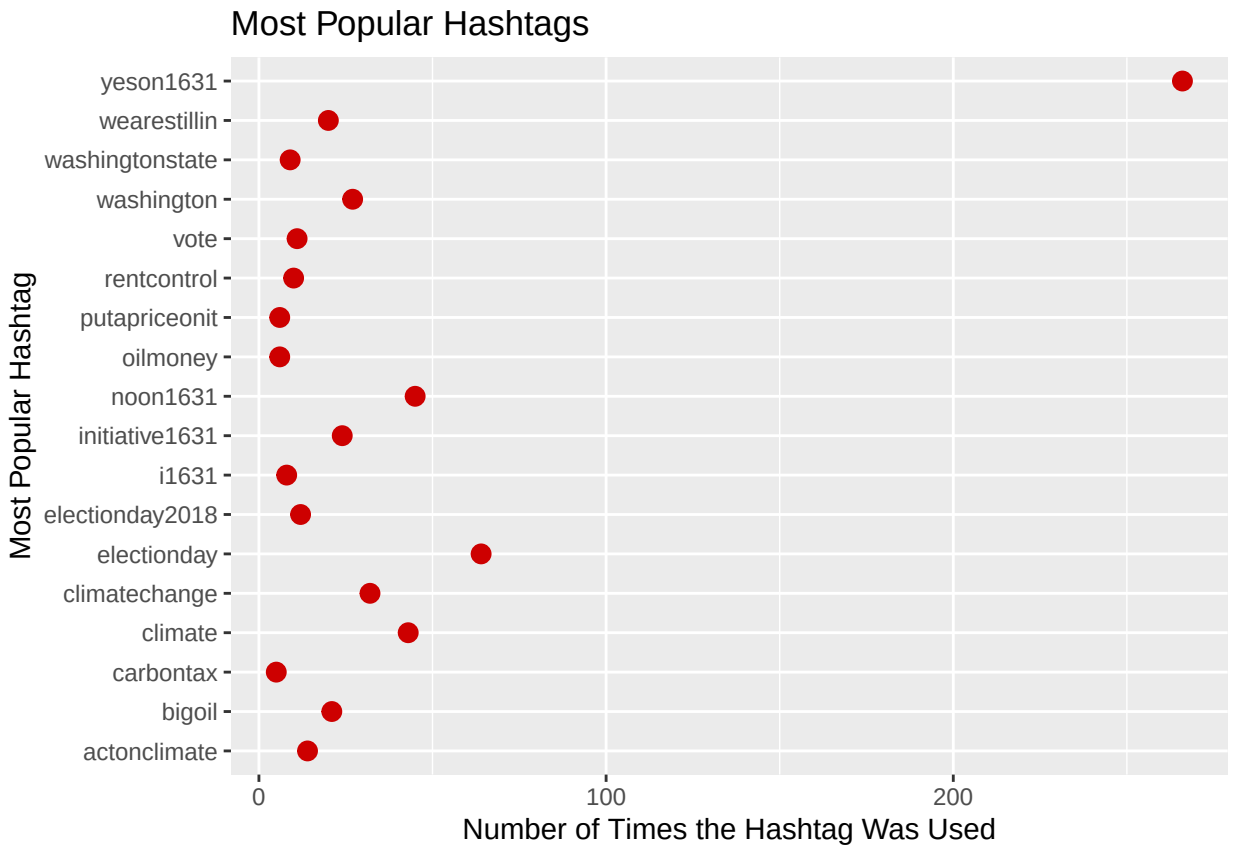
```
popular_tweet_graph
```



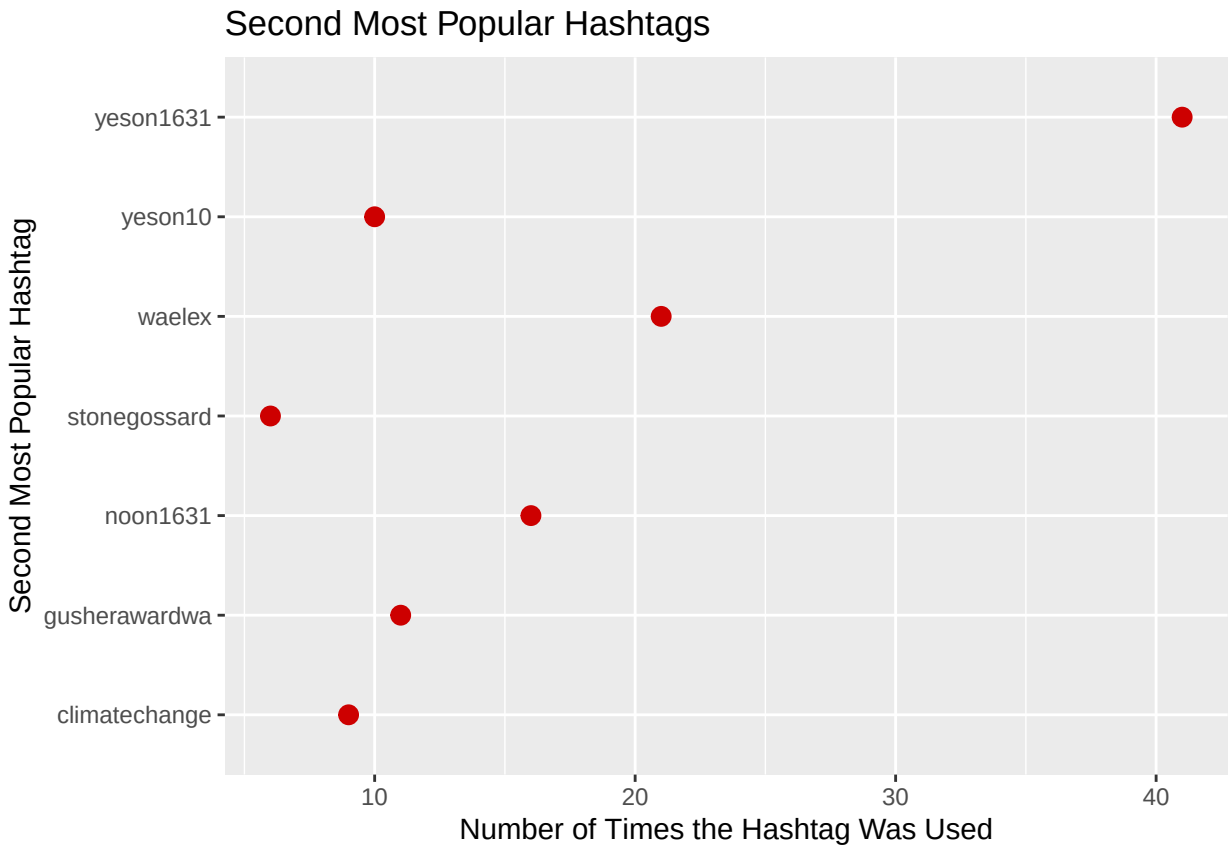

```
user_support_graph
```




```
hashtag_popular
```




```
second_popular
```




```
kable(favorite, "latex") %>%
  column_spec(2, width = "15em")
```

screen_name	text	favorite_count
NaomiAKlein	Clearly a #YesOn1631 demo. https://t.co/aMiZDLTppp	188
yeson1631	.@nytimes endorses #YesOn1631! "If the proposal, Initiative 1631, wins — as we hope it does — the result could ripple beyond Washington's boundaries." Washington can lead! Vote #yeson1631 by Nov. 6! #waelex https://t.co/k9IWSCplYe	120
nature_org	For the 1st time in the U.S., voters in Washington State will choose whether to tax carbon emissions that trap heat in the atmosphere. Initiative 1631 would demonstrate that carbon taxes don't mean economic ruin. https://t.co/4Cd3vY4KSO (@USATODAY) https://t.co/roS5cuTf0g	88
AlexSteffen	What does the Carbon Lobby look like when it's scared? Washingtonians are voting on a breakthrough carbon tax initiative. Oil company donations to the opposition war chest just hit a state record—$25.87 million. That's a lot of fear. #YesOn1631 https://t.co/kY8uDdUb2Z	87
yeson1631	On this #ElectionDay2018, we give thanks to the OVER 6,000 volunteers that made this campaign possible! From gathering 355,000 signatures all the way to making over a half a million voter contacts, our volunteers have inspired us again and again. Thank you. <U+0001F60D><U+0001F64C>#waelex #yeson1631 https://t.co/HSZVVPZ8TP	82
TheAtlantic	A ballot question in Washington state could alter the national politics of climate change, @yayitsrob writes https://t.co/v8Ij1822q7	63

We will also create a table to see the tweets that are shared the most.

```
kable(most_retweets, "latex")%>%
  column_spec(2, width = "15em")
```

screen_name	text	retweet_count
yeson1631	.@nytimes endorses #YesOn1631! "If the proposal, Initiative 1631, wins — as we hope it does — the result could ripple beyond Washington's boundaries." Washington can lead! Vote #yeson1631 by Nov. 6! #waelex https://t.co/k9IWSCplYe	77
AlexSteffen	What does the Carbon Lobby look like when it's scared? Washingtonians are voting on a breakthrough carbon tax initiative. Oil company donations to the opposition war chest just hit a state record—$25.87 million. That's a lot of fear. #YesOn1631 https://t.co/kY8uDdUb2Z	61
NaomiAKlein	Clearly a #YesOn1631 demo. https://t.co/aMiZDLTppp	53
nature_org	For the 1st time in the U.S., voters in Washington State will choose whether to tax carbon emissions that trap heat in the atmosphere. Initiative 1631 would demonstrate that carbon taxes don't mean economic ruin. https://t.co/4Cd3vY4KSO (@USATODAY) https://t.co/roS5cuTf0g	39
TheAtlantic	A ballot question in Washington state could alter the national politics of climate change, @yayitsrob writes https://t.co/v8Ij1822q7	35
yeson1631	On this #ElectionDay2018, we give thanks to the OVER 6,000 volunteers that made this campaign possible! From gathering 355,000 signatures all the way to making over a half a million voter contacts, our volunteers have inspired us again and again. Thank you. <U+0001F60D><U+0001F64C>#waelex #yeson1631 https://t.co/HSZVVPZ8TP	29

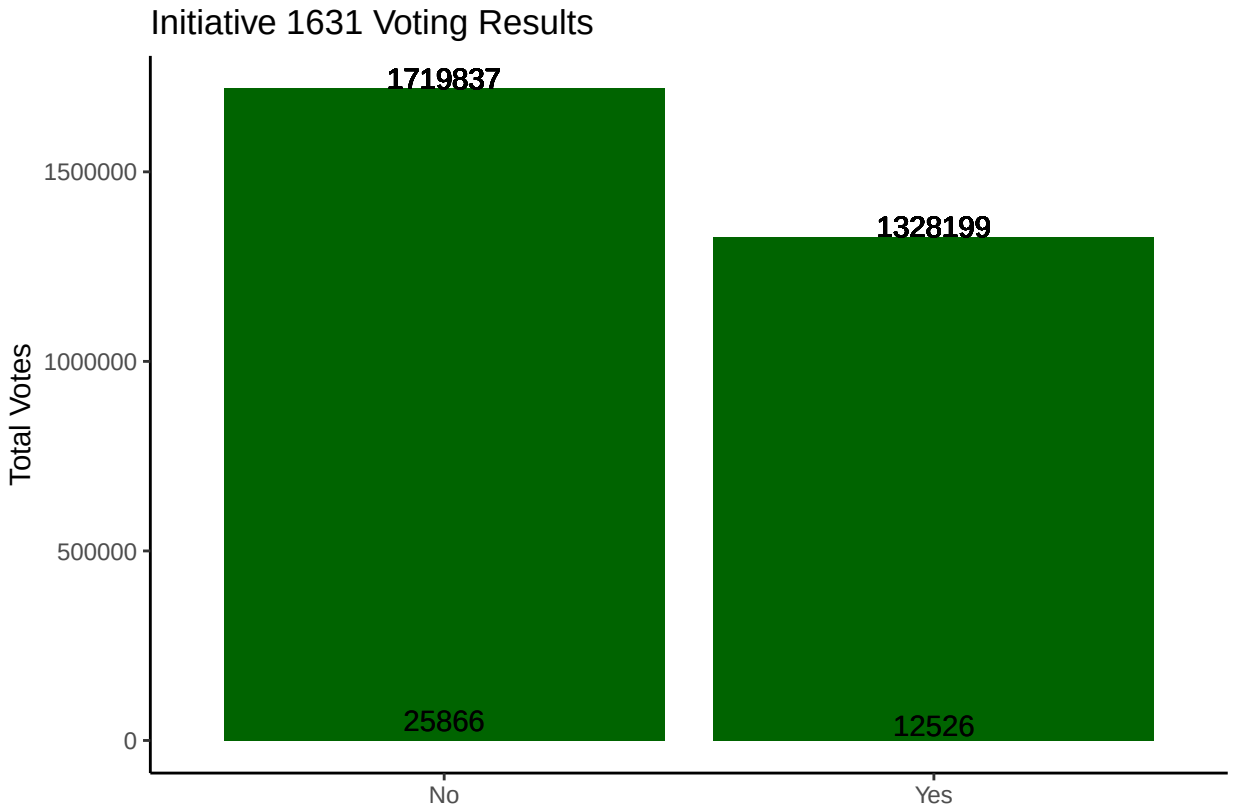
Data exploration

The results section may have a data exploration part, but in general the structure here depends on the specific project.

Voting Results

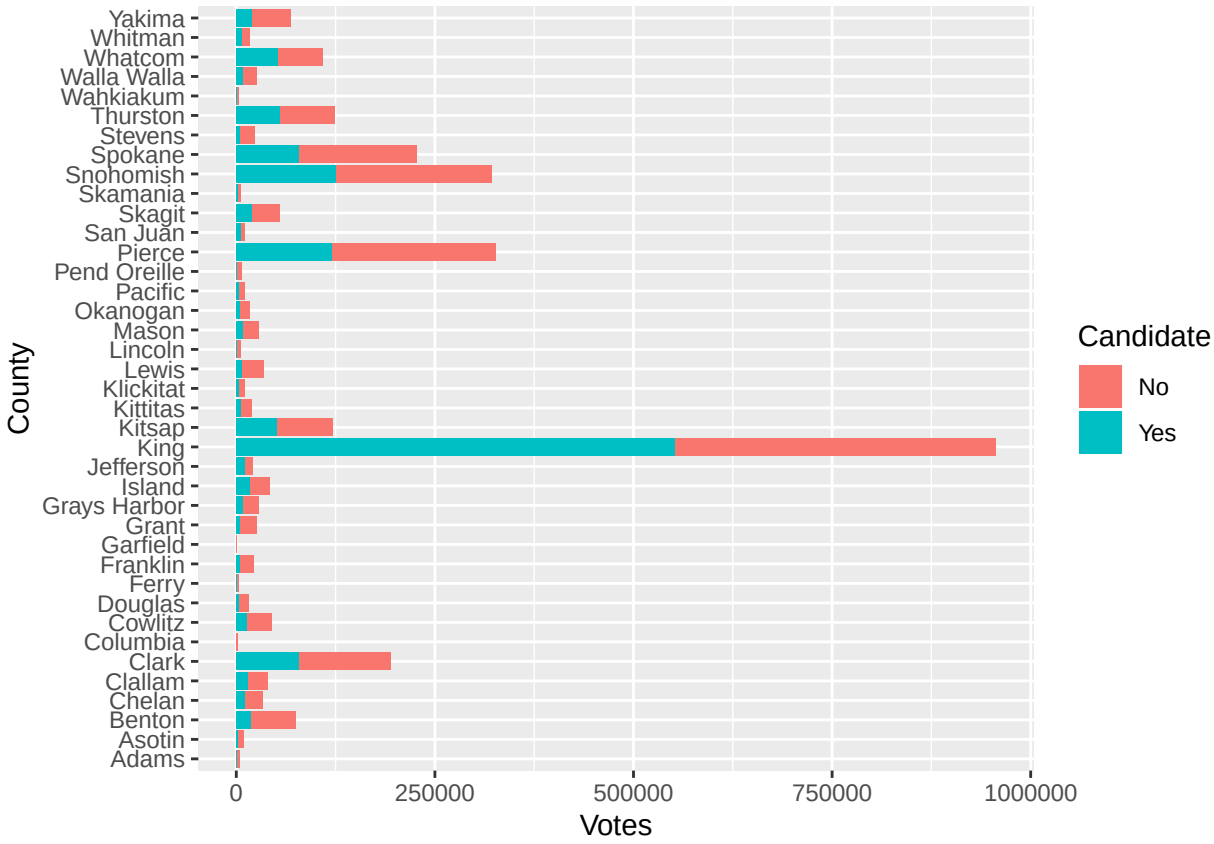
Twitter has a strong level of support for Initiative 1631, but the voting results are very different. Below is a chart that displays the overall sum of votes for Yes and No.

```
vote_count
```



When we look at the results by county, we see that there is significant opposition to the measure in almost every county in the state.

```
#option
ggplot(votes, aes(County, Votes)) +
geom_bar(stat = "identity", aes(fill = Candidate)) + coord_flip()
```



Analysis

Mapping

We pull a map of Washington state and the coordinates for the country boundaries from the maps package.

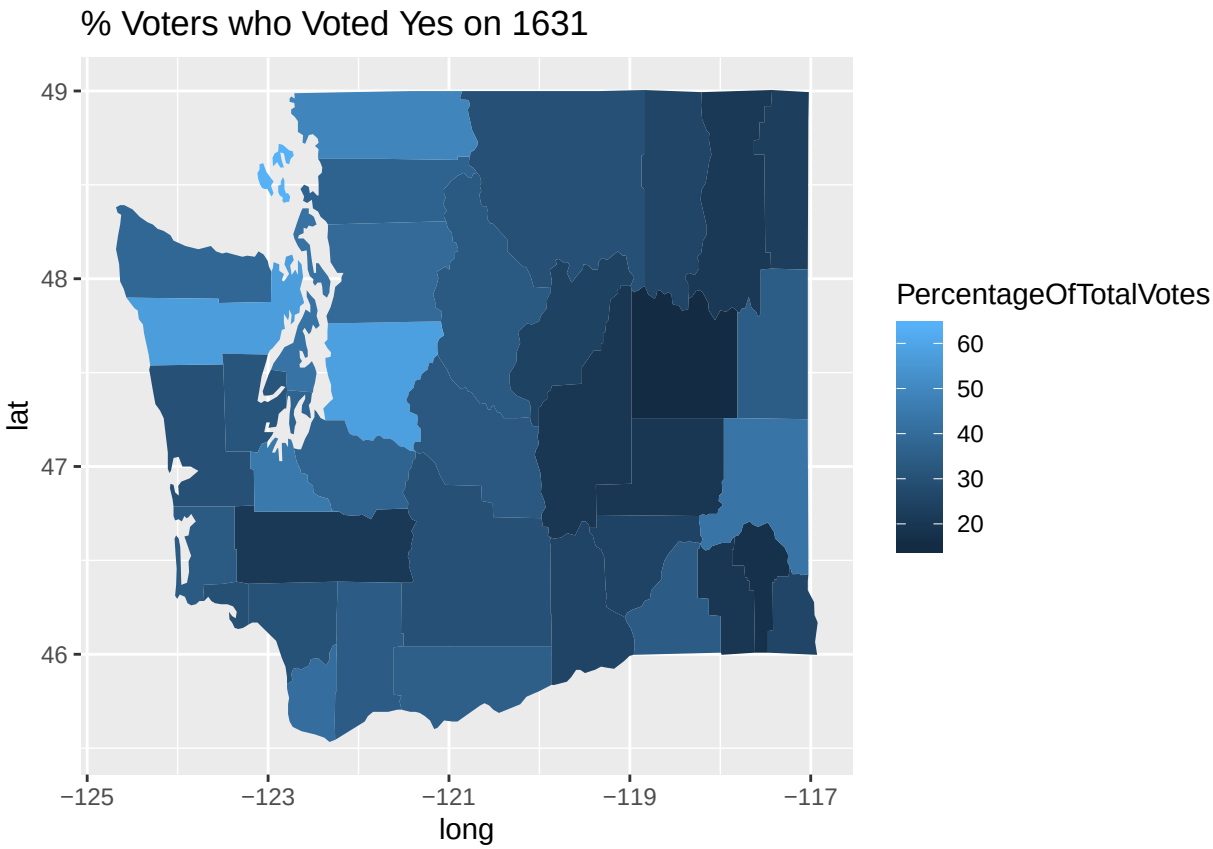
Next we need to clean the voting data and combine it with the county data so we can map it.

```
votes <-
  votes %>%
  select(County, Race, Candidate, Votes, PercentageOfTotalVotes) %>%
  filter(Race %in% c(target, target2)) %>%
  mutate(subregion= tolower(County))

vote_loc <- right_join(wash_counties, votes, by = "subregion")
```

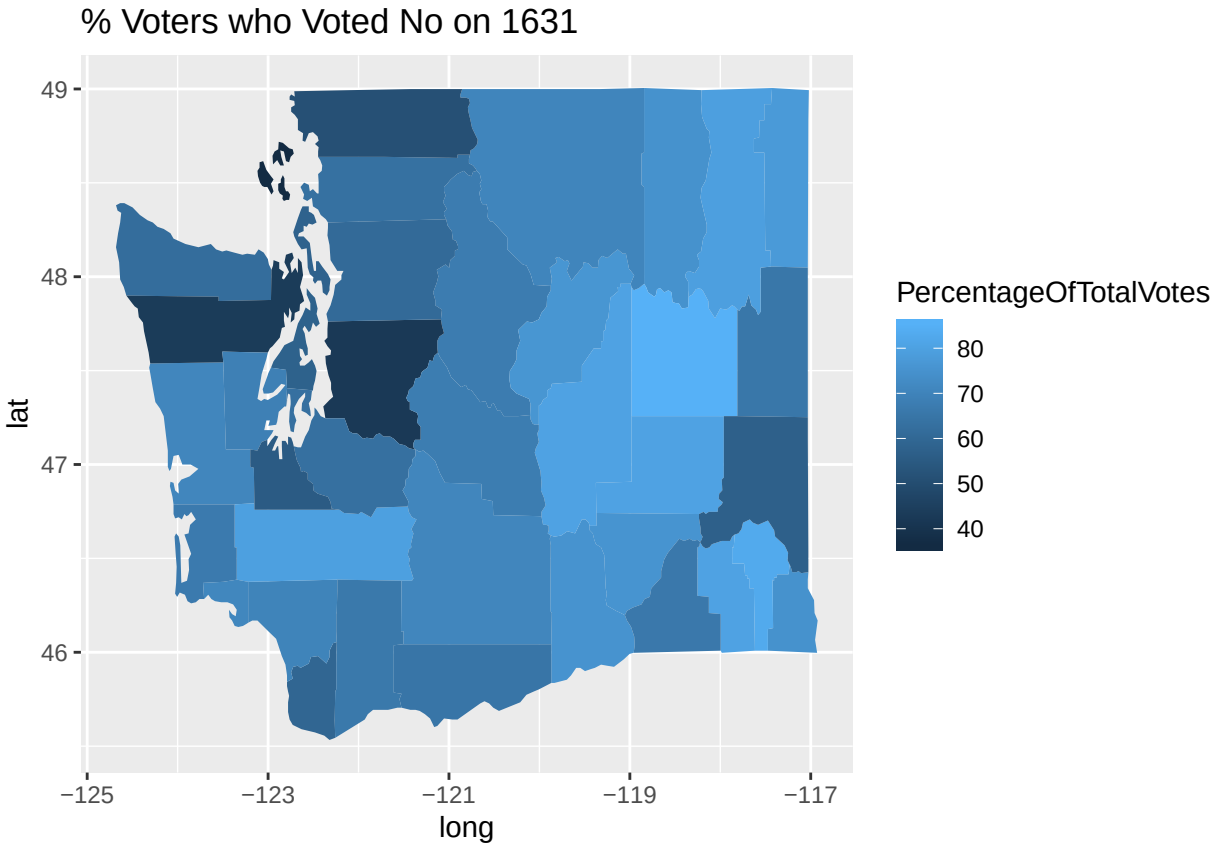
Then I filter the data so that we can visualize the percentage of voters who voted Yes on 1631 and map the results by county. This displays where people voted for Initiative 1631.

```
results
```



We can also see where the many "No" Voters are located; there are many No voters.

```
no_results
```



Discussion

This section summarizes the results and may briefly outline advantages and limitations of the work presented.

References