Covid Data Analysis

This is a minor analysis report created using two datasets containing information about worldwide Covid cases, deaths, locations, etc. and the same but specifically in US. We look at some of the obvious insights that can be garnered by delving deep into these datasets. One drawback is that the data was available only from January until June for the worldwide dataset, while the US dataset has the same until August.

We start by loading a few essential packages.

```
#setwd("C:\Program Files\R\R-3.6.2")

library("tidyverse")

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

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

## v ggplot2 3.3.2     v purrr   0.3.4
## v tibble  3.0.0     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 'tidyr' 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("tidymodels")

## Warning: package 'tidymodels' was built under R version 3.6.3

## -- Attaching packages ------------------------------------------------
---------------------------------------------------------- tidymodels
0.1.1 --
```

```
## v broom      0.7.0      v recipes    0.1.13
## v dials      0.0.8      v rsample    0.0.7
## v infer      0.5.3      v tune       0.1.1
## v modeldata 0.0.2       v workflows 0.1.3
## v parsnip    0.1.3      v yardstick 0.0.7

## Warning: package 'broom' was built under R version 3.6.3

## Warning: package 'dials' was built under R version 3.6.3

## Warning: package 'scales' was built under R version 3.6.3

## Warning: package 'infer' was built under R version 3.6.3

## Warning: package 'modeldata' was built under R version 3.6.3

## Warning: package 'parsnip' was built under R version 3.6.3

## Warning: package 'recipes' was built under R version 3.6.3

## Warning: package 'rsample' was built under R version 3.6.3

## Warning: package 'tune' was built under R version 3.6.3

## Warning: package 'workflows' was built under R version 3.6.3

## Warning: package 'yardstick' was built under R version 3.6.3

## -- Conflicts ---------------------------------------------------------
------------------------------------------------------------
tidymodels_conflicts() --
## x scales::discard() masks purrr::discard()
## x dplyr::filter()   masks stats::filter()
## x recipes::fixed()  masks stringr::fixed()
## x dplyr::lag()      masks stats::lag()
## x yardstick::spec() masks readr::spec()
## x recipes::step()   masks stats::step()
```

```r
library("plotly")
```

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

##
## Attaching package: 'plotly'

## 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
```

```r
library("skimr")
```

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

```r
library("caret")
```

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

```
## Loading required package: lattice
```

```
##
## Attaching package: 'caret'
```

```
## The following objects are masked from 'package:yardstick':
##
##     precision, recall, sensitivity, specificity
```

```
## The following object is masked from 'package:purrr':
##
##     lift
```

```r
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("plyr")
```

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

```
## --------------------------------------------------------------------------
----
```

```
## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first,
then dplyr:
## library(plyr); library(dplyr)
```

```
## --------------------------------------------------------------------------
----
```

```
##
## Attaching package: 'plyr'
```

```
## The following objects are masked from 'package:plotly':
##
##     arrange, mutate, rename, summarise

## The following objects are masked from 'package:dplyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize

## The following object is masked from 'package:purrr':
##
##     compact
```

```
library("dplyr")
library("fpp3")
```

```
## Warning: package 'fpp3' was built under R version 3.6.3

## -- Attaching packages --------------------------------------------------------
------------------------------------------------------------------- fpp3
0.3 --

## v tsibble     0.9.2      v feasts      0.1.5
## v tsibbledata 0.2.0      v fable       0.2.1

## Warning: package 'tsibble' was built under R version 3.6.3

## Warning: package 'tsibbledata' was built under R version 3.6.3

## Warning: package 'feasts' was built under R version 3.6.3

## Warning: package 'fabletools' was built under R version 3.6.3

## Warning: package 'fable' was built under R version 3.6.3

## -- Conflicts -----------------------------------------------------------------
-------------------------------------------------------------
fpp3_conflicts --
## x fabletools::accuracy()   masks yardstick::accuracy()
## x plyr::arrange()          masks plotly::arrange(), dplyr::arrange()
## x plyr::compact()          masks purrr::compact()
## x plyr::count()            masks dplyr::count()
## x lubridate::date()        masks base::date()
## x scales::discard()        masks purrr::discard()
## x plyr::failwith()         masks dplyr::failwith()
## x plotly::filter()         masks dplyr::filter(), stats::filter()
## x fabletools::generate()   masks infer::generate()
## x plyr::id()               masks dplyr::id()
## x tsibble::interval()      masks lubridate::interval()
## x dplyr::lag()             masks stats::lag()
## x caret::lift()            masks purrr::lift()
## x fabletools::MAE()        masks caret::MAE()
```

```
## x plyr::mutate()           masks plotly::mutate(), dplyr::mutate()
## x fabletools::null_model() masks parsnip::null_model()
## x plyr::rename()           masks plotly::rename(), dplyr::rename()
## x fabletools::RMSE()       masks caret::RMSE()
## x plyr::summarise()        masks plotly::summarise(), dplyr::summarise()
## x plyr::summarize()        masks dplyr::summarize()

library("anomalize")

## Warning: package 'anomalize' was built under R version 3.6.3

## == Use anomalize to improve your Forecasts by 50%!
## ==============================================================================
## ===========================
## Business Science offers a 1-hour course - Lab #18: Time Series Anomaly
Detection!
## </> Learn more at: https://university.business-science.io/p/learning-labs-
pro </>

library("maps")

## Warning: package 'maps' was built under R version 3.6.3

##
## Attaching package: 'maps'

## The following object is masked from 'package:plyr':
##
##      ozone

## The following object is masked from 'package:purrr':
##
##      map

library("ggplot2")
library("reshape2")

## Warning: package 'reshape2' was built under R version 3.6.3

##
## Attaching package: 'reshape2'

## The following object is masked from 'package:tidyr':
##
##      smiths

library("ggrepel")

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

We read into the global level Covid data.

```
df <- read_csv("Covid_Global_Level.csv")
```

```
## Parsed with column specification:
## cols(
##   Case_Type = col_character(),
##   Cases = col_double(),
##   Difference = col_double(),
##   Date = col_character(),
##   Country_Region = col_character(),
##   Province_State = col_character(),
##   Lat = col_double(),
##   Long = col_double(),
##   Population_Count = col_double()
## )

df$Date <- mdy(df$Date)
df

## Warning: `...` is not empty.
##
## We detected these problematic arguments:
## * `needs_dots`
##
## These dots only exist to allow future extensions and should be empty.
## Did you misspecify an argument?

## # A tibble: 950,670 x 9
##     Case_Type Cases Difference Date       Country_Region Province_State
## Lat
##     <chr>     <dbl>      <dbl> <date>     <chr>          <chr>
## <dbl>
##  1 Confirmed      6          0 2020-05-22 Western Sahara N/A
## 24.2
##  2 Confirmed      0          0 2020-02-03 Switzerland    N/A
## 46.8
##  3 Deaths         0          0 2020-03-01 Cyprus         N/A
## 35.1
##  4 Confirmed     23          0 2020-04-21 Antigua and B~ N/A
## 17.1
##  5 Deaths        56          0 2020-05-11 Thailand       N/A
## 15.9
##  6 Deaths         0          0 2020-02-11 Jamaica        N/A
## 18.1
##  7 Confirmed      0          0 2020-02-06 Belize         N/A
## 17.2
##  8 Confirmed      1          0 2020-03-18 Central Afric~ N/A
## 6.61
##  9 Confirmed     23          0 2020-06-02 Grenada        N/A
## 12.1
## 10 Confirmed   2710         19 2020-05-09 Greece         N/A
## 39.1
```

```
## # ... with 950,660 more rows, and 2 more variables: Long <dbl>,
## #   Population_Count <dbl>
```

A rough overview of the same, with basic statistical breakdown.

```
skim(df)
```

Data summary

Name	df
Number of rows	950670
Number of columns	9

_____

Column type frequency:

character	3
Date	1
numeric	5

_____

Group variables	None

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
Case_Type	0	1	6	9	0	2	0
Country_Region	0	1	2	32	0	187	0
Province_State	0	1	3	32	0	136	0

Variable type: Date

skim_variable	n_missing	complete_rate	min	max	median	n_unique
Date	0	1	2020-01-22	2020-06-04	2020-03-29	135

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
Cases	0	1.00	273.52	5187.50	0.00	0.00	0.00	4.00	6.149410e+05	▇▁▁▁▁
Difference	0	1.00	7.39	166.49	-10034.00	0.00	0.00	0.00	3.327400e+04	▁▇▁▁▁

	2889 0	0.97	37.12	9.76	- 51.8 0	34.0 7	38.1 5	41.7 7	7.1710 00e+01	__ _∎ _
Lat										
Long	2889 0	0.97	-83.44	38.62	- 174. 16	- 97.7 0	- 89.2 1	- 81.9 3	1.7806 00e+02	_∎ __ _
Populatio n_Count	2889 0	0.97	22602 63.54	26618 851.12	86.0 0	1202 3.00	2969 9.50	9792 8.00	1.3800 04e+09	∎_ __ _

We can perform a few basic operations to clean it, like converting the date column to date format (done above), removing rows containing NAs, as they are a minuscule percentage of the entire data.

```
df <- df %>%
  drop_na(Population_Count)

skim(df)
```

Data summary

Name	df
Number of rows	921780
Number of columns	9

_____

Column type frequency:

character	3
Date	1
numeric	5

_____

Group variables	None

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
Case_Type	0	1	6	9	0	2	0
Country_Region	0	1	2	32	0	186	0
Province_State	0	1	3	32	0	134	0

Variable type: Date

skim_variable	n_missing	complete_rate	min	max	median	n_unique

Date	0	1	2020-01-22	2020-06-04	2020-03-29	135

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
Cases	0	1	281.22	5267.87	0.00	0.00	0.00	4.00	6.149410e+05	▮___ _
Difference	0	1	7.60	168.96	-10034.00	0.00	0.00	0.00	3.327400e+04	_▮___ _
Lat	0	1	37.12	9.76	-51.80	34.07	38.15	41.77	7.171000e+01	__ _▮_
Long	0	1	-83.44	38.62	-174.16	-97.70	-89.21	-81.93	1.780600e+02	_▮___ _
Population_Count	0	1	2260263.54	26618851.12	86.00	12023.00	29699.50	97928.00	1.380004e+09	▮___ _

Overview continued. We can see that this dataset consists of a large number of rows, with each row highlighting the number of cases and deaths on a particular date in a particular location. The difference between the previous date cases and the date shown in the row is also present, thereby allowing us to check how many cases were confirmed on that date.

```r
str(df)

## tibble [921,780 x 9] (S3: tbl_df/tbl/data.frame)
##  $ Case_Type      : chr [1:921780] "Confirmed" "Confirmed" "Deaths"
"Confirmed" ...
##  $ Cases          : num [1:921780] 6 0 0 23 56 0 0 1 23 2710 ...
##  $ Difference     : num [1:921780] 0 0 0 0 0 0 0 0 0 19 ...
##  $ Date           : Date[1:921780], format: "2020-05-22" "2020-02-03" ...
##  $ Country_Region : chr [1:921780] "Western Sahara" "Switzerland"
"Cyprus" "Antigua and Barbuda" ...
##  $ Province_State : chr [1:921780] "N/A" "N/A" "N/A" "N/A" ...
##  $ Lat            : num [1:921780] 24.2 46.8 35.1 17.1 15.9 ...
##  $ Long           : num [1:921780] -12.89 8.23 33.43 -61.8 100.99 ...
##  $ Population_Count: num [1:921780] 597330 8654618 1207361 97928 69799978
...
##  - attr(*, "spec")=
##   .. cols(
```

```
##    ..    Case_Type = col_character(),
##    ..    Cases = col_double(),
##    ..    Difference = col_double(),
##    ..    Date = col_character(),
##    ..    Country_Region = col_character(),
##    ..    Province_State = col_character(),
##    ..    Lat = col_double(),
##    ..    Long = col_double(),
##    ..    Population_Count = col_double()
##    ..  )
```

Here, we essentially group together total cases and deaths for each country in the dataset, along with population of each country and the percentage of fatal cases.

```r
confirmed_cases <- df %>%
  filter(Case_Type == "Confirmed") %>%
  group_by(Country_Region) %>%
  tally(Difference)

names(confirmed_cases)[names(confirmed_cases) == "n"] <- "Total_cases"
names(confirmed_cases)[names(confirmed_cases) == "Country_Region"] <-
"Country"

deaths <- df %>%
  filter(Case_Type == "Deaths") %>%
  group_by(Country_Region) %>%
  tally(Difference)

names(deaths)[names(deaths) == "n"] <- "Total_deaths"
names(deaths)[names(deaths) == "Country_Region"] <- "Country"

confirmed_cases_and_deaths <- merge(confirmed_cases, deaths, by = "Country")

confirmed_cases_and_deaths$Population <- 0

for (i in unique(df$Country_Region)){
  temp_df <- df %>%
    filter(Country_Region == i)

  if (sum(temp_df$Province_State == "N/A") != 0){
    confirmed_cases_and_deaths$Population[confirmed_cases_and_deaths$Country
== i] <-
      unique(temp_df$Population_Count[temp_df$Country_Region == i &
temp_df$Province_State == "N/A"])
  }
  if (sum(temp_df$Province_State == "N/A") == 0){
    confirmed_cases_and_deaths$Population[confirmed_cases_and_deaths$Country
== i] <- sum(unique(temp_df$Population_Count))
  }
}
```

```r
confirmed_cases_and_deaths <-
confirmed_cases_and_deaths[!confirmed_cases_and_deaths$Population == 0, ]

confirmed_cases_and_deaths <- confirmed_cases_and_deaths[c("Country",
"Population", "Total_cases", "Total_deaths")] %>%
  mutate(Percentage_deaths_cases = (Total_deaths/Total_cases)*100)

confirmed_cases_and_deaths <- confirmed_cases_and_deaths %>%
  drop_na(Population)

confirmed_cases_and_deaths
```

```
##                             Country Population Total_cases Total_deaths
## 1                       Afghanistan   38928341       18054          300
## 2                           Albania    2877800        1197           33
## 3                           Algeria   43851043        9831          681
## 4                           Andorra      77265         852           51
## 5                            Angola   32866268          86            4
## 6               Antigua and Barbuda      97928          26            3
## 7                         Argentina   45195777       20197          608
## 8                           Armenia    2963234       11221          176
## 9                         Australia   25459700        7247          102
## 10                          Austria    9006400       16805          670
## 11                       Azerbaijan   10139175        6522           78
## 12                          Bahamas     393248         102           11
## 13                          Bahrain    1701583       13296           21
## 14                       Bangladesh  164689383       57563          781
## 15                         Barbados     287371          92            7
## 16                          Belarus    9449321       45981          253
## 17                          Belgium   11589616       58767         9548
## 18                           Belize     397621          18            2
## 19                            Benin   12123198         261            3
## 20                           Bhutan     771612          47            0
## 21                          Bolivia   11673029       12245          415
## 22           Bosnia and Herzegovina    3280815        2594          159
## 23                         Botswana    2351625          40            1
## 24                           Brazil  212559409      614941        34021
## 25                           Brunei     437483         141            2
## 26                         Bulgaria    6948445        2585          147
## 27                     Burkina Faso   20903278         885           53
## 28                            Burma   54409794         236            6
## 29                          Burundi   11890781          63            1
## 30                       Cabo Verde     555988         502            5
## 31                         Cambodia   16718971         125            0
## 32                         Cameroon   26545864        6789          203
## 33                           Canada   37855702       95256         7716
## 34         Central African Republic    4829764        1288            4
## 35                             Chad   16425859         828           66
## 36                            Chile   19116209      118292         1356
```

```
## 37                 China 1396530000      83027      4634
## 38              Colombia   50882884      33466      1099
## 39               Comoros     869595        132         2
## 40   Congo (Brazzaville)    5518092        611        20
## 41     Congo (Kinshasa)    89561404       3644        78
## 42            Costa Rica    5094114       1194        10
## 43          Cote d'Ivoire  26378275       3262        35
## 44               Croatia    4105268       2247       103
## 45                  Cuba   11326616       2119        83
## 46                Cyprus    1207361        958        17
## 47               Czechia   10708982       9494       326
## 48               Denmark    5792203      12011       582
## 49              Djibouti     988002       4054        26
## 50              Dominica      71991         18         0
## 51    Dominican Republic   10847904      18319       520
## 52               Ecuador   17643060      40966      3486
## 53                 Egypt  102334403      29767      1126
## 54           El Salvador    6486201       2781        52
## 55     Equatorial Guinea    1402985       1306        12
## 56               Eritrea    3546427         39         0
## 57               Estonia    1326539       1890        69
## 58              Eswatini    1160164        300         3
## 59              Ethiopia  114963583       1636        18
## 60                  Fiji     896444         18         0
## 61               Finland    5540718       6911       322
## 62                France   65273512     189569     29068
## 63                 Gabon    2225728       2955        21
## 64                Gambia    2416664         26         1
## 65               Georgia    3989175        801        13
## 66               Germany   83783945     184472      8635
## 67                 Ghana   31072945       8885        38
## 68                Greece   10423056       2952       180
## 69               Grenada     112519         23         0
## 70             Guatemala   17915567       6154       158
## 71                Guinea   13132792       3991        23
## 72         Guinea-Bissau    1967998       1339         8
## 73                Guyana     786559        153        12
## 74                 Haiti   11402533       2640        50
## 75              Holy See        809         12         0
## 76              Honduras    9904608       5880       243
## 77               Hungary    9660350       3954       539
## 78               Iceland     341250       1806        10
## 79                 India 1380004385     226713      6363
## 80             Indonesia  273523621      28818      1721
## 81                  Iran   83992953     164270      8071
## 82                  Iraq   40222503       8840       271
## 83               Ireland    4937796      25142      1664
## 84                Israel    8655541      17495       291
## 85                 Italy   60461828     234013     33689
## 86               Jamaica    2961161        591        10
```

```
## 87              Japan 126476458     16911     911
## 88             Jordan  10203140       765       9
## 89         Kazakhstan  18776707     12067      52
## 90              Kenya  53771300      2340      78
## 91       Korea, South  51269183     11668     273
## 92             Kosovo   1810366      1142      30
## 93             Kuwait   4270563     29921     236
## 94         Kyrgyzstan   6524191      1899      20
## 95               Laos   7275556        19       0
## 96             Latvia   1886202      1082      25
## 97            Lebanon   6825442      1306      28
## 98            Lesotho   2142252         4       0
## 99            Liberia   5057677       321      28
## 100             Libya   6871287       209       5
## 101     Liechtenstein     38137        82       1
## 102         Lithuania   2722291      1687      71
## 103        Luxembourg    625976      4027     110
## 104        Madagascar  27691019       957       7
## 105            Malawi  19129955       393       4
## 106          Malaysia  32365998      8247     115
## 107          Maldives    540542      1872       7
## 108              Mali  20250834      1461      85
## 109             Malta    441539       622       9
## 110        Mauritania   4649660       784      39
## 111         Mauritius   1271767       335      10
## 112            Mexico 127792286    105680   12545
## 113           Moldova   4033963      9018     315
## 114            Monaco     39244        99       4
## 115          Mongolia   3278292       186       0
## 116        Montenegro    628062       324       9
## 117           Morocco  36910558      8003     208
## 118        Mozambique  31255435       352       2
## 119           Namibia   2540916        25       0
## 120             Nepal  29136808      2634      10
## 121       Netherlands  17134873     47148    6009
## 122       New Zealand   4822233      1504      22
## 123         Nicaragua   6624554      1118      46
## 124             Niger  24206636       963      65
## 125           Nigeria 206139587     11516     323
## 126    North Macedonia   2083380     2611     147
## 127            Norway   5421242      8504     238
## 128              Oman   5106622     14316      67
## 129          Pakistan 220892331     85264    1770
## 130            Panama   4314768     15044     363
## 131  Papua New Guinea   8947027         8       0
## 132          Paraguay   7132530      1086      11
## 133              Peru  32971846    183198    5031
## 134       Philippines 109581085     20382     984
## 135            Poland  37846605     25048    1117
## 136          Portugal  10196707     33592    1455
```

```
## 137                           Qatar   2881060     63741      45
## 138                         Romania  19237682     19907    1305
## 139                          Russia 145934460    440538    5376
## 140                          Rwanda  12952209       410       2
## 141           Saint Kitts and Nevis     53192        15       0
## 142                     Saint Lucia    183629        19       0
## 143 Saint Vincent and the Grenadines    110947        26       0
## 144                      San Marino     33938       678      42
## 145           Sao Tome and Principe    219161       485      12
## 146                    Saudi Arabia  34813867     93157     611
## 147                         Senegal  16743930      4021      45
## 148                          Serbia   8737370     11571     246
## 149                      Seychelles     98340        11       0
## 150                    Sierra Leone   7976985       914      47
## 151                       Singapore   5850343     36922      24
## 152                        Slovakia   5459643      1526      28
## 153                        Slovenia   2078932      1477     109
## 154                         Somalia  15893219      2204      79
## 155                    South Africa  59308690     40792     848
## 156                     South Sudan  11193729       994      10
## 157                           Spain  46754783    240660   27133
## 158                       Sri Lanka  21413250      1797      11
## 159                           Sudan  43849269      5714     333
## 160                        Suriname    586634        82       1
## 161                          Sweden  10099270     41883    4562
## 162                     Switzerland   8654618     30913    1921
## 163                           Syria  17500657       124       6
## 164                         Taiwan*  23816775       443       7
## 165                      Tajikistan   9537642      4289      48
## 166                        Tanzania  59734213       509      21
## 167                        Thailand  69799978      3101      58
## 168                     Timor-Leste   1318442        24       0
## 169                            Togo   8278737       465      13
## 170             Trinidad and Tobago   1399491       117       8
## 171                         Tunisia  11818618      1087      49
## 172                          Turkey  84339067    167410    4630
## 173                          Uganda  45741000       522       0
## 174                         Ukraine  43733759     25981     755
## 175            United Arab Emirates   9890400     37018     273
## 176                  United Kingdom  67886004    283079   39987
## 177                         Uruguay   3473727       832      23
## 178                              US 338876573   1859179  106950
## 179                      Uzbekistan  33469199      3939      16
## 180                       Venezuela  28435943      2087      20
## 181                         Vietnam  97338583       328       0
## 182             West Bank and Gaza   5101416       464       3
## 183                  Western Sahara    597330         9       1
## 184                           Yemen  29825968       453     103
## 185                          Zambia  18383956      1089       7
## 186                        Zimbabwe  14862927       237       4
```

```
##    Percentage_deaths_cases
## 1            1.6616816
## 2            2.7568922
## 3            6.9270674
## 4            5.9859155
## 5            4.6511628
## 6           11.5384615
## 7            3.0103481
## 8            1.5684877
## 9            1.4074790
## 10           3.9869087
## 11           1.1959522
## 12          10.7843137
## 13           0.1579422
## 14           1.3567743
## 15           7.6086957
## 16           0.5502273
## 17          16.2472136
## 18          11.1111111
## 19           1.1494253
## 20           0.0000000
## 21           3.3891384
## 22           6.1295297
## 23           2.5000000
## 24           5.5324007
## 25           1.4184397
## 26           5.6866538
## 27           5.9887006
## 28           2.5423729
## 29           1.5873016
## 30           0.9960159
## 31           0.0000000
## 32           2.9901311
## 33           8.1002771
## 34           0.3105590
## 35           7.9710145
## 36           1.1463159
## 37           5.5813169
## 38           3.2839300
## 39           1.5151515
## 40           3.2733224
## 41           2.1405049
## 42           0.8375209
## 43           1.0729614
## 44           4.5838896
## 45           3.9169420
## 46           1.7745303
## 47           3.4337476
## 48           4.8455582
## 49           0.6413419
```

```
## 50                0.0000000
## 51                2.8385829
## 52                8.5094957
## 53                3.7827124
## 54                1.8698310
## 55                0.9188361
## 56                0.0000000
## 57                3.6507937
## 58                1.0000000
## 59                1.1002445
## 60                0.0000000
## 61                4.6592389
## 62               15.3337307
## 63                0.7106599
## 64                3.8461538
## 65                1.6229713
## 66                4.6809272
## 67                0.4276871
## 68                6.0975610
## 69                0.0000000
## 70                2.5674358
## 71                0.5762967
## 72                0.5974608
## 73                7.8431373
## 74                1.8939394
## 75                0.0000000
## 76                4.1326531
## 77               13.6317653
## 78                0.5537099
## 79                2.8066322
## 80                5.9719620
## 81                4.9132526
## 82                3.0656109
## 83                6.6184074
## 84                1.6633324
## 85               14.3962088
## 86                1.6920474
## 87                5.3870262
## 88                1.1764706
## 89                0.4309273
## 90                3.3333333
## 91                2.3397326
## 92                2.6269702
## 93                0.7887437
## 94                1.0531859
## 95                0.0000000
## 96                2.3105360
## 97                2.1439510
## 98                0.0000000
## 99                8.7227414
```

```
## 100             2.3923445
## 101             1.2195122
## 102             4.2086544
## 103             2.7315620
## 104             0.7314525
## 105             1.0178117
## 106             1.3944465
## 107             0.3739316
## 108             5.8179329
## 109             1.4469453
## 110             4.9744898
## 111             2.9850746
## 112            11.8707419
## 113             3.4930140
## 114             4.0404040
## 115             0.0000000
## 116             2.7777778
## 117             2.5990254
## 118             0.5681818
## 119             0.0000000
## 120             0.3796507
## 121            12.7449733
## 122             1.4627660
## 123             4.1144902
## 124             6.7497404
## 125             2.8047933
## 126             5.6300268
## 127             2.7986830
## 128             0.4680078
## 129             2.0759054
## 130             2.4129221
## 131             0.0000000
## 132             1.0128913
## 133             2.7462090
## 134             4.8277892
## 135             4.4594379
## 136             4.3313884
## 137             0.0705982
## 138             6.5554830
## 139             1.2203261
## 140             0.4878049
## 141             0.0000000
## 142             0.0000000
## 143             0.0000000
## 144             6.1946903
## 145             2.4742268
## 146             0.6558820
## 147             1.1191246
## 148             2.1260047
## 149             0.0000000
```

```
## 150                      5.1422319
## 151                      0.0650019
## 152                      1.8348624
## 153                      7.3798240
## 154                      3.5843920
## 155                      2.0788390
## 156                      1.0060362
## 157                     11.2744120
## 158                      0.6121313
## 159                      5.8277914
## 160                      1.2195122
## 161                     10.8922475
## 162                      6.2142141
## 163                      4.8387097
## 164                      1.5801354
## 165                      1.1191420
## 166                      4.1257367
## 167                      1.8703644
## 168                      0.0000000
## 169                      2.7956989
## 170                      6.8376068
## 171                      4.5078197
## 172                      2.7656651
## 173                      0.0000000
## 174                      2.9059697
## 175                      0.7374791
## 176                     14.1257388
## 177                      2.7644231
## 178                      5.7525392
## 179                      0.4061945
## 180                      0.9583134
## 181                      0.0000000
## 182                      0.6465517
## 183                     11.1111111
## 184                     22.7373068
## 185                      0.6427916
## 186                      1.6877637
```

A brief overview of the cumulative dataframe created above.

```
skim(confirmed_cases_and_deaths)
```

Data summary

Name	confirmed_cases_and_death...
Number of rows	186
Number of columns	5

_____

Column type frequency:

character	1
numeric	4

_____

Group variables	None

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
Country	0	1	2	32	0	186	0

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
Population	0	1	41461973.6 6	14877 8832.9 6	8 0 9	2447 727.0 0	9598 996.0 0	30761 200.7 5	1.3965 30e+0 9	▇_ _ _ _
Total_cases	0	1	35578 .63	15227 0.22	4	445.5 0	1993. 00	14061 .00	1.8591 79e+0 6	▇_ _ _ _
Total_deaths	0	1	2095. 99	9523.3 0	0	7.00	45.50	320.2 5	1.0695 00e+0 5	▇_ _ _ _
Percentage_deaths_cases	0	1	3.43	3.67	0	0.97	2.44	4.79	2.2740 00e+0 1	▇▂_ _ _

A plot showcasing the severity of the pandemic relative to a country's population. This graph highlights (albeit unclearly) all the countries in the dataset.

```
total_cases_plot <- ggplot(confirmed_cases_and_deaths, aes(x =
Population/1000000, y = Total_cases/1000)) + geom_point() +
  scale_x_continuous(breaks = seq(0, 1500, by = 100)) +
scale_y_continuous(breaks = seq(0, 2000, len = 5)) +
  geom_text(aes(label = Country)) + xlab("Population (in millions)") +
ylab("Total cases (in thousands)")

total_cases_plot
```
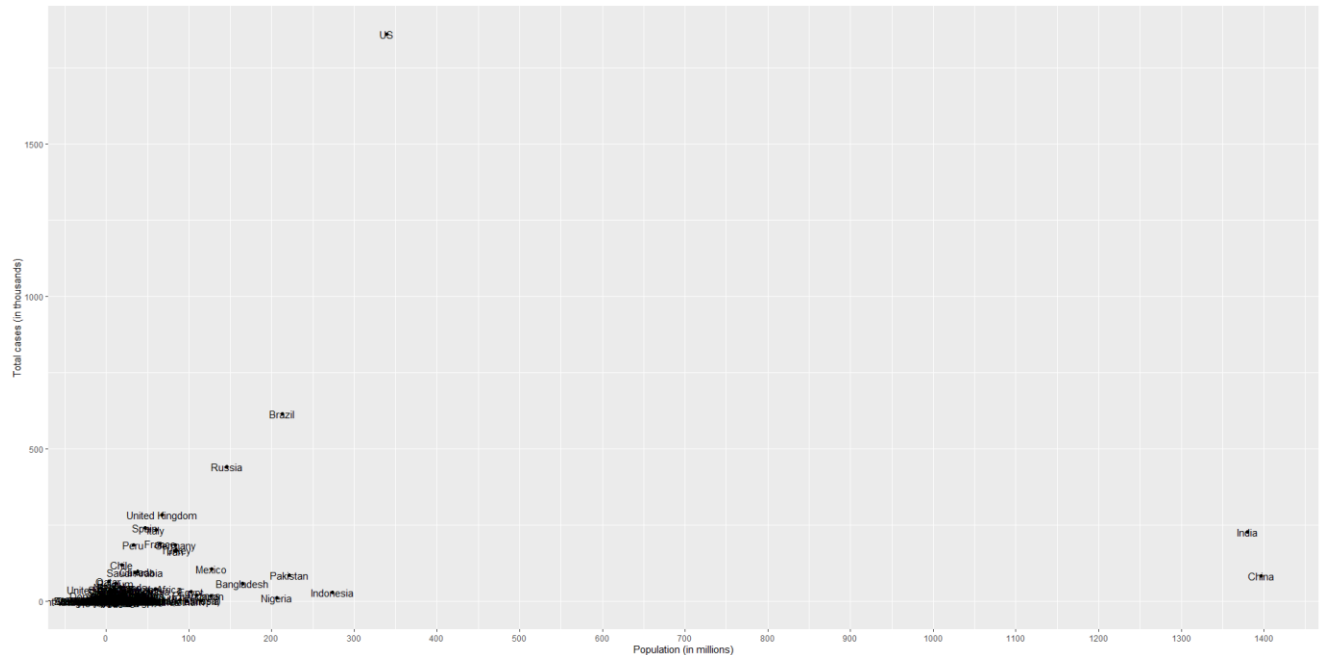
We now zoom into the above graph to get a better picture of the situation. A simple filter was deployed; population was limited to a range of 10 million to 500 million and the number of cases was limited to a range of 10 thousand to 1 million. This gave us a list of highly populated countries with high number of cases (excluding the outliers China, India and US).

```
temp <- subset(confirmed_cases_and_deaths, 1e+7 < Population & Population <
5e+08 & 1e+4 < Total_cases & Total_cases < 1e+6)

total_cases_plot1 <- ggplot(temp, aes(x = Population/1000000, y =
Total_cases/1000, label = Country)) + geom_point() + geom_label_repel() +
  scale_x_continuous(breaks = seq(0, 300, by = 50)) +
scale_y_continuous(breaks = seq(0, 600, len = 4)) +
  xlab("Population (in millions)") + ylab("Total cases (in thousands)")

total_cases_plot1
```
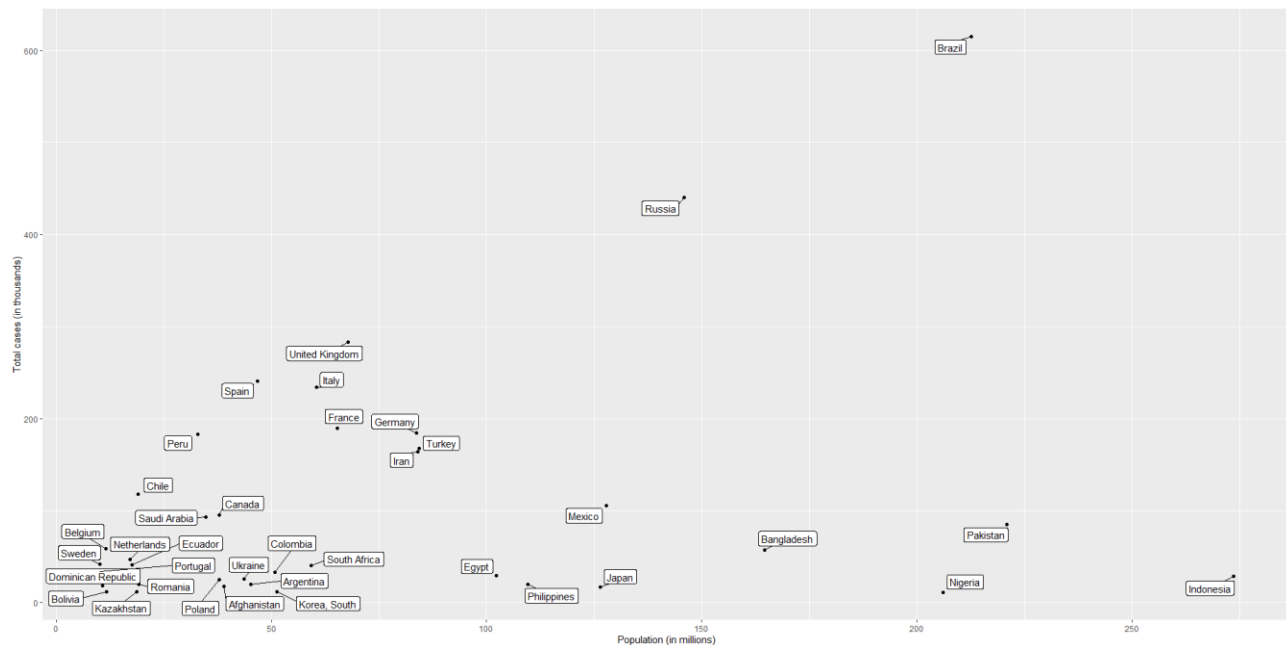
Now we focus on finding out the total number of confirmed cases and deaths on each date between January and June.

```
datewise_confirmed_cases <- df %>%
  filter(Case_Type == "Confirmed") %>%
  group_by(Date) %>%
  tally(Difference)

names(datewise_confirmed_cases)[names(datewise_confirmed_cases) == "n"] <-
"Total_cases"

datewise_deaths <- df %>%
  filter(Case_Type == "Deaths") %>%
  group_by(Date) %>%
  tally(Difference)

names(datewise_deaths)[names(datewise_deaths) == "n"] <- "Total_deaths"

datewise_confirmed_cases_and_deaths <- merge(datewise_confirmed_cases,
datewise_deaths, by = "Date") %>%
  mutate(Percentage_deaths_cases = (Total_deaths/Total_cases)*100)

datewise_confirmed_cases_and_deaths

##            Date Total_cases Total_deaths Percentage_deaths_cases
## 1    2020-01-22         554           17               3.0685921
## 2    2020-01-23          96            1               1.0416667
## 3    2020-01-24         287            8               2.7874564
## 4    2020-01-25         490           16               3.2653061
## 5    2020-01-26         678           14               2.0648968
```

```
## 6    2020-01-27      808      26      3.2178218
## 7    2020-01-28     2650      49      1.8490566
## 8    2020-01-29      586       2      0.3412969
## 9    2020-01-30     2068      38      1.8375242
## 10   2020-01-31     1691      42      2.4837374
## 11   2020-02-01     2110      46      2.1800948
## 12   2020-02-02     4746     103      2.1702486
## 13   2020-02-03     3094      64      2.0685197
## 14   2020-02-04     4007      65      1.6221612
## 15   2020-02-05     3739      72      1.9256486
## 16   2020-02-06     3156      70      2.2179975
## 17   2020-02-07     3535      85      2.4045262
## 18   2020-02-08     2728      87      3.1891496
## 19   2020-02-09     3024     100      3.3068783
## 20   2020-02-10     2532     107      4.2259084
## 21   2020-02-11     2029     100      4.9285362
## 22   2020-02-12      378       5      1.3227513
## 23   2020-02-13    15144     253      1.6706286
## 24   2020-02-14     6471     152      2.3489414
## 25   2020-02-15     2078     143      6.8816169
## 26   2020-02-16     2123     104      4.8987282
## 27   2020-02-17     1932      98      5.0724638
## 28   2020-02-18     1788     139      7.7740492
## 29   2020-02-19      423     114     26.9503546
## 30   2020-02-20      540     123     22.7777778
## 31   2020-02-21      622       4      0.6430868
## 32   2020-02-22     1752     207     11.8150685
## 33   2020-02-23      324      10      3.0864198
## 34   2020-02-24      562     160     28.4697509
## 35   2020-02-25      840      79      9.4047619
## 36   2020-02-26      955      61      6.3874346
## 37   2020-02-27     1357      44      3.2424466
## 38   2020-02-28     1362      56      4.1116006
## 39   2020-02-29     1898      69      3.6354057
## 40   2020-03-01     2357      55      2.3334748
## 41   2020-03-02     1932      89      4.6066253
## 42   2020-03-03     2533      75      2.9609159
## 43   2020-03-04     2275      94      4.1318681
## 44   2020-03-05     2768      93      3.3598266
## 45   2020-03-06     3916     112      2.8600613
## 46   2020-03-07     4020      99      2.4626866
## 47   2020-03-08     3966     242      6.1018659
## 48   2020-03-09     3771     186      4.9323787
## 49   2020-03-10     4836     276      5.7071960
## 50   2020-03-11     7330     346      4.7203274
## 51   2020-03-12     5159     302      5.8538476
## 52   2020-03-13    14211     497      3.4972908
## 53   2020-03-14    11057     420      3.7984987
## 54   2020-03-15    10775     640      5.9396752
## 55   2020-03-16    14371     680      4.7317514
```

```
## 56   2020-03-17   15435    806    5.2218983
## 57   2020-03-18   19109    893    4.6731906
## 58   2020-03-19   26471   1090    4.1177137
## 59   2020-03-20   28786   1480    5.1413882
## 60   2020-03-21   32776   1708    5.2111301
## 61   2020-03-22   32489   1648    5.0724861
## 62   2020-03-23   40229   1910    4.7478187
## 63   2020-03-24   40117   2222    5.5387990
## 64   2020-03-25   49065   2760    5.6251911
## 65   2020-03-26   60330   2952    4.8930880
## 66   2020-03-27   63737   3426    5.3752138
## 67   2020-03-28   66695   3675    5.5101582
## 68   2020-03-29   58097   3428    5.9004768
## 69   2020-03-30   61255   3972    6.4843686
## 70   2020-03-31   75240   4469    5.9396598
## 71   2020-04-01   73798   5634    7.6343532
## 72   2020-04-02   80485   6154    7.6461452
## 73   2020-04-03   82244   6007    7.3038763
## 74   2020-04-04   81365   6010    7.3864684
## 75   2020-04-05   73157   5050    6.9029621
## 76   2020-04-06   71472   5822    8.1458473
## 77   2020-04-07   75993   8027   10.5628150
## 78   2020-04-08   84001   6672    7.9427626
## 79   2020-04-09   86047   7546    8.7696259
## 80   2020-04-10   92302   7168    7.7658122
## 81   2020-04-11   77475   6182    7.9793482
## 82   2020-04-12   98493   5688    5.7750297
## 83   2020-04-13   69798   5672    8.1263073
## 84   2020-04-14   69493   6802    9.7880362
## 85   2020-04-15   81478   8340   10.2358919
## 86   2020-04-16   96540   7282    7.5429874
## 87   2020-04-17   87689   8252    9.4105304
## 88   2020-04-18   73115   5914    8.0886275
## 89   2020-04-19   83337   5160    6.1917276
## 90   2020-04-20   71170   5593    7.8586483
## 91   2020-04-21   73741   6868    9.3136790
## 92   2020-04-22   77127   6817    8.8386687
## 93   2020-04-23   89233   6521    7.3078345
## 94   2020-04-24   87423   6112    6.9912952
## 95   2020-04-25   84926   6748    7.9457410
## 96   2020-04-26   73533   3549    4.8264045
## 97   2020-04-27   68631   4731    6.8933864
## 98   2020-04-28   73761   6336    8.5899052
## 99   2020-04-29   75200   6865    9.1289894
## 100  2020-04-30   84983   5624    6.6177941
## 101  2020-05-01   88112   5318    6.0355003
## 102  2020-05-02   81594   5206    6.3803711
## 103  2020-05-03   78541   3607    4.5925058
## 104  2020-05-04   76504   3986    5.2101851
## 105  2020-05-05   79682   5706    7.1609648
```

```
## 106 2020-05-06      93624        6489           6.9309151
## 107 2020-05-07      89170        5667           6.3552764
## 108 2020-05-08      92179        5311           5.7616160
## 109 2020-05-09      85890        4366           5.0832460
## 110 2020-05-10      76956        3403           4.4220074
## 111 2020-05-11      77310        3591           4.6449360
## 112 2020-05-12      83920        5593           6.6646806
## 113 2020-05-13      85206        5222           6.1286764
## 114 2020-05-14      94696        5259           5.5535609
## 115 2020-05-15      99945        5234           5.2368803
## 116 2020-05-16      90980        4073           4.4768081
## 117 2020-05-17      79070        3403           4.3037815
## 118 2020-05-18      87173        3220           3.6938043
## 119 2020-05-19      95533        4770           4.9930391
## 120 2020-05-20      99296        4865           4.8994924
## 121 2020-05-21     105621        4826           4.5691671
## 122 2020-05-22     108540        5230           4.8185001
## 123 2020-05-23      99525        3964           3.9829189
## 124 2020-05-24      96247        2870           2.9819111
## 125 2020-05-25      87825        1198           1.3640763
## 126 2020-05-26      94932        4186           4.4094720
## 127 2020-05-27     101939        5115           5.0177067
## 128 2020-05-28     117711        4638           3.9401585
## 129 2020-05-29     121601        4743           3.9004613
## 130 2020-05-30     127634        4096           3.2091762
## 131 2020-05-31     107222        2902           2.7065341
## 132 2020-06-01      98455        3494           3.5488294
## 133 2020-06-02     111982        4689           4.1872801
## 134 2020-06-03     130555        5688           4.3567845
## 135 2020-06-04     124181        5203           4.1898519
```

Below is the plot of how the virus spread over the months. As clearly seen, cases were exponentially increasing in March, due to which complete lockdowns were implemented all over. This helped flatten the curve for a few months, get the situation slightly under control (especially the health sector), before cases started spiking again in June.

```
daily_cases_plot <- ggplot(datewise_confirmed_cases_and_deaths, aes(x = Date,
y = Total_cases/1000)) +
  geom_line() + xlab("Month") + ylab("Daily cases (in thousands)")

daily_cases_plot
```
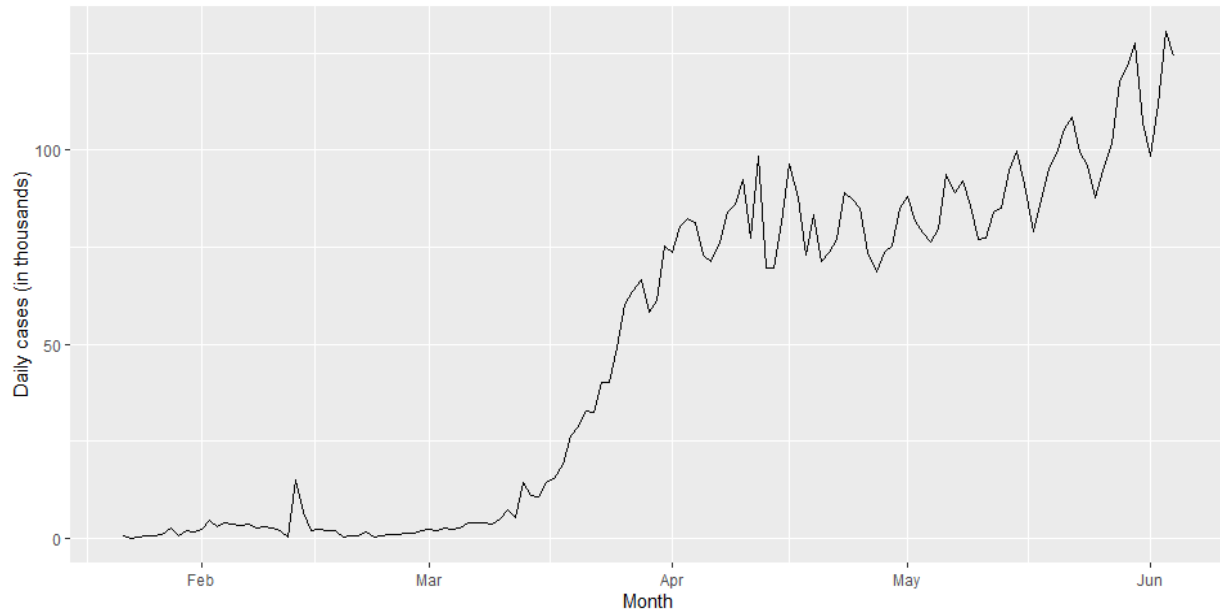
We now move on to the dataset containing information about cases and deaths on a datewise basis in US.

```
df1 <- read_csv("Covid_US_State_and_County_Level.csv")

## Parsed with column specification:
## cols(
##   county = col_character(),
##   state = col_character(),
##   lat = col_double(),
##   long = col_double(),
##   date = col_character(),
##   cases = col_double(),
##   state_code = col_logical(),
##   deaths = col_double()
## )

## Warning: 630694 parsing failures.
##   row        col            expected actual
file
## 15909 state_code 1/0/T/F/TRUE/FALSE      AL
'Covid_US_State_and_County_Level.csv'
## 15910 state_code 1/0/T/F/TRUE/FALSE      AL
'Covid_US_State_and_County_Level.csv'
## 15911 state_code 1/0/T/F/TRUE/FALSE      AL
'Covid_US_State_and_County_Level.csv'
## 15912 state_code 1/0/T/F/TRUE/FALSE      AL
'Covid_US_State_and_County_Level.csv'
## 15913 state_code 1/0/T/F/TRUE/FALSE      AL
'Covid_US_State_and_County_Level.csv'
## ..... .......... .................. ......
```

```
.....................................
## See problems(...) for more details.

df1$date <- mdy(df1$date)
df1

## Warning: `...` is not empty.
##
## We detected these problematic arguments:
## * `needs_dots`
##
## These dots only exist to allow future extensions and should be empty.
## Did you misspecify an argument?

## # A tibble: 647,960 x 8
##    county state             lat  long date       cases state_code deaths
##    <chr>  <chr>           <dbl> <dbl> <date>     <dbl> <lgl>       <dbl>
##  1 <NA>   American Samoa -14.3 -170. 2020-01-22     0 NA              0
##  2 <NA>   American Samoa -14.3 -170. 2020-01-23     0 NA              0
##  3 <NA>   American Samoa -14.3 -170. 2020-01-24     0 NA              0
##  4 <NA>   American Samoa -14.3 -170. 2020-01-25     0 NA              0
##  5 <NA>   American Samoa -14.3 -170. 2020-01-26     0 NA              0
##  6 <NA>   American Samoa -14.3 -170. 2020-01-27     0 NA              0
##  7 <NA>   American Samoa -14.3 -170. 2020-01-28     0 NA              0
##  8 <NA>   American Samoa -14.3 -170. 2020-01-29     0 NA              0
##  9 <NA>   American Samoa -14.3 -170. 2020-01-30     0 NA              0
## 10 <NA>   American Samoa -14.3 -170. 2020-01-31     0 NA              0
## # ... with 647,950 more rows
```

Basic statistical breakdown follows.

```
skim(df1)
```

Data summary

Name	df1
Number of rows	647960
Number of columns	8

_____

Column type frequency:

character	2
Date	1
logical	1
numeric	4

_____

Group variables	None

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
county	1164	1	3	41	0	1978	0
state	0	1	4	24	0	58	0

Variable type: Date

skim_variable	n_missing	complete_rate	min	max	median	n_unique
date	0	1	2020-01-22	2020-08-02	2020-04-27	194

Variable type: logical

skim_variable	n_missing	complete_rate	mean	count
state_code	647960	0	NaN	:

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
lat	0	1	36.71	9.06	-14.27	33.90	38.00	41.57	69.31	▁▁▆█▁
long	0	1	-88.60	21.72	-174.16	-97.79	-89.49	-82.31	145.67	▁█▇▁▁
cases	0	1	388.10	3657.99	0.00	0.00	5.00	71.00	225723.00	█▁▁▁▁
deaths	0	1	18.60	307.25	0.00	0.00	0.00	1.00	23541.00	█▁▁▁▁

Continued.

```
str(df1)

## tibble [647,960 x 8] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ county    : chr [1:647960] NA NA NA NA ...
##  $ state     : chr [1:647960] "American Samoa" "American Samoa" "American
Samoa" "American Samoa" ...
##  $ lat       : num [1:647960] -14.3 -14.3 -14.3 -14.3 -14.3 ...
##  $ long      : num [1:647960] -170 -170 -170 -170 -170 ...
##  $ date      : Date[1:647960], format: "2020-01-22" "2020-01-23" ...
##  $ cases     : num [1:647960] 0 0 0 0 0 0 0 0 0 0 ...
##  $ state_code: logi [1:647960] NA NA NA NA NA NA ...
##  $ deaths    : num [1:647960] 0 0 0 0 0 0 0 0 0 0 ...
##  - attr(*, "problems")= tibble [630,694 x 5] (S3: tbl_df/tbl/data.frame)
```

```
##    ..$ row    : int [1:630694] 15909 15910 15911 15912 15913 15914 15915
15916 15917 15918 ...
##    ..$ col    : chr [1:630694] "state_code" "state_code" "state_code"
"state_code" ...
##    ..$ expected: chr [1:630694] "1/0/T/F/TRUE/FALSE" "1/0/T/F/TRUE/FALSE"
"1/0/T/F/TRUE/FALSE" "1/0/T/F/TRUE/FALSE" ...
##    ..$ actual  : chr [1:630694] "AL" "AL" "AL" "AL" ...
##    ..$ file    : chr [1:630694] "'Covid_US_State_and_County_Level.csv'"
"'Covid_US_State_and_County_Level.csv'"
"'Covid_US_State_and_County_Level.csv'"
"'Covid_US_State_and_County_Level.csv'" ...
##   - attr(*, "spec")=
##    .. cols(
##    ..    county = col_character(),
##    ..    state = col_character(),
##    ..    lat = col_double(),
##    ..    long = col_double(),
##    ..    date = col_character(),
##    ..    cases = col_double(),
##    ..    state_code = col_logical(),
##    ..    deaths = col_double()
##    .. )
```

We create a dataframe to showcase daily cases for each date between January and August for all major regions (states and territories) in US.

```
list_of_states <- list()
list_of_dfs <- list()

list_of_states <- unique(df1$state)

for(i in 1:length(list_of_states))
  {
    temp <- df1 %>%
      filter(state == list_of_states[i])

    state_cases <- aggregate(temp$cases, by = list(Date = temp$date), FUN =
sum) %>%
      mutate(Daily_cases = x - lag(x))

    names(state_cases)[names(state_cases) == "Daily_cases"] <-
list_of_states[i]

    state_cases[is.na(state_cases)] <- 0
    state_cases$x <- NULL

    list_of_dfs[[i]] <- state_cases
  }

statewise_daily_cases <- list_of_dfs %>%
```

```
  reduce(left_join, by = "Date")
```

statewise_daily_cases

```
##              Date American Samoa Guam Northern Mariana Islands Puerto Rico
## 1   2020-01-22              0    0                       0           0
## 2   2020-01-23              0    0                       0           0
## 3   2020-01-24              0    0                       0           0
## 4   2020-01-25              0    0                       0           0
## 5   2020-01-26              0    0                       0           0
## 6   2020-01-27              0    0                       0           0
## 7   2020-01-28              0    0                       0           0
## 8   2020-01-29              0    0                       0           0
## 9   2020-01-30              0    0                       0           0
## 10  2020-01-31              0    0                       0           0
## 11  2020-02-01              0    0                       0           0
## 12  2020-02-02              0    0                       0           0
## 13  2020-02-03              0    0                       0           0
## 14  2020-02-04              0    0                       0           0
## 15  2020-02-05              0    0                       0           0
## 16  2020-02-06              0    0                       0           0
## 17  2020-02-07              0    0                       0           0
## 18  2020-02-08              0    0                       0           0
## 19  2020-02-09              0    0                       0           0
## 20  2020-02-10              0    0                       0           0
## 21  2020-02-11              0    0                       0           0
## 22  2020-02-12              0    0                       0           0
## 23  2020-02-13              0    0                       0           0
## 24  2020-02-14              0    0                       0           0
## 25  2020-02-15              0    0                       0           0
## 26  2020-02-16              0    0                       0           0
## 27  2020-02-17              0    0                       0           0
## 28  2020-02-18              0    0                       0           0
## 29  2020-02-19              0    0                       0           0
## 30  2020-02-20              0    0                       0           0
## 31  2020-02-21              0    0                       0           0
## 32  2020-02-22              0    0                       0           0
## 33  2020-02-23              0    0                       0           0
## 34  2020-02-24              0    0                       0           0
## 35  2020-02-25              0    0                       0           0
## 36  2020-02-26              0    0                       0           0
## 37  2020-02-27              0    0                       0           0
## 38  2020-02-28              0    0                       0           0
## 39  2020-02-29              0    0                       0           0
## 40  2020-03-01              0    0                       0           0
## 41  2020-03-02              0    0                       0           0
## 42  2020-03-03              0    0                       0           0
## 43  2020-03-04              0    0                       0           0
## 44  2020-03-05              0    0                       0           0
## 45  2020-03-06              0    0                       0           0
```

```
## 46  2020-03-07         0    0                    0        0
## 47  2020-03-08         0    0                    0        0
## 48  2020-03-09         0    0                    0        0
## 49  2020-03-10         0    0                    0        0
## 50  2020-03-11         0    0                    0        0
## 51  2020-03-12         0    0                    0        0
## 52  2020-03-13         0    0                    0        0
## 53  2020-03-14         0    0                    0        0
## 54  2020-03-15         0    0                    0        0
## 55  2020-03-16         0    3                    0        5
## 56  2020-03-17         0    0                    0        0
## 57  2020-03-18         0    2                    0        0
## 58  2020-03-19         0    7                    0        0
## 59  2020-03-20         0    2                    0        9
## 60  2020-03-21         0    1                    0        7
## 61  2020-03-22         0   12                    0        2
## 62  2020-03-23         0    2                    0        8
## 63  2020-03-24         0    3                    0        8
## 64  2020-03-25         0    5                    0       12
## 65  2020-03-26         0    8                    0       13
## 66  2020-03-27         0    6                    0       15
## 67  2020-03-28         0    4                    0       21
## 68  2020-03-29         0    1                    0       27
## 69  2020-03-30         0    2                    0       47
## 70  2020-03-31         0   11                    2       65
## 71  2020-04-01         0    8                    4       47
## 72  2020-04-02         0    5                    0       30
## 73  2020-04-03         0    2                    2        0
## 74  2020-04-04         0    9                    0      136
## 75  2020-04-05         0   19                    0       23
## 76  2020-04-06         0    1                    0       38
## 77  2020-04-07         0    8                    0       60
## 78  2020-04-08         0    0                    3       47
## 79  2020-04-09         0    7                    0       63
## 80  2020-04-10         0    2                    0       42
## 81  2020-04-11         0    3                    0       63
## 82  2020-04-12         0    0                    0      109
## 83  2020-04-13         0    0                    0        6
## 84  2020-04-14         0    0                    0       20
## 85  2020-04-15         0    2                    2       51
## 86  2020-04-16         0    0                    0       69
## 87  2020-04-17         0    1                    0       25
## 88  2020-04-18         0    0                    1       50
## 89  2020-04-19         0    0                    0       95
## 90  2020-04-20         0    0                    0       39
## 91  2020-04-21         0    0                    0       46
## 92  2020-04-22         0    0                    0      -46
## 93  2020-04-23         0    3                    0      164
## 94  2020-04-24         0    2                    0     -140
## 95  2020-04-25         0    0                    0       31
```

```
## 96  2020-04-26            0    0              0    64
## 97  2020-04-27            0    0              0    18
## 98  2020-04-28            0    0              0    11
## 99  2020-04-29            0    0              0    33
## 100 2020-04-30            0    4              0   106
## 101 2020-05-01            0    0              0    36
## 102 2020-05-02            0    0              0   182
## 103 2020-05-03            0    0              0    51
## 104 2020-05-04            0    0              0    35
## 105 2020-05-05            0    0              0    81
## 106 2020-05-06            0    4              1    44
## 107 2020-05-07            0    0              0    63
## 108 2020-05-08            0    2              0   125
## 109 2020-05-09            0    0              1    17
## 110 2020-05-10            0    0              0    25
## 111 2020-05-11            0    0              3    58
## 112 2020-05-12            0    1              0    43
## 113 2020-05-13            0    0              0    30
## 114 2020-05-14            0    0              0    98
## 115 2020-05-15            0    2              0   115
## 116 2020-05-16            0    0              2    47
## 117 2020-05-17            0    0              0    57
## 118 2020-05-18            0    0              0    64
## 119 2020-05-19            0    0              0    95
## 120 2020-05-20            0    0              0    61
## 121 2020-05-21            0   11              1    47
## 122 2020-05-22            0    0              0   117
## 123 2020-05-23            0    0              0    70
## 124 2020-05-24            0    1              0    89
## 125 2020-05-25            0    0              0    71
## 126 2020-05-26            0    1              0    64
## 127 2020-05-27            0    3              0    73
## 128 2020-05-28            0    1              0    89
## 129 2020-05-29            0    1              0   161
## 130 2020-05-30            0    0              0    71
## 131 2020-05-31            0    0              0    58
## 132 2020-06-01            0    3              0    97
## 133 2020-06-02            0    0              1    62
## 134 2020-06-03            0    2              1    88
## 135 2020-06-04            0    2              2   485
## 136 2020-06-05            0    0              0   112
## 137 2020-06-06            0    0              0   295
## 138 2020-06-07            0    0              1    70
## 139 2020-06-08            0    0              1    61
## 140 2020-06-09            0    1              2   139
## 141 2020-06-10            0    0              0   144
## 142 2020-06-11            0    3              0    23
## 143 2020-06-12            0    0              0   184
## 144 2020-06-13            0    0              0   154
## 145 2020-06-14            0    0              0   121
```

```
## 146 2020-06-15          0     2                    0      79
## 147 2020-06-16          0     1                    0      61
## 148 2020-06-17          0     2                    0      52
## 149 2020-06-18          0     4                    0     108
## 150 2020-06-19          0     8                    0      84
## 151 2020-06-20          0    22                    0     268
## 152 2020-06-21          0     0                    0      62
## 153 2020-06-22          0     0                    0      39
## 154 2020-06-23          0     3                    0     121
## 155 2020-06-24          0     1                    0     135
## 156 2020-06-25          0     5                    0      57
## 157 2020-06-26          0    16                    0      45
## 158 2020-06-27          0     0                    0     144
## 159 2020-06-28          0     0                    0     123
## 160 2020-06-29          0     6                    0      61
## 161 2020-06-30          0     4                    0     215
## 162 2020-07-01          0    10                    0      72
## 163 2020-07-02          0    13                    1      71
## 164 2020-07-03          0     0                    0      75
## 165 2020-07-04          0     0                    0     104
## 166 2020-07-05          0     0                    0     129
## 167 2020-07-06          0    21                    0     669
## 168 2020-07-07          0     2                    0     129
## 169 2020-07-08          0     4                    0      31
## 170 2020-07-09          0     2                    0     117
## 171 2020-07-10          0     1                    0     275
## 172 2020-07-11          0     0                    2     229
## 173 2020-07-12          0     0                    0     288
## 174 2020-07-13          0     2                    0     356
## 175 2020-07-14          0     0                    3     113
## 176 2020-07-15          0     1                    0     256
## 177 2020-07-16          0     1                    1     195
## 178 2020-07-17          0     0                    0     546
## 179 2020-07-18          0     0                    0     333
## 180 2020-07-19          0     0                    0     610
## 181 2020-07-20          0     5                    1     398
## 182 2020-07-21          0     0                    0     479
## 183 2020-07-22          0    11                    0      98
## 184 2020-07-23          0     7                    0     435
## 185 2020-07-24          0     0                    0     494
## 186 2020-07-25          0     0                    2     573
## 187 2020-07-26          0     0                    0     603
## 188 2020-07-27          0    12                    0     288
## 189 2020-07-28          0     2                    0     409
## 190 2020-07-29          0     3                    2     221
## 191 2020-07-30          0     2                    0     511
## 192 2020-07-31          0     0                    0     209
## 193 2020-08-01          0     0                    2    1091
## 194 2020-08-02          0    12                    1     539
##      Virgin Islands Alabama Alaska Arizona Arkansas California Colorado
```

```
## 1           0    0    0    0    0     0    0
## 2           0    0    0    0    0     0    0
## 3           0    0    0    0    0     0    0
## 4           0    0    0    0    0     0    0
## 5           0    0    0    1    0     2    0
## 6           0    0    0    0    0     0    0
## 7           0    0    0    0    0     0    0
## 8           0    0    0    0    0     0    0
## 9           0    0    0    0    0     0    0
## 10          0    0    0    0    0     1    0
## 11          0    0    0    0    0     0    0
## 12          0    0    0    0    0     0    0
## 13          0    0    0    0    0     3    0
## 14          0    0    0    0    0     0    0
## 15          0    0    0    0    0     0    0
## 16          0    0    0    0    0     0    0
## 17          0    0    0    0    0     0    0
## 18          0    0    0    0    0     0    0
## 19          0    0    0    0    0     0    0
## 20          0    0    0    0    0     0    0
## 21          0    0    0    0    0     1    0
## 22          0    0    0    0    0     0    0
## 23          0    0    0    0    0     1    0
## 24          0    0    0    0    0     0    0
## 25          0    0    0    0    0     0    0
## 26          0    0    0    0    0     0    0
## 27          0    0    0    0    0     0    0
## 28          0    0    0    0    0     0    0
## 29          0    0    0    0    0     0    0
## 30          0    0    0    0    0     0    0
## 31          0    0    0    0    0     2    0
## 32          0    0    0    0    0     0    0
## 33          0    0    0    0    0     0    0
## 34          0    0    0    0    0     0    0
## 35          0    0    0    0    0     0    0
## 36          0    0    0    0    0     0    0
## 37          0    0    0    0    0     1    0
## 38          0    0    0    0    0     0    0
## 39          0    0    0    0    0     1    0
## 40          0    0    0    0    0     0    0
## 41          0    0    0    0    0     9    0
## 42          0    0    0    0    0     4    0
## 43          0    0    0    0    0    10    0
## 44          0    0    0    0    0    16    2
## 45          0    0    0    1    0     8    6
## 46          0    0    0    2    0    22    0
## 47          0    0    0    0    0    14    0
## 48          0    0    0    0    0     6    4
## 49          0    0    0    2    0    43    5
## 50          0    0    0    3    0    34   17
```

```
## 51           0       0       0       0       0      43      15
## 52           0       5       1       0       9      60      29
## 53           0       2       0       3       3      91      25
## 54           0       4       0       0      -9       1      33
## 55           1      18       0       6       0     184      25
## 56           1      10       2       2       0     143      22
## 57           0      12       2       7       1     131      33
## 58           1      27       3      18      58     178      62
## 59           0      28       3      23      38     234      86
## 60           3      25       2      36      22     169     111
## 61           0      26       5      48      43     239     120
## 62           1      39      12      83      27     462     128
## 63          10      46       4      91      27     429     189
## 64           0     139       7      75      61     467     175
## 65           0     136      15     107      55     901     343
## 66           2      70       2     157      46     769     308
## 67           3     107      27     108      28     431     323
## 68           1     131      17     146      17     753     247
## 69           7      74      12     238      47    1292     319
## 70           0      88       5     132      50    1078     339
## 71           0      73      13     124      61    1177     376
## 72           0     173      11     183      59    1380     386
## 73           7     262      14     173      61    1226     445
## 74           3     119      14     250      39     821     392
## 75           2     151      14     250      94    2197     385
## 76           1     187       5     191      38     990     233
## 77           0     217      23     115      71    1327     246
## 78           2     159      13     151      54    1546     226
## 79           0     375       9     292     119     813     547
## 80           5     244      11      94      52    1371     311
## 81           1     270      11     281      57     636     380
## 82           0     346      15     149      52    1083     414
## 83           0     171       5     163     130    1134     389
## 84           0     219       8     104      88    1455     254
## 85           0     122       8     155      71    1297     330
## 86           0     270       7     273      51     991     395
## 87           0     226       9     274      75    1480     372
## 88           2     141       5     213      49    1354     393
## 89           0     176       5     209      37     920     290
## 90           0     191       2     135     192    2255     382
## 91           0     238       8     188      17    1794     361
## 92           1     276       6     217     286    1872     418
## 93           0     239       2     299     323    2209     387
## 94           0     194       2     273     211    1794     978
## 95           1       0       0     241     101    1013     712
## 96           2     395       1     248      90    1191     473
## 97           0     118       5     191      68    1413     438
## 98           0     211       6     230      58    1192     437
## 99           0     162       4     254      66    2583     442
## 100          9     176       0     446      88    1383     526
```

```
## 101          0     206     9      314     56     1896     509
## 102          0     317     1      395     35     1321     432
## 103          0     277     3      276     65     1556     410
## 104          0     224     2      284     54      981     283
## 105          0     325     1      381     34     2572     449
## 106          0     254     1      402     86     2160     465
## 107          0     355     2      238     92     1532     538
## 108          2     339     3      581     44     1652     457
## 109          0     283     1      434      0     2772     548
## 110          1     221     1      159    265     1028     328
## 111          0     275     0      264     31     1729     176
## 112          0     300     4      353    121     1651     278
## 113          0     236     0      480     72     1818     318
## 114          0     401     0      458    130     2073     363
## 115          0     272     5      495     97     1822     394
## 116          0     301     0      497    115     2032     401
## 117          0      97     0      279    181     1441     305
## 118          0     315     0      263     54     1352     264
## 119          0     290    12      368    110     2246     280
## 120          0     676     1      330     80     2254     315
## 121          0     236     0      442    455     2038     394
## 122          0     382     2      276    154     2225     296
## 123          0     447     4      429    163     2283     477
## 124          0     361     0      324    147     1505     210
## 125          0     508     1      198    107     2401      82
## 126          0     664     2      289    151     3022     296
## 127          0     382     1      454     97     1579     202
## 128          0     498    13      559    261     2742     353
## 129          0     501     5      595    239     2825     491
## 130          0     328     4      786    236     3257     486
## 131          0     593    26      678    240     2056     280
## 132          1     678     7      193    190     2782     199
## 133          0     136    20     1135    375     2482     211
## 134          0      85    18     1092    249     2159     272
## 135          1     221     8      530    358     2820     300
## 136          0     315    11     1553    226     3589     255
## 137          0     656    12     1012    450     2823     233
## 138          0     457     8     1538    325     2051     153
## 139          0     425    19      689    314     3159     182
## 140          0     497    10      618    340     2865     164
## 141          1     567    20     1556    288     3034     151
## 142          0     856    17     1415    448     3724     148
## 143          0     865    15     1772    731     3220     175
## 144          0     891    29     1621    548     3375     195
## 145          0    1014     7     1046    406     2315     113
## 146          0     657     3     1138    416     3377     169
## 147          0     640    12     2341    274     3235     143
## 148          1     400    20     1752    415     3837     229
## 149          0     894    12     2508    322     4335     230
## 150          0     796    13     3465    703     3729     286
```

```
## 151                 0     547     21     3217      511      4381      161
## 152                 3     472     11     2464      419      3414      191
## 153                 0     433      6     2008      522      6108      165
## 154                 0     643      2     3779      595      6712      188
## 155                 0     967     29     1812      697      4547      262
## 156                 4    1142     24     3091      687      5088      324
## 157                 1     977     20     3378      678      5732      317
## 158                 0     900     18     3465      570      3848      226
## 159                 0     358     29     3796      508      4795      284
## 160                 0    1734     21      625      439      8159      204
## 161                 0     870     36     4683      520      7772      204
## 162                 9     917     38     4877      420      7263      314
## 163                 2    1149     39     3340      878      7869      323
## 164                 6    1754     46     4427      547      3964      260
## 165                13     997     47     2695      587      2381      254
## 166                 0    1091     27     3536      605     11786      199
## 167                 1     925     28     3352      439      6354      192
## 168                 4     907     18     3639      259     12977      407
## 169                 6    1177     42     3520      734      8548      452
## 170                22    2212     46     4057      806      9924      408
## 171                 9    1334     55     4221      751      8401      666
## 172                14    1439     62     3038     1061      7876      400
## 173                14    1640     94     2537      503      5782      322
## 174                25    1958     60     1357      572      8814      323
## 175                 0    1710     40     4273      873     12854      450
## 176                37    1812     52     3257      485      8674      469
## 177                 6    2021     62     3259      817      9821      571
## 178                14    2003     41     3910      648      8553      618
## 179                20    2143     62     2742      771      7486      444
## 180                 0    1777     79     2359      695      6161      354
## 181                21    1880     75     1559      699     10964      424
## 182                 0    1467     92     3500      728     11435      493
## 183                16    1455     89     1926      591     11981      639
## 184                16    2399     62     2335     1013      9487      615
## 185                16    1793     56     3357      990      9412      667
## 186                 0    2125     90     3740      732      6267      809
## 187                 0    1164    186     1973      642      5836      547
## 188                12    1821     98     1813      824      5833      229
## 189                11    1251    107     2107      734     12641      749
## 190                10    1416     68     2339      787     14151      482
## 191                 0    1980     81     2525      791      8021      408
## 192                21    1961    111     3212      752      7622      605
## 193                15    1626    146     2992      662      6057      458
## 194                 0    2095    144     1465      637      5562      460
##     Connecticut Delaware District of Columbia Florida Georgia Hawaii Idaho
## 1             0        0                    0       0       0      0     0
## 2             0        0                    0       0       0      0     0
## 3             0        0                    0       0       0      0     0
## 4             0        0                    0       0       0      0     0
## 5             0        0                    0       0       0      0     0
```

## 6	0	0	0	0	0	0	0
## 7	0	0	0	0	0	0	0
## 8	0	0	0	0	0	0	0
## 9	0	0	0	0	0	0	0
## 10	0	0	0	0	0	0	0
## 11	0	0	0	0	0	0	0
## 12	0	0	0	0	0	0	0
## 13	0	0	0	0	0	0	0
## 14	0	0	0	0	0	0	0
## 15	0	0	0	0	0	0	0
## 16	0	0	0	0	0	0	0
## 17	0	0	0	0	0	0	0
## 18	0	0	0	0	0	0	0
## 19	0	0	0	0	0	0	0
## 20	0	0	0	0	0	0	0
## 21	0	0	0	0	0	0	0
## 22	0	0	0	0	0	0	0
## 23	0	0	0	0	0	0	0
## 24	0	0	0	0	0	0	0
## 25	0	0	0	0	0	0	0
## 26	0	0	0	0	0	0	0
## 27	0	0	0	0	0	0	0
## 28	0	0	0	0	0	0	0
## 29	0	0	0	0	0	0	0
## 30	0	0	0	0	0	0	0
## 31	0	0	0	0	0	0	0
## 32	0	0	0	0	0	0	0
## 33	0	0	0	0	0	0	0
## 34	0	0	0	0	0	0	0
## 35	0	0	0	0	0	0	0
## 36	0	0	0	0	0	0	0
## 37	0	0	0	0	0	0	0
## 38	0	0	0	0	0	0	0
## 39	0	0	0	0	0	0	0
## 40	0	0	0	0	0	0	0
## 41	0	0	0	1	0	0	0
## 42	0	0	0	1	2	0	0
## 43	0	0	0	0	0	0	0
## 44	0	0	0	1	0	0	0
## 45	0	0	0	0	1	0	0
## 46	0	0	0	4	2	1	0
## 47	0	0	0	3	0	0	0
## 48	0	0	0	3	5	0	0
## 49	1	0	0	2	7	2	0
## 50	2	1	0	9	6	-1	0
## 51	2	0	0	6	8	0	0
## 52	6	3	0	20	11	0	1
## 53	12	2	0	26	31	2	1
## 54	1	0	0	24	26	2	2
## 55	17	2	22	1	22	2	0

```
## 56       27      8                 0      89     25     2      4
## 57       28      3                 9     116     51     5      1
## 58       63     11                 9     126     90    10     14
## 59       35      9                31     132    198    11     13
## 60        0      6                27     199     70     0      6
## 61      133     11                 4     241     66    17      0
## 62       88     12                18     223    151     3     26
## 63      203     36                21     185    254    34     13
## 64      257     15                46     270    221     1     10
## 65      137     11                44     675    278     4     55
## 66      279     33                40     543    475    11     59
## 67      233     51                33     863    366    43     29
## 68      469     18                38     483    285     0     47
## 69      578     32                59    1227    157    26     59
## 70      557     55                94    1268   1121    29    175
## 71      429     49                91     215    709    20     51
## 72      267     25                67    2052    710    32    210
## 73     1090     57               104    1260    483    63    115
## 74      362    143               145    1269    329    32    131
## 75      399     80               100     813    487    20     56
## 76     1231    110                95     974    667    16     23
## 77      875    145               114    1221   1508    23     69
## 78        0    188               229     911   1079     0     40
## 79     2003     93                83     908    665    32     22
## 80      754    117               137    1167    919     0    122
## 81      972    153               118     963    674    23     42
## 82      525    146                97    1401    293    34     11
## 83     1346    133                80    1124    863     5     19
## 84      608    168               103     609   1263     7     38
## 85      766     88               139     883    409    13      9
## 86     1129     56               153     832    682     6    114
## 87      925    247               126    1416   1525    11     22
## 88      741    221               190     733    475    33     46
## 89      412      0               127     822    632     6     13
## 90     1853    207               134     745   1106     4      4
## 91      545    186               171     810    474     2     64
## 92     2109    269               108     440   1333     6     30
## 93      631    108               155    1339    669     4     70
## 94      836    134               167     885    608     5     34
## 95      647    134               171     306    731     4     17
## 96      686    458               142     693    264     1     10
## 97      728    128                51     606    816     1      0
## 98      315    413               102     710    620     2     55
## 99      455     80               112     345    853     4      0
## 100     933     79               217     497    489     5     32
## 101    1064    184               335    1038   1225     1     31
## 102     523    120               139     735    842     1     46
## 103       0    170               219     615    334     0      0
## 104     686     80               154     819    786     1     45
## 105     648     83               152     542    547     4     21
```

## 106	374	407	139	563	745	1	31
## 107	789	161	193	826	875	3	20
## 108	627	172	245	371	563	0	0
## 109	573	166	203	802	407	2	27
## 110	570	0	170	595	992	1	25
## 111	211	288	117	386	422	2	30
## 112	568	176	96	941	922	1	33
## 113	522	211	99	479	503	3	0
## 114	609	271	152	808	550	-1	58
## 115	621	150	135	928	795	1	0
## 116	618	174	171	673	440	1	68
## 117	716	123	81	777	367	1	0
## 118	697	199	147	854	704	0	36
## 119	314	168	164	502	572	1	0
## 120	587	157	117	527	946	2	51
## 121	191	192	237	1204	862	4	0
## 122	432	143	105	776	819	-5	89
## 123	382	0	73	676	760	1	0
## 124	446	280	144	740	660	0	31
## 125	405	156	115	879	498	0	0
## 126	430	101	109	509	583	0	0
## 127	-15	30	72	379	655	1	73
## 128	271	75	86	651	628	3	71
## 129	203	65	46	1212	615	2	0
## 130	260	186	179	927	450	2	33
## 131	179	76	84	739	732	1	36
## 132	539	107	56	667	839	0	0
## 133	239	80	29	617	305	1	94
## 134	112	27	130	1317	687	0	0
## 135	148	34	104	1419	965	2	57
## 136	221	27	79	1305	762	9	121
## 137	358	72	70	1270	738	9	28
## 138	150	97	63	1180	539	2	0
## 139	124	30	57	966	599	1	50
## 140	87	48	85	1096	752	6	32
## 141	168	36	63	1371	731	3	39
## 142	114	50	52	1698	993	7	0
## 143	228	67	65	1902	810	14	93
## 144	305	56	55	2581	1021	17	0
## 145	94	35	58	2016	877	5	46
## 146	147	76	32	1758	733	8	0
## 147	114	63	19	2783	664	0	63
## 148	80	41	29	2610	952	8	170
## 149	11	55	56	3207	882	18	111
## 150	117	112	49	3822	1097	27	128
## 151	158	70	32	4049	1800	0	133
## 152	40	94	36	3494	892	25	2
## 153	27	45	38	2926	1227	2	250
## 154	117	27	36	3286	1882	3	-2
## 155	14	42	34	5511	1571	16	148

## 156	81	91	31	5004	1714	16	463
## 157	65	37	26	8942	1900	15	0
## 158	147	74	31	9585	1990	6	457
## 159	97	135	32	8530	2225	27	0
## 160	59	150	44	5266	2207	1	430
## 161	152	98	35	6093	1874	17	365
## 162	58	36	38	6563	2951	9	253
## 163	74	221	25	10109	3467	20	223
## 164	71	192	45	9488	2784	29	401
## 165	0	73	12	11458	2826	24	376
## 166	0	132	35	10059	2197	24	363
## 167	259	165	33	6336	1548	7	319
## 168	57	121	54	7347	3406	41	487
## 169	75	48	73	9989	3420	23	430
## 170	101	69	37	8935	2837	36	460
## 171	78	121	64	11433	4490	28	500
## 172	0	91	58	10360	3184	42	577
## 173	0	61	46	15300	2534	20	397
## 174	223	75	59	12624	3637	23	501
## 175	20	90	40	9194	3391	21	316
## 176	106	81	80	10181	3875	28	729
## 177	114	64	50	13965	3449	19	685
## 178	143	223	39	11466	3905	23	619
## 179	0	92	79	10328	4688	20	550
## 180	0	90	67	12478	3249	27	571
## 181	162	105	78	10347	2453	12	394
## 182	41	122	88	9440	3406	25	555
## 183	127	46	102	9785	3314	17	499
## 184	9	132	42	10249	4305	55	415
## 185	544	278	78	12444	4813	59	528
## 186	0	-27	68	12199	3768	71	561
## 187	0	115	63	9344	2765	63	352
## 188	207	116	78	8892	2890	28	514
## 189	94	70	87	9230	4209	46	528
## 190	463	126	54	9446	3271	108	454
## 191	130	87	58	9956	3963	124	568
## 192	140	99	0	9007	4066	122	474
## 193	0	89	0	9642	3660	86	394
## 194	0	72	0	7104	3165	45	0

##	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland
## 1	0	0	0	0	0	0	0	0
## 2	0	0	0	0	0	0	0	0
## 3	1	0	0	0	0	0	0	0
## 4	0	0	0	0	0	0	0	0
## 5	0	0	0	0	0	0	0	0
## 6	0	0	0	0	0	0	0	0
## 7	0	0	0	0	0	0	0	0
## 8	0	0	0	0	0	0	0	0
## 9	0	0	0	0	0	0	0	0
## 10	1	0	0	0	0	0	0	0

```
## 11        0        0        0        0        0        0        0        0
## 12        0        0        0        0        0        0        0        0
## 13        0        0        0        0        0        0        0        0
## 14        0        0        0        0        0        0        0        0
## 15        0        0        0        0        0        0        0        0
## 16        0        0        0        0        0        0        0        0
## 17        0        0        0        0        0        0        0        0
## 18        0        0        0        0        0        0        0        0
## 19        0        0        0        0        0        0        0        0
## 20        0        0        0        0        0        0        0        0
## 21        0        0        0        0        0        0        0        0
## 22        0        0        0        0        0        0        0        0
## 23        0        0        0        0        0        0        0        0
## 24        0        0        0        0        0        0        0        0
## 25        0        0        0        0        0        0        0        0
## 26        0        0        0        0        0        0        0        0
## 27        0        0        0        0        0        0        0        0
## 28        0        0        0        0        0        0        0        0
## 29        0        0        0        0        0        0        0        0
## 30        0        0        0        0        0        0        0        0
## 31        0        0        0        0        0        0        0        0
## 32        0        0        0        0        0        0        0        0
## 33        0        0        0        0        0        0        0        0
## 34        0        0        0        0        0        0        0        0
## 35        0        0        0        0        0        0        0        0
## 36        0        0        0        0        0        0        0        0
## 37        0        0        0        0        0        0        0        0
## 38        0        0        0        0        0        0        0        0
## 39        0        0        0        0        0        0        0        0
## 40        1        0        0        0        0        0        0        0
## 41        1        0        0        0        0        0        0        0
## 42        0        0        0        0        0        0        0        0
## 43        0        0        0        0        0        0        0        0
## 44        1        0        0        0        0        0        0        0
## 45        0        1        0        0        1        0        0        3
## 46        1        0        0        0        0        0        0        0
## 47        1        1        0        1        0        0        0        2
## 48        0        1        3        0        3        0        0        0
## 49        5        3        5        0        1        0        0        3
## 50       13        5        5        0        3        5        0        1
## 51        7        2        1        3        2       14        1        3
## 52       14        0        3        2        4       10        2        6
## 53       18        3        0        2        2       48        0        9
## 54        2        4        1        0        2       10       -1       -3
## 55       17        5        5        3        3       28       15       18
## 56       78        5        0        7        5       81        9       18
## 57      111        8       15        4        2       61        9       25
## 58      150       22        6       13       22      135       17       22
## 59      163       26        1       13       14      145        4       42
## 60      168       42       24        9       23      226       14       44
```

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## 61      296     76    21      8     16      74    19      51
## 62      236     66    15     19     20     335    18      46
## 63      252     98    19     16     39     216    11      59
## 64      328    109    22     34     35     407    24      76
## 65      673    168    33     38     50     509    13     158
## 66      486    334    56     34     54     440    13     192
## 67      467    254    63     60     79     571    43     220
## 68     1105    280    38     64     58     225    42     244
## 69      460    273    88     42     41     485    22     174
## 70      938    372    73     62    149    1212    28     247
## 71      986    406    50     51      4    1187     0     326
## 72      715    474    67     68    138    2725    73     345
## 73     1209    399    85     76      0    1148    56     427
## 74     1453    516    88     69    147    2199    24     367
## 75      902    458    82     53     38     514    14     492
## 76     1003    545    77     98      0    1857    29     428
## 77     1291    554   100     63    194    1417    20     326
## 78     1525    433    99    134      0     746    18    1158
## 79     1344    408   125     70    192    1253    23     656
## 80     1465    556   118      1    352     970    26     783
## 81     1293    528   122    158      0     761    30     726
## 82     1672    493    77     69    270     581    17     531
## 83     1173    431   123     46     55     421    65     711
## 84     1223    168   189     51     30     502    37     536
## 85     1345    433    96     63    162     433    35     560
## 86     1141    582   146    111    225     581    26     752
## 87     1844    612   191    115     87     586    31     788
## 88     1582    487   181     91    185     462    20     754
## 89     1197    570   389     84    253     348    20     521
## 90     1156    477   257    143     90     595     8     837
## 91     1546    409   482    116    154     331    13     509
## 92     2048    341   107    167    174     404    19     582
## 93     1830    601   176    390    101     481    30     962
## 94     2721    642   521    238    300     401    28     879
## 95     2119    718   647    176    136     372     0    1150
## 96     2126    613   384    142    170     261    50     815
## 97     1980    949   392    196     71     295     8     906
## 98     2219    627   508    179    219     218    17     626
## 99     2256    594   467    187    162     374    16     736
## 100    2560    653   302    574    171     341    39     893
## 101    3137    795   739    221    174     710    28    1730
## 102    2450    665   759    251     -3     429    30    1001
## 103    2994    638   532    271    251     200    32     989
## 104    2278    574   528    227    115     333    20     946
## 105    2112    526   408    265    577     323    21     709
## 106    2343    837   293    345    112     403    28    1046
## 107    2639    633   655    339    195     253    76    1211
## 108    2889    643   398    335    159     203    44    1111
## 109    2325    586   214    162    152     562    34    1049
## 110    1656    394   288    122      0     183    28    1053
```

```
## 111   1266   501   414   208   237    215   26    786
## 112   4014   500   539    81   176    235   15    688
## 113   1673   346   377   278     0    612   38    751
## 114   3243   580   386   187   372    827   50   1091
## 115   2432   603   374   181   219    348   38   1083
## 116   2088   624   279    53   244    280   45    982
## 117   1734   498   323    14     0    315   39    836
## 118   2294   477   304   350   247    277   26    958
## 119   1545   450   341    50   134    329   28   1784
## 120   2388   569   324   154    98    278   78    777
## 121   2270   662   550   118   119   1188   58   1208
## 122   2756   473   322   284   140    421   71    893
## 123   2352   492   406    37   145      0   65   1071
## 124   2508   475   353    58     0    244   42    818
## 125   1713   339   306   121     0    640   19    839
## 126   1178   363   146    74   380    245   35    535
## 127   1111   359   666    92   126    443   28    736
## 128   1527   631   217    80   108    305   52   1286
## 129   1622   490   371   291   279      0   37   1279
## 130   1462   653   287    28   240    775   56   1027
## 131   1343   363   308    10     0    339   43    763
## 132    974   256   147   220   342    425   24    549
## 133   1614   407   320    45   139    405   28    848
## 134    982   475   281   127   225    387   41    807
## 135    929   384   506    75   295    429   28    876
## 136   1156   482   348   139   272    427   36    912
## 137    975   419   324    55   310    497   42    712
## 138    867   400   234    45     0    330   46    491
## 139    658   226   295   138   189    234   18    431
## 140    797   410   230    65   231    562   18    500
## 141    625   304   389   141   176    418   31    561
## 142    766   411   347    73    62    442   30    732
## 143    595   398   377   150   221    523   54    416
## 144    673   397   367    47   279   1288   36    692
## 145    672   366   209    81     0    336   36    396
## 146    473   521   156   218   202    553   17    331
## 147    623   356    97    92     0    534    9    377
## 148    546   227   281   233   348    928   17    560
## 149    593   425   401   109   202      0   42    260
## 150    692   308   413   268   257   -119   35    319
## 151    634   315   222    76   176    870   25    408
## 152    658   362   467    39   120    393   19    350
## 153    462   210   183   292    89    461   14    297
## 154    601   238   323   109   302   1356   25    404
## 155    715   269   132   393   222    882   21    330
## 156    894   515   772   177   254    938   53    440
## 157    857   485   344   355   242   1354   32    338
## 158    786   435   356   155   308      0   52    335
## 159    646   355   447   230    65   1467   37    327
## 160    738   298   325   362   115    845   28    477
```

```
## 161      724     366  229   161   277  1014   34   305
## 162      828     358  440   460   218  2083   41   359
## 163      869     435  745   172   237  1383   34   505
## 164      868     528  204   657   297  1728   45   538
## 165      862     517  598   252     0     0   24   380
## 166      639     769  456   170     0  1937   18   291
## 167      614     323  241   557   776  1101    8   272
## 168     1709     102  395   222   367  1936   17   492
## 169      980     437  471   472   400  1888   20   465
## 170     1018     512  630   453   326  1843   26   586
## 171     1327     725  918   518   427  2642   13   463
## 172     1195     779  486   384   449  2167   21   557
## 173      954     533  752   294   268  1319   19   642
## 174      883     425  221   664   264  1705   19   418
## 175      707     648  235   242   570  2215    8   733
## 176     1187     685  670   462   454  2089   12   756
## 177     1257     710  814   468   406  2280   20   648
## 178     1427     733  553   571   522  2179   38   707
## 179     1276     841  410   305   579     0    9   835
## 180      965     917  500   303   977  3116   42   925
## 181     1172     635  530   660   253  3186   24   554
## 182      942     710  378   273   646  1691   12   860
## 183     1611     757  487   552   480  2771   -1   627
## 184     1621     929  588   475   607  2296   15   664
## 185     1600     996  638   598   785  2084   20   930
## 186     1426     922  452   455   832     0   33  1288
## 187     1541     852  471   281   318  3840   24   694
## 188     1231     535  339   514   504  2343   18  1128
## 189     1074     771  232   254   525  1121    6   648
## 190     1395     621  695   533   616  1735   28   761
## 191     1772     954  662   294   659  1708   22   892
## 192     1980     901  468   479   765  1799   24  1169
## 193     1639     968  540   228   572     0   25  1019
## 194     1470     735  430   279   462  3467   21   909
##      Massachusetts Michigan Minnesota Mississippi Missouri Montana Nebraska
## 1                0        0         0           0        0       0        0
## 2                0        0         0           0        0       0        0
## 3                0        0         0           0        0       0        0
## 4                0        0         0           0        0       0        0
## 5                0        0         0           0        0       0        0
## 6                0        0         0           0        0       0        0
## 7                0        0         0           0        0       0        0
## 8                0        0         0           0        0       0        0
## 9                0        0         0           0        0       0        0
## 10               0        0         0           0        0       0        0
## 11               1        0         0           0        0       0        0
## 12               0        0         0           0        0       0        0
## 13               0        0         0           0        0       0        0
## 14               0        0         0           0        0       0        0
## 15               0        0         0           0        0       0        0
```

```
## 16       0       0       0       0       0       0       0
## 17       0       0       0       0       0       0       0
## 18       0       0       0       0       0       0       0
## 19       0       0       0       0       0       0       0
## 20       0       0       0       0       0       0       0
## 21       0       0       0       0       0       0       0
## 22       0       0       0       0       0       0       0
## 23       0       0       0       0       0       0       0
## 24       0       0       0       0       0       0       0
## 25       0       0       0       0       0       0       0
## 26       0       0       0       0       0       0       0
## 27       0       0       0       0       0       0       0
## 28       0       0       0       0       0       0       0
## 29       0       0       0       0       0       0       0
## 30       0       0       0       0       0       0       0
## 31       0       0       0       0       0       0       0
## 32       0       0       0       0       0       0       0
## 33       0       0       0       0       0       0       0
## 34       0       0       0       0       0       0       0
## 35       0       0       0       0       0       0       0
## 36       0       0       0       0       0       0       0
## 37       0       0       0       0       0       0       0
## 38       0       0       0       0       0       0       0
## 39       0       0       0       0       0       0       0
## 40       0       0       0       0       0       0       0
## 41       0       0       0       0       0       0       0
## 42       1       0       0       0       0       0       0
## 43       0       0       0       0       0       0       0
## 44       0       0       0       0       0       0       0
## 45       4       0       1       0       0       0       1
## 46       0       0       0       0       0       0       0
## 47      16       0       0       0       1       0       0
## 48       0       0       1       0       0       0       2
## 49      19       0       0       0       0       0       0
## 50      51       2       3       0       0       0       2
## 51      15       1       4       1       0       0       5
## 52      16      21       5       5       3       1       4
## 53      15      12       7       0       0       4       4
## 54       0       9       0       0       1       1      -1
## 55      49      31      32       6       3       0       1
## 56      30      14       6       9       6       2       5
## 57      35      69      18      13       7       2       1
## 58      76     155      12      16      21       1       5
## 59      85     157      24      30      37       9       8
## 60     110     154      21      60      10       7       1
## 61     117     506      33      67      33       7      13
## 62     137     323      67      42     103       0       0
## 63     382     488      27      71      66      17      15
## 64     679     526      25      57      91      14       5
## 65     579     564      58     108     195      25       3
```

## 66	823	816	52	94	167	19	8
## 67	1017	1042	45	84	120	20	14
## 68	698	863	62	96	70	25	12
## 69	797	1050	73	88	355	17	37
## 70	868	1148	53	90	261	27	27
## 71	1118	1766	60	136	253	10	38
## 72	1228	1513	53	104	200	33	36
## 73	1436	1991	46	181	121	2	33
## 74	1334	1514	77	97	348	22	42
## 75	764	1533	70	183	96	21	43
## 76	1337	1552	51	100	462	13	53
## 77	1365	1824	83	177	297	20	30
## 78	1588	1432	85	88	184	13	72
## 79	2151	1221	86	257	243	22	49
## 80	2033	982	96	209	395	11	67
## 81	1886	1221	91	173	246	12	64
## 82	2615	683	194	139	139	10	92
## 83	1392	1439	0	161	180	7	23
## 84	1297	1420	74	145	166	5	83
## 85	1755	1102	114	273	125	5	4
## 86	2262	822	0	264	303	11	51
## 87	2804	1259	261	169	212	7	114
## 88	1978	806	139	181	193	4	183
## 89	1711	657	147	300	168	7	225
## 90	1578	636	114	238	162	0	174
## 91	1580	724	97	204	199	4	37
## 92	1782	1356	155	178	191	2	128
## 93	3113	1441	220	259	267	3	389
## 94	4973	1485	243	281	243	2	222
## 95	2435	459	261	284	165	1	295
## 96	1618	751	156	193	167	3	311
## 97	1542	494	209	183	169	1	328
## 98	1898	1132	370	248	147	2	159
## 99	2008	1213	463	227	170	0	334
## 100	2010	1099	492	246	195	2	430
## 101	2177	1046	594	397	234	0	727
## 102	2050	900	502	229	259	2	309
## 103	1880	623	431	109	263	0	344
## 104	1070	301	571	327	286	2	376
## 105	1266	566	617	330	197	-1	336
## 106	1884	824	728	217	252	0	316
## 107	1800	674	786	262	236	0	645
## 108	1752	758	723	404	146	2	484
## 109	1471	506	702	288	159	0	275
## 110	1115	410	481	123	117	0	78
## 111	733	545	528	173	107	1	236
## 112	961	632	695	234	117	2	125
## 113	1287	556	423	182	191	1	380
## 114	1803	1348	518	393	164	0	348
## 115	1326	643	805	318	189	4	350

## 116	1588	505	729	322	176	2	610
## 117	1126	648	699	173	123	0	-43
## 118	1066	892	704	136	148	2	448
## 119	955	610	657	272	132	1	229
## 120	1133	857	641	263	176	7	268
## 121	1206	666	530	255	147	1	305
## 122	936	555	805	403	211	0	235
## 123	845	503	840	380	159	0	301
## 124	1067	349	728	255	249	0	171
## 125	658	226	742	198	155	0	228
## 126	460	353	645	273	172	0	257
## 127	602	618	504	313	151	2	365
## 128	770	524	483	328	211	4	265
## 129	682	717	584	421	150	8	399
## 130	893	392	659	436	167	12	257
## 131	695	486	660	294	173	10	196
## 132	337	217	358	229	214	4	244
## 133	358	312	300	289	268	4	271
## 134	429	417	362	281	243	2	269
## 135	471	322	403	238	288	14	254
## 136	494	842	707	209	167	2	267
## 137	575	93	521	270	289	-1	166
## 138	304	55	385	231	90	5	92
## 139	190	135	338	498	223	3	122
## 140	263	63	299	355	211	6	132
## 141	267	15	346	360	188	7	140
## 142	511	267	447	0	192	2	257
## 143	392	223	479	608	51	10	207
## 144	336	164	377	257	235	15	118
## 145	208	218	299	168	30	13	90
## 146	87	31	222	283	349	8	121
## 147	195	184	189	353	246	5	187
## 148	266	228	414	489	212	16	193
## 149	271	301	379	0	302	25	183
## 150	228	299	356	0	296	11	174
## 151	286	448	436	0	390	32	119
## 152	125	166	453	0	403	19	105
## 153	149	246	307	1688	133	17	151
## 154	229	240	242	569	412	9	136
## 155	172	358	294	526	118	23	122
## 156	226	434	360	1092	514	37	125
## 157	233	340	493	550	579	26	178
## 158	373	350	417	465	356	23	251
## 159	224	267	516	361	224	11	124
## 160	101	277	312	675	519	56	143
## 161	114	505	442	680	497	48	135
## 162	261	361	413	653	292	49	133
## 163	195	589	494	870	532	67	142
## 164	290	497	414	914	524	45	208
## 165	210	406	0	990	423	39	167

```
## 166           136    360    512    226    233    45    102
## 167           163    326    433    357    395    37    117
## 168           201    633    564    957    707    78    155
## 169           264    651    456    674    672    44    224
## 170           295    512    574    703    820    95    198
## 171           213    622    604   1031    659   127    154
## 172           288    685    804    797    537    84    221
## 173           199    406    710    868    274    81    174
## 174           230    422    491    393    409    85    227
## 175           303    666    398    862    951   109    318
## 176           217   1049    572   1025    817   144    262
## 177           234    926    605   1230    816   135    155
## 178           298    754    666   1032    865   135    227
## 179           359    745    457   1017    966   105    120
## 180           296    530    734    792    817    62    102
## 181           255    527    903   1251    581    87    264
## 182           244    664    350   1635   1092    91    343
## 183           287    671    504   1547   1303   101    296
## 184           327    701    760    982   1563    97    332
## 185           338    641    767   1532   1575   129    356
## 186           283    550    803   1396   1399   221    221
## 187           369   1039    862   1173   1126    82    223
## 188           289    512    650    627   1329    39    281
## 189           256    785    478   1304   1692    94    258
## 190           502   1016    666   1719   1761   202    265
## 191           414    807    745   1775   2197   138    344
## 192           514    793    771   1168   1477   151    445
## 193           428    758    725   1134   1016   116    180
## 194           418    426    759    672    552   112    311
##      Nevada New Hampshire New Jersey New Mexico New York North Carolina
## 1         0             0          0          0        0              0
## 2         0             0          0          0        0              0
## 3         0             0          0          0        0              0
## 4         0             0          0          0        0              0
## 5         0             0          0          0        0              0
## 6         0             0          0          0        0              0
## 7         0             0          0          0        0              0
## 8         0             0          0          0        0              0
## 9         0             0          0          0        0              0
## 10        0             0          0          0        0              0
## 11        0             0          0          0        0              0
## 12        0             0          0          0        0              0
## 13        0             0          0          0        0              0
## 14        0             0          0          0        0              0
## 15        0             0          0          0        0              0
## 16        0             0          0          0        0              0
## 17        0             0          0          0        0              0
## 18        0             0          0          0        0              0
## 19        0             0          0          0        0              0
## 20        0             0          0          0        0              0
```

```
## 21         0           0           0           0           0           0
## 22         0           0           0           0           0           0
## 23         0           0           0           0           0           0
## 24         0           0           0           0           0           0
## 25         0           0           0           0           0           0
## 26         0           0           0           0           0           0
## 27         0           0           0           0           0           0
## 28         0           0           0           0           0           0
## 29         0           0           0           0           0           0
## 30         0           0           0           0           0           0
## 31         0           0           0           0           0           0
## 32         0           0           0           0           0           0
## 33         0           0           0           0           0           0
## 34         0           0           0           0           0           0
## 35         0           0           0           0           0           0
## 36         0           0           0           0           0           0
## 37         0           0           0           0           0           0
## 38         0           0           0           0           0           0
## 39         0           0           0           0           0           0
## 40         0           0           0           0           0           0
## 41         0           1           0           0           1           0
## 42         0           1           0           0           1           1
## 43         0           0           0           0           9           0
## 44         1           0           2           0          12           0
## 45         1           0           0           0           8           1
## 46         0           0           2           0          45           0
## 47         2           2           1           0          30           0
## 48         0           0           0           0          36           0
## 49         0           0          10           0           8           5
## 50         3           1           8           3          70           0
## 51         3           1           6           2         107           8
## 52         8           0          20           5          94           2
## 53         2           1          20           3         192           8
## 54         0           0           3           0           2           7
## 55        25          10         104           8         352           7
## 56        10           9          74           2         611          25
## 57         0          11         147           5        1460          28
## 58        40           5         344           7        2666          44
## 59        66          11         149           7        2699          53
## 60         0           8         437          13        3324          67
## 61        29          12         587           2        4073          49
## 62        55          28         930          26        5084          48
## 63        33           0         831          17        4797         142
## 64        45           7         727          13        5160          95
## 65        97          29        2474           0        7036         148
## 66       116          21        1949          23        6999         149
## 67        90          29        2299          72        7534         133
## 68       294          27        2262          29        7238         171
## 69        92         100        3250           0        7015         122
## 70       102          43        2060          78        9170         222
```

```
## 71    165     10   3559    12    8115    140
## 72    184    112   3335    46    8558    302
## 73     51      0   4305   117   10481    274
## 74    228     61   4229    16   10846    235
## 75    113     81   3381   118    9327    163
## 76     98     94   3585    62    8655    313
## 77    171      0   3326   108    8060    337
## 78    135     32   3021    27   11186    200
## 79    197     72   3590    44   10718    237
## 80    266      0   3561   216   10569    229
## 81    -20     66   3563    10    8678    389
## 82    134     44   3699   154    8007    216
## 83    154     56   2734    17    6716    316
## 84    144    -63   4240    83    7271    227
## 85     77    217   2206   139   11434    227
## 86      3      0   4287     0    9237    299
## 87    310    148   3150   113    6906    406
## 88    102     55   2953   201    6877    283
## 89    102     48   3881    47    5908    273
## 90    102     57   3421   126    5034    294
## 91    107     43   3665     0    5103    239
## 92    144     98   3527   239    4703    361
## 93    127     82   4111   169    5238    325
## 94    190     50   2171   142    8130    470
## 95    141     77   3302   139   10553    478
## 96    195     67   3540    66    5902    229
## 97    -34     74   2150    99    3951    324
## 98    121     72   2668   149    3110    434
## 99    113     48   2509   239    4585    425
## 100   119     88   2287   198    4681    574
## 101   195    164   2538   102    3942    316
## 102   141    119   2527   219    4663    518
## 103    83     89   3027   118    3438    182
## 104   158     70   1525   181    2538    201
## 105    30     48   2324   107    2239    539
## 106    81    105   1297   153    2786    543
## 107   114    102   2101   202    3491    487
## 108    65    104   1849   180    2938    466
## 109   251     64   1557   105    2715    472
## 110   -51     60   1357    85    2273    460
## 111    32     89   1452   206    1660    336
## 112   161     79    711   143    1430    348
## 113   163     60    643   152    2176    730
## 114    28     83   1144   139    2390    616
## 115   229     71   1280   159    2762    526
## 116    80    103   1105   185    2419    636
## 117   136     40   1415    91    1889    543
## 118   112     56   1736   158    1250    534
## 119    35     69   1116    96    1474     32
## 120   292    147   1420   125    1525   1023
```

```
## 121     12      67     810    155    2088     250
## 122    125      79     993    153    1696    1598
## 123      1      75     561      0    1772     754
## 124    355      60    1014    318    1589     501
## 125     75      48     938     83    1249     692
## 126    101      34     672    104    1072     398
## 127     93      55     864    122    1129     461
## 128     98     103     557    112    1768     884
## 129    128     103    1659    129    1551    1085
## 130    141       0     764    131    1376     909
## 131    111     159     837     65    1110     991
## 132     74      34     473    111     941     807
## 133    156      64     627    224    1329     431
## 134     93      46     523    116    1045    1253
## 135    178      81     462    213    1048     799
## 136    180      77     806    319    1075    1220
## 137    182      66     557    128    1108    1423
## 138    178      24     271    140     781     907
## 139    147      36     333    122     702     892
## 140    229       0     299     43     683     710
## 141    173      99     550    145     674    1246
## 142    255      31     470    117     736    1111
## 143    231      42     348    159     822    1833
## 144    293      48     441     95     916    1428
## 145    204      19     276    102     694    1419
## 146    114      27     222    122     620     850
## 147    368      19     323     88     631     793
## 148    171      72     277    132     567    1027
## 149    315      14     404     88     618    1233
## 150    355      36     389    107     796    1618
## 151    452      32     338    170     716    1605
## 152    264      26     308    135     664    1411
## 153    288      14     273    129     552    1163
## 154    469      13     319    144     597     675
## 155    365      27     158    152     581    1888
## 156    497      40     304    202     749     945
## 157    381      33     388    216     805    1686
## 158   1099      46     289    211     703    1654
## 159    821      30     309    190     616    1436
## 160    734      13      90    173     391    1488
## 161    562      22     395    165     524    1591
## 162    645      20     261    129     625    1424
## 163    632      20     428    244     875    1465
## 164    985      35     386    256     918    2046
## 165    857      15     291    287     726    1408
## 166    843      25     369    193     533    1322
## 167    491      17     209    251     518    1783
## 168    876      18     267    220     588    1515
## 169    516      20     161    290     692    1397
## 170    603      21     231    234     584    1969
```

```
## 171    1004              18       358       298       786              2376
## 172     930              33       331       224       730              1874
## 173     845              30       339       255       677              1865
## 174     832              14       224       263       557              1898
## 175    1104              23       393       223       912              2331
## 176     849              22       363       327       831              1837
## 177    1447              26       223       297       769              1871
## 178    1380              26        50       318       776              1862
## 179    1182              23       263       280       754              2522
## 180    1288              15       -31       235       502              1711
## 181     948              46       180       244       519              1428
## 182     815              13       293       302       855              1985
## 183    1129              33       389       311       705              2060
## 184    1262              23       242       335       811              1849
## 185     966              57       458       312       753              2603
## 186     931              40       513       313       750              1693
## 187    1027              21       505       254       536              1516
## 188     988               5       449       460       608              1979
## 189    1105              59       483       289       534              1784
## 190     870              13       305       345       715              1687
## 191    1018              31       370       252       777              2145
## 192    1264              39       690       212       644              1766
## 193     986              31       369       196       753              1708
## 194    1131              20       321       220       531              1324
##      North Dakota Ohio Oklahoma Oregon Pennsylvania Rhode Island South
## Carolina
## 1               0    0        0      0            0            0
## 0
## 2               0    0        0      0            0            0
## 0
## 3               0    0        0      0            0            0
## 0
## 4               0    0        0      0            0            0
## 0
## 5               0    0        0      0            0            0
## 0
## 6               0    0        0      0            0            0
## 0
## 7               0    0        0      0            0            0
## 0
## 8               0    0        0      0            0            0
## 0
## 9               0    0        0      0            0            0
## 0
## 10              0    0        0      0            0            0
## 0
## 11              0    0        0      0            0            0
## 0
## 12              0    0        0      0            0            0
## 0
```

```
## 13              0    0       0    0          0            0
0
## 14              0    0       0    0          0            0
0
## 15              0    0       0    0          0            0
0
## 16              0    0       0    0          0            0
0
## 17              0    0       0    0          0            0
0
## 18              0    0       0    0          0            0
0
## 19              0    0       0    0          0            0
0
## 20              0    0       0    0          0            0
0
## 21              0    0       0    0          0            0
0
## 22              0    0       0    0          0            0
0
## 23              0    0       0    0          0            0
0
## 24              0    0       0    0          0            0
0
## 25              0    0       0    0          0            0
0
## 26              0    0       0    0          0            0
0
## 27              0    0       0    0          0            0
0
## 28              0    0       0    0          0            0
0
## 29              0    0       0    0          0            0
0
## 30              0    0       0    0          0            0
0
## 31              0    0       0    0          0            0
0
## 32              0    0       0    0          0            0
0
## 33              0    0       0    0          0            0
0
## 34              0    0       0    0          0            0
0
## 35              0    0       0    0          0            0
0
## 36              0    0       0    0          0            0
0
## 37              0    0       0    0          0            0
0
```

```
## 38               0    0        0    0        0        0
## 0
## 39               0    0        0    1        0        0
## 0
## 40               0    0        0    0        0        1
## 0
## 41               0    0        0    2        0        1
## 0
## 42               0    0        0    0        0        0
## 0
## 43               0    0        0    0        0        0
## 0
## 44               0    0        0    0        0        0
## 0
## 45               0    0        0    0        2        0
## 0
## 46               0    0        1    3        0        1
## 2
## 47               0    0        0    8        4        0
## 0
## 48               0    0        0    0        1        0
## 1
## 49               0    3        1    0        5        0
## 4
## 50               0    1        0    5        4        2
## 3
## 51               1    1        1    5        6       -2
## -3
## 52               0    7        0    6       19        9
## 1
## 53               0   14        1    6        6        8
## 11
## 54               0    4        0    0        0        0
## 0
## 55               0   20        6    3       32        1
## 11
## 56               2   17        7   27       33        2
## 17
## 57               3   22        0    9       43       10
## 13
## 58              13   30       27   13       51       11
## 20
## 59               7   54        5   26      105       10
## 46
## 60               2   74        4   23       88       12
## 48
## 61               0  109       14   24      110       17
## 22
## 62               2   87       14   30      189       23
## 102
```

```
## 63              6  124     25     19      248            18
44
## 64              9  137     58     56      314             8
82
## 65              6  164     84     50      535            33
0
## 66             17  269     74    100      550            38
118
## 67             26  269     55     63      500            36
118
## 68              4  247     52     69      587            55
114
## 69             11  280     52     58      723           114
151
## 70             13  266     87     84      808            80
158
## 71             20  348    153     46     1046            78
210
## 72             17  354    160     90     1259            79
261
## 73             14  411    109     73     1302            66
146
## 74             13  427    171      0     1874            95
217
## 75             21  304     93    169     1145           116
132
## 76             18  410     75      0     1538           160
183
## 77             12  329    145     64     1726           147
185
## 78             14  366     52     49     1778           221
0
## 79             18  364    160    140     1669           277
376
## 80              9  366    108      1     1751             0
274
## 81             15  372     74     49     1668           622
144
## 82             15  354    102    156     1219           316
109
## 83             23  371     99     57     1354             0
71
## 84             10  310    115     49     1173           586
162
## 85             24  509     79     30     1288             0
103
## 86             28  620     94     73     1505           278
275
## 87              0  693    108     49     1630           648
168
```

```
## 88      135 1115     0   59     1764      314
149
## 89       57 1380   102   66     1250      215
129
## 90       42 1317   113   47     1012      384
69
## 91       17  806   127   47     1335      410
-7
## 92       35  392    87   55      833      341
322
## 93       30  577   123   68     2297      415
156
## 94       39  475   104   50     1829      443
153
## 95       55  418    73   76      945      430
183
## 96       64  385    60   58     1463      310
245
## 97       75  353    27   43      942      269
115
## 98       49  444   129   31     1579      219
122
## 99       42  534    63   61     1190      320
147
## 100      34  724   145   64     1644      374
213
## 101      40  716   130   69     1608      341
163
## 102      46  592   103   56      915      327
231
## 103      38  579   121   45      731      188
137
## 104      34  560    72   79     1591      175
131
## 105      41  495    83   80     1048      281
84
## 106      57  607    75   77      936      272
95
## 107      48  555   128   73     1156      325
206
## 108      54  885    94   79     1415      249
225
## 109      39  681    66   92     1189      210
164
## 110      27  384    99   68     1379      285
122
## 111      27  696    24   58      520      176
139
## 112      53  473   119   72      851      164
135
```

## 113	76	471	126	58	791	221
103						
## 114	65	636	105	63	1004	181
159						
## 115	49	597	124	62	1031	203
218						
## 116	87	520	150	71	1049	215
254						
## 117	52	449	73	11	515	240
155						
## 118	31	531	88	64	969	121
126						
## 119	63	498	91	39	642	156
114						
## 120	101	484	43	75	815	405
119						
## 121	134	731	148	16	1126	215
206						
## 122	88	627	169	47	959	165
257						
## 123	48	614	111	24	798	216
257						
## 124	53	503	77	39	554	113
201						
## 125	39	566	53	22	362	0
82						
## 126	-35	529	48	18	853	145
238						
## 127	17	433	91	71	779	143
207						
## 128	42	476	44	48	663	141
165						
## 129	39	651	65	45	764	141
343						
## 130	34	467	80	54	713	184
263						
## 131	23	480	0	58	432	109
467						
## 132	48	471	155	59	517	63
287						
## 133	21	366	119	33	579	121
271						
## 134	33	442	113	64	555	107
51						
## 135	27	490	102	75	555	106
56						
## 136	39	476	100	96	480	116
932						
## 137	71	353	52	0	690	0
80						

## 138	45	365	91	92	403	0
764						
## 139	19	361	55	260	431	201
498						
## 140	21	325	158	66	531	49
428						
## 141	40	413	120	72	446	65
531						
## 142	39	429	143	177	532	106
682						
## 143	36	420	223	140	633	85
729						
## 144	42	427	224	0	463	0
785						
## 145	22	297	158	259	259	0
840						
## 146	21	428	186	184	386	146
583						
## 147	23	434	228	278	389	71
612						
## 148	42	412	259	120	311	49
566						
## 149	27	700	451	148	394	56
977						
## 150	33	609	352	206	516	68
1075						
## 151	25	530	331	178	391	0
1148						
## 152	37	547	478	187	345	0
905						
## 153	25	729	218	146	641	122
1005						
## 154	7	590	297	191	632	74
906						
## 155	42	632	479	170	477	73
1325						
## 156	31	892	438	124	456	34
1125						
## 157	28	987	399	250	719	21
1313						
## 158	37	817	299	276	586	0
1604						
## 159	37	854	301	247	417	0
1381						
## 160	44	737	228	144	604	103
1324						
## 161	37	743	582	171	672	49
1755						
## 162	39	1076	362	275	636	40
1520						

## 163	42	1301	412	363	837	88
1782						
## 164	65	1091	538	342	780	50
1831						
## 165	57	926	579	294	530	0
1854						
## 166	37	967	283	300	481	0
1461						
## 167	33	806	431	165	697	0
1533						
## 168	49	948	858	210	798	163
972						
## 169	73	1277	674	212	827	50
1557						
## 170	100	1150	603	371	817	39
1782						
## 171	84	1525	595	266	940	69
1728						
## 172	88	1358	687	397	734	0
2280						
## 173	91	1378	456	319	578	0
1949						
## 174	108	1261	511	268	536	175
1520						
## 175	51	1142	994	367	936	101
2221						
## 176	72	1316	1074	276	1003	52
1856						
## 177	103	1290	626	428	806	71
1838						
## 178	124	1679	700	293	1004	82
1977						
## 179	115	1541	917	347	701	0
1552						
## 180	112	1111	209	430	604	0
2374						
## 181	107	1236	170	268	1021	111
1459						
## 182	81	1047	890	292	1055	82
1892						
## 183	160	1527	972	254	763	76
1705						
## 184	126	1444	671	320	882	86
1564						
## 185	121	1560	1147	391	1187	76
2001						
## 186	122	1438	965	388	823	0
1401						
## 187	140	889	1204	266	630	0
1191						

## 188	110	1104	1400	330	1250	291	1218
## 189	155	1320	1090	320	1088	210	1692
## 190	86	1396	848	313	856	75	1737
## 191	74	1733	1117	410	868	150	1726
## 192	168	1533	747	361	980	72	1444
## 193	133	928	1244	325	681	0	1583
## 194	58	944	494	280	565	0	1189

##	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia
## 1	0	0	0	0	0	0	0	0
## 2	0	0	0	0	0	0	0	0
## 3	0	0	0	0	0	0	0	0
## 4	0	0	0	0	0	0	0	0
## 5	0	0	0	0	0	0	0	0
## 6	0	0	0	0	0	0	0	0
## 7	0	0	0	0	0	0	0	0
## 8	0	0	0	0	0	0	0	0
## 9	0	0	0	0	0	0	0	0
## 10	0	0	0	0	0	0	0	0
## 11	0	0	0	0	0	0	0	0
## 12	0	0	0	0	0	0	0	0
## 13	0	0	0	0	0	0	0	0
## 14	0	0	0	0	0	0	0	0
## 15	0	0	0	0	0	0	0	0
## 16	0	0	0	0	0	0	0	0
## 17	0	0	0	0	0	0	0	0

```
## 18             0     0    0    0       0       0       0
0
## 19             0     0    0    0       0       0       0
0
## 20             0     0    0    0       0       0       0
0
## 21             0     0    0    0       0       0       0
0
## 22             0     0    0    0       0       0       0
0
## 23             0     0    0    0       0       0       0
0
## 24             0     0    0    0       0       0       0
0
## 25             0     0    0    0       0       0       0
0
## 26             0     0    0    0       0       0       0
0
## 27             0     0    0    0       0       0       0
0
## 28             0     0    0    0       0       0       0
0
## 29             0     0    0    0       0       0       0
0
## 30             0     0    0    0       0       0       0
0
## 31             0     0    0    0       0       0       0
0
## 32             0     0    0    0       0       0       0
0
## 33             0     0    0    0       0       0       0
0
## 34             0     0    0    0       0       0       0
0
## 35             0     0    0    0       0       0       0
0
## 36             0     0    0    0       0       0       0
0
## 37             0     0    0    0       0       0       0
0
## 38             0     0    0    0       0       0       0
0
## 39             0     0    0    0       0       0       6
0
## 40             0     0    0    0       0       0       4
0
## 41             0     0    0    0       0       0       7
0
## 42             0     0    0    0       0       0       9
0
```

## 43	0	0	0	0	0	0	12	0
## 44	0	1	3	0	0	0	31	0
## 45	0	0	1	0	0	0	8	0
## 46	0	0	4	1	0	0	24	0
## 47	0	2	3	0	1	2	20	0
## 48	0	0	2	0	0	0	0	0
## 49	0	0	3	1	0	6	45	0
## 50	8	6	5	1	0	1	115	0
## 51	-1	9	6	0	1	3	160	0
## 52	1	8	17	6	0	15	126	0
## 53	0	6	16	1	3	10	74	0
## 54	0	0	3	8	0	0	-39	0
## 55	2	20	22	10	7	12	176	0
## 56	1	22	25	11	0	18	176	0
## 57	0	26	86	8	1	12	67	1
## 58	3	54	110	15	9	24	352	1
## 59	0	69	123	33	7	20	150	6
## 60	0	81	153	23	20	34	269	4
## 61	7	89	61	44	3	63	204	4
## 62	7	221	115	95	23	34	224	0
## 63	2	158	197	41	20	39	107	6
## 64	11	144	274	42	30	103	263	17
## 65	5	181	334	56	33	70	616	13
## 66	12	221	374	76	26	141	270	24
## 67	10	193	518	130	27	133	553	20

## 68	22	209	337	118	24	150	435	17
## 69	11	197	355	78	21	130	458	32
## 70	7	474	662	90	37	229	509	17
## 71	21	542	546	0	28	234	176	29
## 72	36	80	714	198	17	223	781	25
## 73	22	54	665	162	51	306	457	21
## 74	25	255	833	180	72	395	401	45
## 75	28	311	642	173	51	233	578	42
## 76	48	169	834	77	31	238	486	21
## 77	32	337	882	61	32	457	381	67
## 78	73	224	852	109	30	310	584	71
## 79	54	271	1431	8	23	397	363	31
## 80	89	257	897	247	51	467	480	60
## 81	90	241	918	104	32	568	315	3
## 82	104	376	654	96	16	197	175	16
## 83	138	102	598	60	21	473	26	18
## 84	120	217	731	54	4	435	164	29
## 85	180	0	901	131	7	318	143	62
## 86	143	339	969	135	15	389	115	26
## 87	100	97	973	110	5	602	460	47
## 88	131	326	855	124	24	562	259	10
## 89	93	481	556	152	10	489	202	105
## 90	50	168	491	144	3	448	136	12
## 91	70	156	913	84	2	640	278	6
## 92	103	0	657	148	5	636	204	31

```
## 93       98    872 1329 167    2    732    157
42
## 94       84    462  992 170    2    596    224
29
## 95      107    461  511 166   16    772    342
0
## 96       65    478  814 175    8    604    202
45
## 97       32    251  445 113    4    568    165
8
## 98       69    134  945 109    7    801    156
32
## 99       60    314 1012 152    0    623    228
15
## 100      76    369 1358 175    4    885    257
15
## 101      76   1156  965 156   13   1055    310
27
## 102      63    770 1225 157    7    836    366
33
## 103      43    516 1081 190   11    934    182
10
## 104      37    394  785 142    5    821    277
29
## 105      53    119 1129 132    5    764    132
22
## 106      59    248 1016 146    1    728    311
-4
## 107     126    158 1108 129    8    585    326
45
## 108     239    345 1210 195    3    772    157
36
## 109     248    327 1148 184    2    854    286
0
## 110     124    217  864 148    6    885    217
37
## 111      97    559 1297 111   -1    989    231
6
## 112      49    567 1113  70    1    730    208
12
## 113      69    259 1352 188    2    946    182
20
## 114      60    329 1460 129    3   1067    261
29
## 115      95    261 1241 164    1    859    178
20
## 116      72    303 1731 155    1   1011    337
23
## 117      28     96  944 170    6    705    145
22
```

## 118	40	652	781	146	0	752	178
10							
## 119	58	401	1375	134	4	1005	200
0							
## 120	92	0	1307	192	0	763	160
65							
## 121	0	549	1194	164	6	1229	146
26							
## 122	179	433	486	183	2	813	148
112							
## 123	108	391	1237	203	2	799	0
0							
## 124	99	326	1085	132	2	495	563
54							
## 125	23	424	548	129	6	1483	237
15							
## 126	67	360	821	99	5	1615	116
0							
## 127	57	390	1312	86	4	907	225
125							
## 128	83	394	1853	215	3	1152	358
36							
## 129	73	384	506	343	1	1132	307
16							
## 130	94	503	1993	269	2	1078	278
38							
## 131	33	0	1758	264	4	996	353
21							
## 132	41	0	941	202	2	791	275
18							
## 133	33	1776	1717	203	5	841	180
28							
## 134	95	491	1567	295	2	666	327
21							
## 135	85	357	1678	316	36	951	245
25							
## 136	30	474	1993	439	1	676	264
17							
## 137	90	513	1922	546	19	865	449
17							
## 138	71	316	938	268	17	1284	287
8							
## 139	33	512	1055	256	12	570	312
17							
## 140	52	570	1745	237	9	487	313
8							
## 141	81	355	2569	305	11	439	0
25							
## 142	61	410	1881	388	15	470	425
23							

## 143	77	778	2269	325	9	564	392
32							
## 144	91	431	1988	404	6	658	367
25							
## 145	65	794	1608	332	2	637	296
16							
## 146	30	661	1688	295	1	380	324
32							
## 147	38	747	3358	329	3	445	373
19							
## 148	84	363	4130	407	-1	444	253
35							
## 149	59	656	3560	495	5	463	408
42							
## 150	49	1247	4135	586	9	555	409
50							
## 151	67	429	4187	643	3	650	624
32							
## 152	72	656	3363	394	12	551	455
33							
## 153	29	451	4846	444	4	471	190
19							
## 154	27	750	5142	394	1	529	516
41							
## 155	66	932	5200	484	20	520	483
38							
## 156	60	799	6426	590	7	432	498
63							
## 157	56	1410	5615	676	7	624	488
36							
## 158	91	728	5721	578	2	677	549
52							
## 159	55	0	4828	472	2	489	348
50							
## 160	35	2125	5984	564	6	453	501
38							
## 161	48	1212	6354	553	0	598	571
35							
## 162	62	1806	9308	499	2	416	611
74							
## 163	67	1575	6769	554	17	532	716
74							
## 164	85	1822	7662	596	9	658	627
73							
## 165	50	1428	7159	676	2	716	469
79							
## 166	35	1176	3463	410	11	639	651
57							
## 167	42	723	8221	517	2	354	1087
180							

```
## 168    58    1475 10384  564     3     638     435
63
## 169    79    2472  8903  722     2     635     521
202
## 170    94    1605 11612  601    16     613     640
119
## 171    65    1955  9379  867     5     943     637
157
## 172    53    1460  8495  632     6     851       0
163
## 173    45     954  8347  629    13     888    1438
98
## 174    25    3314  7016  546     5     972    1101
69
## 175    48    1514  9799  448     4     801     547
94
## 176    80    2273 11315  413    13    1084     742
150
## 177    42    2479 14962  954     7     904    1267
100
## 178    95    2279 11914  727     9    1002     754
126
## 179    73    2517  9338  760     4     940     959
111
## 180    44    1779  8151  785    12    1057     920
96
## 181    37    1639  8526  409    10     945     797
94
## 182    76    2190  7288  486     6     996     832
88
## 183    58    2473 12544  566     0    1022     672
40
## 184    66    2570  9422  521    11     844     762
240
## 185    57    2091  7327  863     8    1127     815
201
## 186   105    1718  9922  661    11    1245    1025
122
## 187    90    3140  3798  350     4     958     786
114
## 188    49    2553  6252  436     2    1505     686
110
## 189    48    2555  8157  446     3     922     884
121
## 190   149    1778 10502  339     1     999     780
157
## 191    44    2049  9234  502     1     911     818
98
## 192    79    3088 10064  500     7     984       0
204
```

193   103   2225 6445 506   7   913   1738
159
194   88   1443 3407 473   5   981   632
120
Wisconsin Wyoming Diamond Princess Grand Princess
1   0   0   0   0
2   0   0   0   0
3   0   0   0   0
4   0   0   0   0
5   0   0   0   0
6   0   0   0   0
7   0   0   0   0
8   0   0   0   0
9   0   0   0   0
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16   0   0   0   0
17   0   0   0   0
18   0   0   0   0
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30   0   0   0   0
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32   0   0   0   0
33   0   0   0   0
34   0   0   0   0
35   0   0   0   0
36   0   0   0   0
37   0   0   0   0
38   0   0   0   0
39   0   0   0   0
40   0   0   0   0
41   0   0   0   0
42   0   0   0   0
43   0   0   0   0
44   0   0   0   0
45   0   0   0   0

```
## 46       0       0           0           0
## 47       0       0           0           0
## 48       0       0           0           0
## 49       3       0           0           0
## 50       1       0           0           0
## 51       4       1           0           0
## 52      11       0           0           0
## 53       8       1           0           0
## 54       1       0           0           0
## 55      20       0           0          20
## 56      25       9          47           1
## 57      38       5           0           0
## 58      48       2           0           1
## 59      60       3           2           1
## 60      63       2           0           0
## 61      99       3           0           7
## 62      44       0           0          -2
## 63      56       3           0           0
## 64     140      15           0           0
## 65     107       9           0           0
## 66     198      17           0           0
## 67     129      12           0          75
## 68     109       4           0           0
## 69      66       8           0           0
## 70     182      15           0           0
## 71     144      21           0           0
## 72     192      20           0           0
## 73     264      12           0           0
## 74      18      25           0           0
## 75     290      10           0           0
## 76     129      13           0           0
## 77     129       6           0           0
## 78     132       5           0           0
## 79     176       9           0           0
## 80     182       9           0           0
## 81     145      22           0           0
## 82     128       9           0           0
## 83      87       5           0           0
## 84     127       7           0           0
## 85     166       5           0           0
## 86     154       9           0           0
## 87     178       9           0           0
## 88     146       4           0           0
## 89     147       4           0           0
## 90     153       4           0           0
## 91     126     126           0           0
## 92     220       4           0           0
## 93     207       6           0           0
## 94     304      20           0           0
## 95     331      18           0           0
```

```
## 96     225    11          0          0
## 97     169    18          0          0
## 98     208    16          0          0
## 99     231     9          0          0
## 100    334    14          0          0
## 101    460     7          0          0
## 102    346    13          0          0
## 103    304     7          0          0
## 104    272    10          0          0
## 105    330     8          0          0
## 106    335    27          0          0
## 107    314     4          0          0
## 108    375     9          0          0
## 109    349     9          0          0
## 110    280     9          0          0
## 111    199     7          0          0
## 112    193     6          0          0
## 113    291    13          0          0
## 114    373    13          0          0
## 115    410    15          0          0
## 116    502    25          0          0
## 117    356    13          0          0
## 118    144    12          0          0
## 119    198    10          0          0
## 120    528    11          0          0
## 121    472    14          0          0
## 122    511     2          0          0
## 123    481    10          0          0
## 124    400    25          0          0
## 125    307     5          0          0
## 126    279     7          0          0
## 127    599    10          0          0
## 128    512    16          0          0
## 129    733    15          0          0
## 130    523     7          0          0
## 131    173     5          0          0
## 132    140     7          0          0
## 133    374     2          0          0
## 134    483     3          0          0
## 135    492     6          0          0
## 136    357    12          0          0
## 137    322     6          0          0
## 138    264     8          0          0
## 139    203    13          0          0
## 140    270    10          0          0
## 141    285    10          0          0
## 142    333    29          0          0
## 143    320    18          0          0
## 144    272    23          0          0
## 145    240    10          0          0
```

```
## 146      174   19         0         0
## 147      266   10         0         0
## 148      258   25         0         0
## 149      420   30         0         0
## 150      278   29         0         0
## 151      385    6         0         0
## 152      280   18         0         0
## 153      249   33         0         0
## 154      263   24         0         0
## 155      432   28         0         0
## 156      464   44         0         0
## 157      520   42         0         0
## 158      539   24         0         0
## 159      457   25         0         0
## 160      315   33         0         0
## 161      601   37         0         0
## 162      540   27         0         0
## 163      539   36         0         0
## 164      579   32         0         0
## 165      738   24         0         0
## 166      522   28         0         0
## 167      484   41         0         0
## 168      495   34         0         0
## 169      598   31         0         0
## 170      754   29         0         0
## 171      845   21         0         0
## 172      926   49         0         0
## 173      769   23         0         0
## 174      494   41         0         0
## 175      964   47         0         0
## 176      821   35         0         0
## 177      900   41         0         0
## 178      880   43         0         0
## 179      978   39         0         0
## 180      830   18         0         0
## 181      703   61         0         0
## 182     1117   51         0         0
## 183      712   50         0         0
## 184     1052   59         0         0
## 185     1018   58         0         0
## 186      953   41         0         0
## 187      957   29         0         0
## 188      590   45         0         0
## 189      762   69         0         0
## 190      870   39         0         0
## 191     1059   58         0         0
## 192      832   40         0         0
## 193     1062   43         0         0
## 194      922   39         0         0
```

We create a subset of the above dataframe to highlight the top 10 worst regions to be affected by this pandemic. Worst here would imply the total number of cases confirmed in the specified time period. Although a better measure may have been cases per 100,000 people, population data was not included in the dataset and external data was not used.

```
top_10_states_daily_cases <- statewise_daily_cases[,
names(sort(colSums(statewise_daily_cases[-1]), decreasing = TRUE))]

top_10_states_daily_cases <- cbind(top_10_states_daily_cases, Date =
statewise_daily_cases$Date)

top_10_states_daily_cases <- top_10_states_daily_cases[,
c(ncol(top_10_states_daily_cases), 1:(ncol(top_10_states_daily_cases) - 1))]

top_10_states_daily_cases <- top_10_states_daily_cases[-c(12:59)]

top_10_states_daily_cases
```

```
##           Date California Florida Texas New York Georgia Illinois New
Jersey
## 1   2020-01-22          0       0     0        0       0        0
0
## 2   2020-01-23          0       0     0        0       0        0
0
## 3   2020-01-24          0       0     0        0       0        1
0
## 4   2020-01-25          0       0     0        0       0        0
0
## 5   2020-01-26          2       0     0        0       0        0
0
## 6   2020-01-27          0       0     0        0       0        0
0
## 7   2020-01-28          0       0     0        0       0        0
0
## 8   2020-01-29          0       0     0        0       0        0
0
## 9   2020-01-30          0       0     0        0       0        0
0
## 10  2020-01-31          1       0     0        0       0        1
0
## 11  2020-02-01          0       0     0        0       0        0
0
## 12  2020-02-02          0       0     0        0       0        0
0
## 13  2020-02-03          3       0     0        0       0        0
0
## 14  2020-02-04          0       0     0        0       0        0
0
## 15  2020-02-05          0       0     0        0       0        0
```

```
0
## 16   2020-02-06           0         0       0        0        0        0
0
## 17   2020-02-07           0         0       0        0        0        0
0
## 18   2020-02-08           0         0       0        0        0        0
0
## 19   2020-02-09           0         0       0        0        0        0
0
## 20   2020-02-10           0         0       0        0        0        0
0
## 21   2020-02-11           1         0       0        0        0        0
0
## 22   2020-02-12           0         0       0        0        0        0
0
## 23   2020-02-13           1         0       0        0        0        0
0
## 24   2020-02-14           0         0       0        0        0        0
0
## 25   2020-02-15           0         0       0        0        0        0
0
## 26   2020-02-16           0         0       0        0        0        0
0
## 27   2020-02-17           0         0       0        0        0        0
0
## 28   2020-02-18           0         0       0        0        0        0
0
## 29   2020-02-19           0         0       0        0        0        0
0
## 30   2020-02-20           0         0       0        0        0        0
0
## 31   2020-02-21           2         0       0        0        0        0
0
## 32   2020-02-22           0         0       0        0        0        0
0
## 33   2020-02-23           0         0       0        0        0        0
0
## 34   2020-02-24           0         0       0        0        0        0
0
## 35   2020-02-25           0         0       0        0        0        0
0
## 36   2020-02-26           0         0       0        0        0        0
0
## 37   2020-02-27           1         0       0        0        0        0
0
## 38   2020-02-28           0         0       0        0        0        0
0
## 39   2020-02-29           1         0       0        0        0        0
0
## 40   2020-03-01           0         0       0        0        0        1
```

```
0
## 41   2020-03-02         9       1       0       1       0       1
0
## 42   2020-03-03         4       1       0       1       2       0
0
## 43   2020-03-04        10       0       0       9       0       0
0
## 44   2020-03-05        16       1       3      12       0       1
2
## 45   2020-03-06         8       0       1       8       1       0
0
## 46   2020-03-07        22       4       4      45       2       1
2
## 47   2020-03-08        14       3       3      30       0       1
1
## 48   2020-03-09         6       3       2      36       5       0
0
## 49   2020-03-10        43       2       3       8       7       5
10
## 50   2020-03-11        34       9       5      70       6      13
8
## 51   2020-03-12        43       6       6     107       8       7
6
## 52   2020-03-13        60      20      17      94      11      14
20
## 53   2020-03-14        91      26      16     192      31      18
20
## 54   2020-03-15         1      24       3       2      26       2
3
## 55   2020-03-16       184       1      22     352      22      17
104
## 56   2020-03-17       143      89      25     611      25      78
74
## 57   2020-03-18       131     116      86    1460      51     111
147
## 58   2020-03-19       178     126     110    2666      90     150
344
## 59   2020-03-20       234     132     123    2699     198     163
149
## 60   2020-03-21       169     199     153    3324      70     168
437
## 61   2020-03-22       239     241      61    4073      66     296
587
## 62   2020-03-23       462     223     115    5084     151     236
930
## 63   2020-03-24       429     185     197    4797     254     252
831
## 64   2020-03-25       467     270     274    5160     221     328
727
## 65   2020-03-26       901     675     334    7036     278     673
```

```
                                                                     2474
## 66  2020-03-27    769    543    374    6999    475     486
                                                                     1949
## 67  2020-03-28    431    863    518    7534    366     467
                                                                     2299
## 68  2020-03-29    753    483    337    7238    285    1105
                                                                     2262
## 69  2020-03-30   1292   1227    355    7015    157     460
                                                                     3250
## 70  2020-03-31   1078   1268    662    9170   1121     938
                                                                     2060
## 71  2020-04-01   1177    215    546    8115    709     986
                                                                     3559
## 72  2020-04-02   1380   2052    714    8558    710     715
                                                                     3335
## 73  2020-04-03   1226   1260    665   10481    483    1209
                                                                     4305
## 74  2020-04-04    821   1269    833   10846    329    1453
                                                                     4229
## 75  2020-04-05   2197    813    642    9327    487     902
                                                                     3381
## 76  2020-04-06    990    974    834    8655    667    1003
                                                                     3585
## 77  2020-04-07   1327   1221    882    8060   1508    1291
                                                                     3326
## 78  2020-04-08   1546    911    852   11186   1079    1525
                                                                     3021
## 79  2020-04-09    813    908   1431   10718    665    1344
                                                                     3590
## 80  2020-04-10   1371   1167    897   10569    919    1465
                                                                     3561
## 81  2020-04-11    636    963    918    8678    674    1293
                                                                     3563
## 82  2020-04-12   1083   1401    654    8007    293    1672
                                                                     3699
## 83  2020-04-13   1134   1124    598    6716    863    1173
                                                                     2734
## 84  2020-04-14   1455    609    731    7271   1263    1223
                                                                     4240
## 85  2020-04-15   1297    883    901   11434    409    1345
                                                                     2206
## 86  2020-04-16    991    832    969    9237    682    1141
                                                                     4287
## 87  2020-04-17   1480   1416    973    6906   1525    1844
                                                                     3150
## 88  2020-04-18   1354    733    855    6877    475    1582
                                                                     2953
## 89  2020-04-19    920    822    556    5908    632    1197
                                                                     3881
## 90  2020-04-20   2255    745    491    5034   1106    1156
```

```
3421
## 91  2020-04-21      1794    810    913    5103     474    1546
3665
## 92  2020-04-22      1872    440    657    4703    1333    2048
3527
## 93  2020-04-23      2209   1339   1329    5238     669    1830
4111
## 94  2020-04-24      1794    885    992    8130     608    2721
2171
## 95  2020-04-25      1013    306    511   10553     731    2119
3302
## 96  2020-04-26      1191    693    814    5902     264    2126
3540
## 97  2020-04-27      1413    606    445    3951     816    1980
2150
## 98  2020-04-28      1192    710    945    3110     620    2219
2668
## 99  2020-04-29      2583    345   1012    4585     853    2256
2509
## 100 2020-04-30      1383    497   1358    4681     489    2560
2287
## 101 2020-05-01      1896   1038    965    3942    1225    3137
2538
## 102 2020-05-02      1321    735   1225    4663     842    2450
2527
## 103 2020-05-03      1556    615   1081    3438     334    2994
3027
## 104 2020-05-04       981    819    785    2538     786    2278
1525
## 105 2020-05-05      2572    542   1129    2239     547    2112
2324
## 106 2020-05-06      2160    563   1016    2786     745    2343
1297
## 107 2020-05-07      1532    826   1108    3491     875    2639
2101
## 108 2020-05-08      1652    371   1210    2938     563    2889
1849
## 109 2020-05-09      2772    802   1148    2715     407    2325
1557
## 110 2020-05-10      1028    595    864    2273     992    1656
1357
## 111 2020-05-11      1729    386   1297    1660     422    1266
1452
## 112 2020-05-12      1651    941   1113    1430     922    4014
711
## 113 2020-05-13      1818    479   1352    2176     503    1673
643
## 114 2020-05-14      2073    808   1460    2390     550    3243
1144
## 115 2020-05-15      1822    928   1241    2762     795    2432
```

```
1280
## 116 2020-05-16          2032    673  1731    2419    440    2088
1105
## 117 2020-05-17          1441    777   944    1889    367    1734
1415
## 118 2020-05-18          1352    854   781    1250    704    2294
1736
## 119 2020-05-19          2246    502  1375    1474    572    1545
1116
## 120 2020-05-20          2254    527  1307    1525    946    2388
1420
## 121 2020-05-21          2038   1204  1194    2088    862    2270
810
## 122 2020-05-22          2225    776   486    1696    819    2756
993
## 123 2020-05-23          2283    676  1237    1772    760    2352
561
## 124 2020-05-24          1505    740  1085    1589    660    2508
1014
## 125 2020-05-25          2401    879   548    1249    498    1713
938
## 126 2020-05-26          3022    509   821    1072    583    1178
672
## 127 2020-05-27          1579    379  1312    1129    655    1111
864
## 128 2020-05-28          2742    651  1853    1768    628    1527
557
## 129 2020-05-29          2825   1212   506    1551    615    1622
1659
## 130 2020-05-30          3257    927  1993    1376    450    1462
764
## 131 2020-05-31          2056    739  1758    1110    732    1343
837
## 132 2020-06-01          2782    667   941     941    839     974
473
## 133 2020-06-02          2482    617  1717    1329    305    1614
627
## 134 2020-06-03          2159   1317  1567    1045    687     982
523
## 135 2020-06-04          2820   1419  1678    1048    965     929
462
## 136 2020-06-05          3589   1305  1993    1075    762    1156
806
## 137 2020-06-06          2823   1270  1922    1108    738     975
557
## 138 2020-06-07          2051   1180   938     781    539     867
271
## 139 2020-06-08          3159    966  1055     702    599     658
333
## 140 2020-06-09          2865   1096  1745     683    752     797
```

```
                                            299
## 141 2020-06-10       3034    1371   2569     674     731     625
                                            550
## 142 2020-06-11       3724    1698   1881     736     993     766
                                            470
## 143 2020-06-12       3220    1902   2269     822     810     595
                                            348
## 144 2020-06-13       3375    2581   1988     916    1021     673
                                            441
## 145 2020-06-14       2315    2016   1608     694     877     672
                                            276
## 146 2020-06-15       3377    1758   1688     620     733     473
                                            222
## 147 2020-06-16       3235    2783   3358     631     664     623
                                            323
## 148 2020-06-17       3837    2610   4130     567     952     546
                                            277
## 149 2020-06-18       4335    3207   3560     618     882     593
                                            404
## 150 2020-06-19       3729    3822   4135     796    1097     692
                                            389
## 151 2020-06-20       4381    4049   4187     716    1800     634
                                            338
## 152 2020-06-21       3414    3494   3363     664     892     658
                                            308
## 153 2020-06-22       6108    2926   4846     552    1227     462
                                            273
## 154 2020-06-23       6712    3286   5142     597    1882     601
                                            319
## 155 2020-06-24       4547    5511   5200     581    1571     715
                                            158
## 156 2020-06-25       5088    5004   6426     749    1714     894
                                            304
## 157 2020-06-26       5732    8942   5615     805    1900     857
                                            388
## 158 2020-06-27       3848    9585   5721     703    1990     786
                                            289
## 159 2020-06-28       4795    8530   4828     616    2225     646
                                            309
## 160 2020-06-29       8159    5266   5984     391    2207     738
                                            90
## 161 2020-06-30       7772    6093   6354     524    1874     724
                                            395
## 162 2020-07-01       7263    6563   9308     625    2951     828
                                            261
## 163 2020-07-02       7869   10109   6769     875    3467     869
                                            428
## 164 2020-07-03       3964    9488   7662     918    2784     868
                                            386
## 165 2020-07-04       2381   11458   7159     726    2826     862
```

```
291
## 166 2020-07-05        11786    10059    3463      533      2197      639
369
## 167 2020-07-06         6354     6336    8221      518      1548      614
209
## 168 2020-07-07        12977     7347   10384      588      3406     1709
267
## 169 2020-07-08         8548     9989    8903      692      3420      980
161
## 170 2020-07-09         9924     8935   11612      584      2837     1018
231
## 171 2020-07-10         8401    11433    9379      786      4490     1327
358
## 172 2020-07-11         7876    10360    8495      730      3184     1195
331
## 173 2020-07-12         5782    15300    8347      677      2534      954
339
## 174 2020-07-13         8814    12624    7016      557      3637      883
224
## 175 2020-07-14        12854     9194    9799      912      3391      707
393
## 176 2020-07-15         8674    10181   11315      831      3875     1187
363
## 177 2020-07-16         9821    13965   14962      769      3449     1257
223
## 178 2020-07-17         8553    11466   11914      776      3905     1427
50
## 179 2020-07-18         7486    10328    9338      754      4688     1276
263
## 180 2020-07-19         6161    12478    8151      502      3249      965      -
31
## 181 2020-07-20        10964    10347    8526      519      2453     1172
180
## 182 2020-07-21        11435     9440    7288      855      3406      942
293
## 183 2020-07-22        11981     9785   12544      705      3314     1611
389
## 184 2020-07-23         9487    10249    9422      811      4305     1621
242
## 185 2020-07-24         9412    12444    7327      753      4813     1600
458
## 186 2020-07-25         6267    12199    9922      750      3768     1426
513
## 187 2020-07-26         5836     9344    3798      536      2765     1541
505
## 188 2020-07-27         5833     8892    6252      608      2890     1231
449
## 189 2020-07-28        12641     9230    8157      534      4209     1074
483
## 190 2020-07-29        14151     9446   10502      715      3271     1395
```

```
305
## 191 2020-07-30        8021   9956  9234      777    3963    1772
370
## 192 2020-07-31        7622   9007 10064      644    4066    1980
690
## 193 2020-08-01        6057   9642  6445      753    3660    1639
369
## 194 2020-08-02        5562   7104  3407      531    3165    1470
321
##     Arizona North Carolina Louisiana
## 1         0              0         0
## 2         0              0         0
## 3         0              0         0
## 4         0              0         0
## 5         1              0         0
## 6         0              0         0
## 7         0              0         0
## 8         0              0         0
## 9         0              0         0
## 10        0              0         0
## 11        0              0         0
## 12        0              0         0
## 13        0              0         0
## 14        0              0         0
## 15        0              0         0
## 16        0              0         0
## 17        0              0         0
## 18        0              0         0
## 19        0              0         0
## 20        0              0         0
## 21        0              0         0
## 22        0              0         0
## 23        0              0         0
## 24        0              0         0
## 25        0              0         0
## 26        0              0         0
## 27        0              0         0
## 28        0              0         0
## 29        0              0         0
## 30        0              0         0
## 31        0              0         0
## 32        0              0         0
## 33        0              0         0
## 34        0              0         0
## 35        0              0         0
## 36        0              0         0
## 37        0              0         0
## 38        0              0         0
## 39        0              0         0
## 40        0              0         0
```

```
## 41           0              0           0
## 42           0              1           0
## 43           0              0           0
## 44           0              0           0
## 45           1              1           0
## 46           2              0           0
## 47           0              0           0
## 48           0              0           0
## 49           2              5           0
## 50           3              0           5
## 51           0              8          14
## 52           0              2          10
## 53           3              8          48
## 54           0              7          10
## 55           6              7          28
## 56           2             25          81
## 57           7             28          61
## 58          18             44         135
## 59          23             53         145
## 60          36             67         226
## 61          48             49          74
## 62          83             48         335
## 63          91            142         216
## 64          75             95         407
## 65         107            148         509
## 66         157            149         440
## 67         108            133         571
## 68         146            171         225
## 69         238            122         485
## 70         132            222        1212
## 71         124            140        1187
## 72         183            302        2725
## 73         173            274        1148
## 74         250            235        2199
## 75         250            163         514
## 76         191            313        1857
## 77         115            337        1417
## 78         151            200         746
## 79         292            237        1253
## 80          94            229         970
## 81         281            389         761
## 82         149            216         581
## 83         163            316         421
## 84         104            227         502
## 85         155            227         433
## 86         273            299         581
## 87         274            406         586
## 88         213            283         462
## 89         209            273         348
## 90         135            294         595
```

```
## 91     188     239     331
## 92     217     361     404
## 93     299     325     481
## 94     273     470     401
## 95     241     478     372
## 96     248     229     261
## 97     191     324     295
## 98     230     434     218
## 99     254     425     374
## 100    446     574     341
## 101    314     316     710
## 102    395     518     429
## 103    276     182     200
## 104    284     201     333
## 105    381     539     323
## 106    402     543     403
## 107    238     487     253
## 108    581     466     203
## 109    434     472     562
## 110    159     460     183
## 111    264     336     215
## 112    353     348     235
## 113    480     730     612
## 114    458     616     827
## 115    495     526     348
## 116    497     636     280
## 117    279     543     315
## 118    263     534     277
## 119    368      32     329
## 120    330    1023     278
## 121    442     250    1188
## 122    276    1598     421
## 123    429     754       0
## 124    324     501     244
## 125    198     692     640
## 126    289     398     245
## 127    454     461     443
## 128    559     884     305
## 129    595    1085       0
## 130    786     909     775
## 131    678     991     339
## 132    193     807     425
## 133   1135     431     405
## 134   1092    1253     387
## 135    530     799     429
## 136   1553    1220     427
## 137   1012    1423     497
## 138   1538     907     330
## 139    689     892     234
## 140    618     710     562
```

```
## 141      1556        1246         418
## 142      1415        1111         442
## 143      1772        1833         523
## 144      1621        1428        1288
## 145      1046        1419         336
## 146      1138         850         553
## 147      2341         793         534
## 148      1752        1027         928
## 149      2508        1233           0
## 150      3465        1618        -119
## 151      3217        1605         870
## 152      2464        1411         393
## 153      2008        1163         461
## 154      3779         675        1356
## 155      1812        1888         882
## 156      3091         945         938
## 157      3378        1686        1354
## 158      3465        1654           0
## 159      3796        1436        1467
## 160       625        1488         845
## 161      4683        1591        1014
## 162      4877        1424        2083
## 163      3340        1465        1383
## 164      4427        2046        1728
## 165      2695        1408           0
## 166      3536        1322        1937
## 167      3352        1783        1101
## 168      3639        1515        1936
## 169      3520        1397        1888
## 170      4057        1969        1843
## 171      4221        2376        2642
## 172      3038        1874        2167
## 173      2537        1865        1319
## 174      1357        1898        1705
## 175      4273        2331        2215
## 176      3257        1837        2089
## 177      3259        1871        2280
## 178      3910        1862        2179
## 179      2742        2522           0
## 180      2359        1711        3116
## 181      1559        1428        3186
## 182      3500        1985        1691
## 183      1926        2060        2771
## 184      2335        1849        2296
## 185      3357        2603        2084
## 186      3740        1693           0
## 187      1973        1516        3840
## 188      1813        1979        2343
## 189      2107        1784        1121
## 190      2339        1687        1735
```

```
## 191    2525         2145         1708
## 192    3212         1766         1799
## 193    2992         1708            0
## 194    1465         1324         3467
```

We plot the timeline of how the virus took over in these top 10 states in the specified time period. We can see that it hit New York the hardest in the initial period, after which the lockdown implemented in early April helped reduce the cases for a few months in all these states. Owing to the lax and illogical approach of the government in easing the lockdown to save the tanking economy, we can see the spike in cases in every one of these states, starting mid-June.

```r
plot_df <- melt(top_10_states_daily_cases, id.vars = "Date", variable.name =
"States")

top_10_states_daily_cases_plot <- ggplot(plot_df, aes(Date, value)) +
geom_line(aes(colour = States)) +
  scale_x_date(date_labels = "%b", date_breaks = "1 month") + xlab("Month") +
ylab("Daily cases")

top_10_states_daily_cases_plot
```
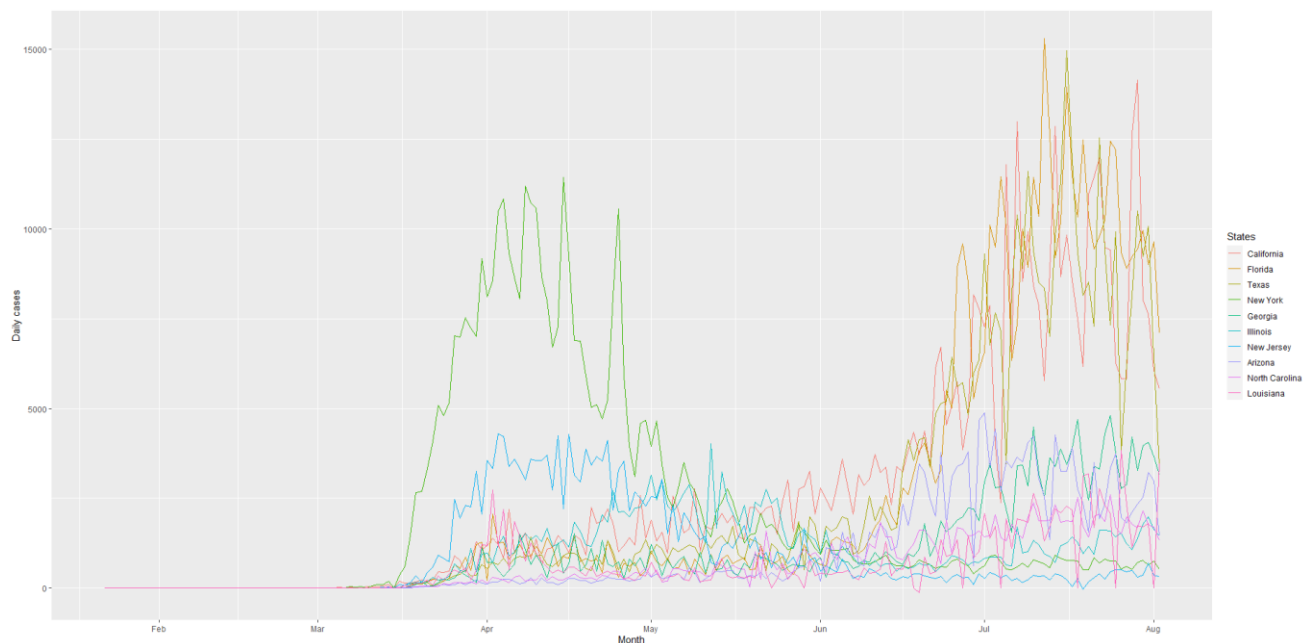

A datewise breakdown of cases and deaths.

```r
datewise_cases <- aggregate(df1$cases, by = list(Date = df1$date), FUN = sum)
%>%
  mutate(Daily_cases = x - lag(x))

datewise_cases[is.na(datewise_cases)] <- 0
datewise_cases$x <- NULL
```

```r
datewise_deaths <- aggregate(df1$deaths, by = list(Date = df1$date), FUN =
sum) %>%
  mutate(Daily_deaths = x - lag(x))

datewise_deaths[is.na(datewise_deaths)] <- 0
datewise_deaths$x <- NULL

datewise_cases_and_deaths <- merge(datewise_cases, datewise_deaths, by =
"Date") %>%
  mutate(Percentage_deaths_cases = (Daily_deaths/Daily_cases)*100)

datewise_cases_and_deaths[is.na(datewise_cases_and_deaths)] <- 0

datewise_cases_and_deaths
```

```
##            Date Daily_cases Daily_deaths Percentage_deaths_cases
## 1   2020-01-22           0            0               0.0000000
## 2   2020-01-23           0            0               0.0000000
## 3   2020-01-24           1            0               0.0000000
## 4   2020-01-25           0            0               0.0000000
## 5   2020-01-26           3            0               0.0000000
## 6   2020-01-27           0            0               0.0000000
## 7   2020-01-28           0            0               0.0000000
## 8   2020-01-29           0            0               0.0000000
## 9   2020-01-30           0            0               0.0000000
## 10  2020-01-31           2            0               0.0000000
## 11  2020-02-01           1            0               0.0000000
## 12  2020-02-02           0            0               0.0000000
## 13  2020-02-03           3            0               0.0000000
## 14  2020-02-04           0            0               0.0000000
## 15  2020-02-05           0            0               0.0000000
## 16  2020-02-06           0            0               0.0000000
## 17  2020-02-07           0            0               0.0000000
## 18  2020-02-08           0            0               0.0000000
## 19  2020-02-09           0            0               0.0000000
## 20  2020-02-10           0            0               0.0000000
## 21  2020-02-11           1            0               0.0000000
## 22  2020-02-12           0            0               0.0000000
## 23  2020-02-13           1            0               0.0000000
## 24  2020-02-14           0            0               0.0000000
## 25  2020-02-15           0            0               0.0000000
## 26  2020-02-16           0            0               0.0000000
## 27  2020-02-17           0            0               0.0000000
## 28  2020-02-18           0            0               0.0000000
## 29  2020-02-19           0            0               0.0000000
## 30  2020-02-20           0            0               0.0000000
## 31  2020-02-21           2            0               0.0000000
## 32  2020-02-22           0            0               0.0000000
## 33  2020-02-23           0            0               0.0000000
```

```
## 34   2020-02-24         0         0    0.0000000
## 35   2020-02-25         0         0    0.0000000
## 36   2020-02-26         0         0    0.0000000
## 37   2020-02-27         1         0    0.0000000
## 38   2020-02-28         0         0    0.0000000
## 39   2020-02-29         8         1   12.5000000
## 40   2020-03-01         6         0    0.0000000
## 41   2020-03-02        23         5   21.7391304
## 42   2020-03-03        20         1    5.0000000
## 43   2020-03-04        31         4   12.9032258
## 44   2020-03-05        70         1    1.4285714
## 45   2020-03-06        48         2    4.1666667
## 46   2020-03-07       115         3    2.6086957
## 47   2020-03-08       114         4    3.5087719
## 48   2020-03-09        68         1    1.4705882
## 49   2020-03-10       192         6    3.1250000
## 50   2020-03-11       398         5    1.2562814
## 51   2020-03-12       452        10    2.2123894
## 52   2020-03-13       596         9    1.5100671
## 53   2020-03-14       713         6    0.8415147
## 54   2020-03-15        98        12   12.2448980
## 55   2020-03-16      1392        27    1.9396552
## 56   2020-03-17      1781        35    1.9651881
## 57   2020-03-18      2776        58    2.0893372
## 58   2020-03-19      5240        79    1.5076336
## 59   2020-03-20      5322        98    1.8414130
## 60   2020-03-21      6346        95    1.4970060
## 61   2020-03-22      7936       148    1.8649194
## 62   2020-03-23     10089       187    1.8535038
## 63   2020-03-24     10262       240    2.3387254
## 64   2020-03-25     11943       315    2.6375283
## 65   2020-03-26     18036       422    2.3397649
## 66   2020-03-27     18185       559    3.0739621
## 67   2020-03-28     19793       653    3.2991462
## 68   2020-03-29     19136       633    3.3079013
## 69   2020-03-30     21502       832    3.8694075
## 70   2020-03-31     26017      1253    4.8160818
## 71   2020-04-01     25481      1263    4.9566344
## 72   2020-04-02     30405      1609    5.2918928
## 73   2020-04-03     31937      1342    4.2020227
## 74   2020-04-04     33152      1326    3.9997587
## 75   2020-04-05     27874      1494    5.3598335
## 76   2020-04-06     29642      1734    5.8498077
## 77   2020-04-07     30777      2376    7.7200507
## 78   2020-04-08     31694      2185    6.8940493
## 79   2020-04-09     34756      2146    6.1744735
## 80   2020-04-10     33501      2149    6.4147339
## 81   2020-04-11     30026      2120    7.0605475
## 82   2020-04-12     28553      1846    6.4651700
## 83   2020-04-13     25291      1902    7.5204618
```

```
## 84  2020-04-14      27065          2457             9.0781452
## 85  2020-04-15      29096          2608             8.9634314
## 86  2020-04-16      31298          2173             6.9429357
## 87  2020-04-17      32724          2663             8.1377582
## 88  2020-04-18      28341          2444             8.6235489
## 89  2020-04-19      26038          1273             4.8890084
## 90  2020-04-20      27341          1834             6.7078746
## 91  2020-04-21      25602          2496             9.7492383
## 92  2020-04-22      28104          2425             8.6286650
## 93  2020-04-23      34195          2467             7.2145050
## 94  2020-04-24      36291          2151             5.9270894
## 95  2020-04-25      32921          1690             5.1335014
## 96  2020-04-26      27689          1325             4.7852938
## 97  2020-04-27      22465          1462             6.5079012
## 98  2020-04-28      24535          2252             9.1787243
## 99  2020-04-29      27520          2527             9.1824128
## 100 2020-04-30      29629          2322             7.8369165
## 101 2020-05-01      34162          1894             5.5441719
## 102 2020-05-02      29195          1582             5.4187361
## 103 2020-05-03      25587          1121             4.3811310
## 104 2020-05-04      22475          1333             5.9310345
## 105 2020-05-05      24185          2317             9.5803184
## 106 2020-05-06      25256          2477             9.8075705
## 107 2020-05-07      27882          1934             6.9363747
## 108 2020-05-08      27178          1749             6.4353521
## 109 2020-05-09      25733          1493             5.8018886
## 110 2020-05-10      19764           896             4.5334952
## 111 2020-05-11      18878          1020             5.4031147
## 112 2020-05-12      22190          1627             7.3321316
## 113 2020-05-13      20958          1760             8.3977479
## 114 2020-05-14      27617          1783             6.4561683
## 115 2020-05-15      25300          1665             6.5810277
## 116 2020-05-16      25101          1228             4.8922354
## 117 2020-05-17      19004           755             3.9728478
## 118 2020-05-18      21769           776             3.5647021
## 119 2020-05-19      20449          1552             7.5896132
## 120 2020-05-20      23807          1577             6.6241022
## 121 2020-05-21      25355          1229             4.8471702
## 122 2020-05-22      24141          1276             5.2856137
## 123 2020-05-23      21823          1124             5.1505293
## 124 2020-05-24      20813           610             2.9308605
## 125 2020-05-25      18991           518             2.7276078
## 126 2020-05-26      18883           691             3.6593762
## 127 2020-05-27      18282          1513             8.2758998
## 128 2020-05-28      22815          1187             5.2027175
## 129 2020-05-29      24504          1171             4.7788116
## 130 2020-05-30      24450           971             3.9713701
## 131 2020-05-31      19910           590             2.9633350
## 132 2020-06-01      17355           776             4.4713339
## 133 2020-06-02      20895          1037             4.9629098
```

```
## 134 2020-06-03     19958          992        4.9704379
## 135 2020-06-04     21351         1014        4.7491921
## 136 2020-06-05     25224          973        3.8574374
## 137 2020-06-06     22732          681        2.9957769
## 138 2020-06-07     17731          452        2.5492076
## 139 2020-06-08     17415          506        2.9055412
## 140 2020-06-09     18127          944        5.2077012
## 141 2020-06-10     20794          919        4.4195441
## 142 2020-06-11     22950          882        3.8431373
## 143 2020-06-12     25330          826        3.2609554
## 144 2020-06-13     25556          753        2.9464705
## 145 2020-06-14     19824          299        1.5082728
## 146 2020-06-15     19660          392        1.9938962
## 147 2020-06-16     23705          841        3.5477747
## 148 2020-06-17     25559          751        2.9382996
## 149 2020-06-18     27809          705        2.5351505
## 150 2020-06-19     31480          672        2.1346887
## 151 2020-06-20     32749          611        1.8657058
## 152 2020-06-21     26439          257        0.9720489
## 153 2020-06-22     30536          409        1.3394027
## 154 2020-06-23     35188          839        2.3843356
## 155 2020-06-24     34935          757        2.1668814
## 156 2020-06-25     39873          554        1.3894114
## 157 2020-06-26     45255          605        1.3368689
## 158 2020-06-27     42705          489        1.1450650
## 159 2020-06-28     39605          241        0.6085090
## 160 2020-06-29     40804          350        0.8577590
## 161 2020-06-30     45746          721        1.5760941
## 162 2020-07-01     51174          673        1.3151210
## 163 2020-07-02     54461          698        1.2816511
## 164 2020-07-03     53312          639        1.1986044
## 165 2020-07-04     45880          247        0.5383609
## 166 2020-07-05     49883          271        0.5432713
## 167 2020-07-06     44953          325        0.7229773
## 168 2020-07-07     60021         1195        1.9909698
## 169 2020-07-08     58601          820        1.3992935
## 170 2020-07-09     63247          990        1.5652916
## 171 2020-07-10     67791          811        1.1963240
## 172 2020-07-11     60188          676        1.1231475
## 173 2020-07-12     59017          428        0.7252148
## 174 2020-07-13     59215          361        0.6096428
## 175 2020-07-14     67417          900        1.3349749
## 176 2020-07-15     67328          949        1.4095176
## 177 2020-07-16     77255          943        1.2206330
## 178 2020-07-17     71558          908        1.2689008
## 179 2020-07-18     63698          853        1.3391315
## 180 2020-07-19     61847          415        0.6710107
## 181 2020-07-20     61417          491        0.7994529
## 182 2020-07-21     64534         1096        1.6983296
## 183 2020-07-22     70910         1195        1.6852348
```

```
## 184 2020-07-23          68695          1114                1.6216610
## 185 2020-07-24          73715          1130                1.5329309
## 186 2020-07-25          66439           905                1.3621517
## 187 2020-07-26          54953           470                0.8552763
## 188 2020-07-27          56414          1077                1.9091006
## 189 2020-07-28          65869          1362                2.0677405
## 190 2020-07-29          70776          1448                2.0458913
## 191 2020-07-30          68033          1233                1.8123558
## 192 2020-07-31          67023          1259                1.8784596
## 193 2020-08-01          58406          1133                1.9398692
## 194 2020-08-02          47511           413                0.8692724
```

We plot the same to showcase the timeline of this pandemic. That second wave, bigger and way worse than the first, sure came along nicely.

```
daily_cases_plot1 <- ggplot(datewise_cases_and_deaths, aes(x = Date, y =
Daily_cases)) + scale_x_date(date_labels = "%b", date_breaks = "1 month") +
  geom_line() + xlab("Month") + ylab("Daily cases")

daily_cases_plot1
```