arielqx.github.io

Practice Project

Practice Project Wk 11

Step 1

Downloading data set (API)

```
library(httr)
```

```
Warning: package 'httr' was built under R version 4.2.3
```

```
library(jsonlite)
```

```
Warning: package 'jsonlite' was built under R version 4.2.3
```

```
library(tidyverse)
```

```
Warning: package 'tidyverse' was built under R version 4.2.3

Warning: package 'ggplot2' was built under R version 4.2.3

Warning: package 'tibble' was built under R version 4.2.1

Warning: package 'tidyr' was built under R version 4.2.2

Warning: package 'readr' was built under R version 4.2.3

Warning: package 'purrr' was built under R version 4.2.2

Warning: package 'dplyr' was built under R version 4.2.2

Warning: package 'stringr' was built under R version 4.2.2

Warning: package 'forcats' was built under R version 4.2.3

Warning: package 'lubridate' was built under R version 4.2.3
```

```
── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
✓ dplyr     1.1.0     ✓ readr     2.1.4
✓ forcats   1.0.0     ✓ stringr   1.5.0
✓ ggplot2   3.4.3     ✓ tibble    3.1.8
✓ lubridate 1.9.2     ✓ tidyr     1.3.0
```

```
✔ purrr     1.0.1
── Conflicts ────────────────────────────────────────── tidyverse_conflicts() ──
✖ dplyr::filter()  masks stats::filter()
✖ purrr::flatten() masks jsonlite::flatten()
✖ dplyr::lag()     masks stats::lag()
ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
errors
```

```
library(ggplot2)
```

Retrieving data

```
historic_state_data_url <- "https://api.covidactnow.org/v2/states.timeseries.json?apiKey=aee46
raw_data <- GET(historic_state_data_url)
```

Step 2

Converting data to a data frame

```
data <- fromJSON(rawToChar(raw_data$content))
```

Step 3

Get a glimpse of data-set

```
glimpse(data)
```

```
Rows: 53
Columns: 25
$ fips                   <chr> "02", "01", "05", "04", "06", "08", "09…
$ country                <chr> "US", "US", "US", "US", "US", "US", "US…
$ state                  <chr> "AK", "AL", "AR", "AZ", "CA", "CO", "CT…
$ county                 <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,…
$ hsa                    <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,…
$ hsaName                <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,…
$ level                  <chr> "state", "state", "state", "state", "st…
$ lat                    <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,…
$ locationId             <chr> "iso1:us#iso2:us-ak", "iso1:us#iso2:us-…
$ long                   <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,…
$ population             <int> 731545, 4903185, 3017804, 7278717, 3951…
$ hsaPopulation          <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,…
$ metrics                <df[,14]> <data.frame[26 x 14]>
$ riskLevels             <df[,6]> <data.frame[26 x 6]>
$ cdcTransmissionLevel   <int> 2, 4, 3, 3, 1, 4, 4, 1, 4, 4, 2, 3,…
$ communityLevels        <df[,2]> <data.frame[26 x 2]>
$ actuals                <df[,19]> <data.frame[26 x 19]>
$ annotations            <df[,30]> <data.frame[26 x 30]>
$ lastUpdatedDate        <chr> "2023-10-30", "2023-10-30", "2023-10…
$ url                    <chr> "https://covidactnow.org/us/alaska-ak",…
$ metricsTimeseries      <list> [<data.frame[1334 x 14]>], [<data.fr…
$ actualsTimeseries      <list> [<data.frame[1334 x 20]>], [<data.f…
$ riskLevelsTimeseries           <list> [<data.frame[1334 x 3]>], [<data.fr…
$ cdcTransmissionLevelTimeseries <list> [<data.frame[1334 x 2]>], [<data.frame[…
$ communityLevelsTimeseries      <list> [<data.frame[1334 x 3]>], [<data.frame[…
```

Step 5

Extracting time-series data from the data-frame

```
time_series<-data %>%
  unnest(actualsTimeseries)
```

Creating a new data frame with the needed data

```
time_series_transmission <-
  tibble(Date=time_series$cdcTransmissionLevelTimeseries[[which(data$state=="CA")]]$date)
# Transmission levels in each state
time_series_transmission$Alaska <- time_series$cdcTransmissionLevelTimeseries[[which(data$stat
time_series_transmission$California <- time_series$cdcTransmissionLevelTimeseries[[which(data$
time_series_transmission$New_Jersey <- time_series$cdcTransmissionLevelTimeseries[[which(data$
time_series_transmission$Tennessee <- time_series$cdcTransmissionLevelTimeseries[[which(data$s
time_series_transmission$District_of_Columbia <- time_series$cdcTransmissionLevelTimeseries[[w
print(head(time_series_transmission))
```

```
# A tibble: 6 × 6
  Date       Alaska California New_Jersey Tennessee District_of_Columbia
  <chr>       <int>      <int>      <int>     <int>                <int>
1 2020-03-01      0          0          0         0                    0
2 2020-03-02      0          0          0         0                    0
3 2020-03-03      0          0          0         0                    0
4 2020-03-04      0          0          0         0                    0
5 2020-03-05      0          0          0         0                    0
6 2020-03-06      0          0          0         0                    0
```

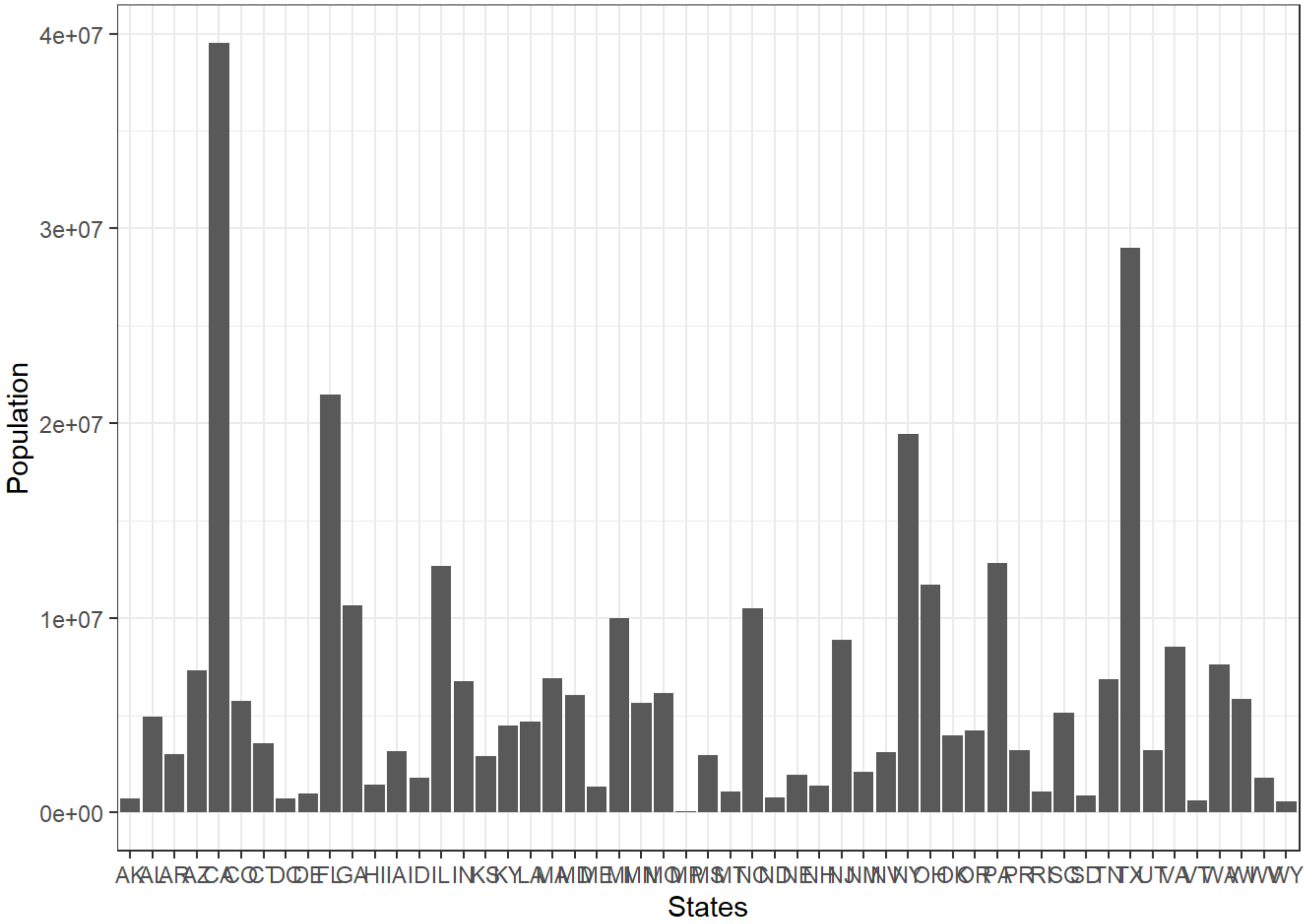
Selecting cases of each states from a new data-frame with dates

```
# New data-frame with dates
time_series_cases <- list(Alaska = time_series %>% filter(state=="AK") %>% select(date,cases))
# Cases of each state
time_series_cases$California  <- time_series %>% filter(state=="CA") %>% select(date,cases)
time_series_cases$New_Jersey  <- time_series %>% filter(state=="NJ") %>% select(date,cases)
time_series_cases$Tennessee  <- time_series %>% filter(state=="TN") %>% select(date,cases)
time_series_cases$District_of_Columbia  <- time_series %>% filter(state=="DC") %>% select(date
```

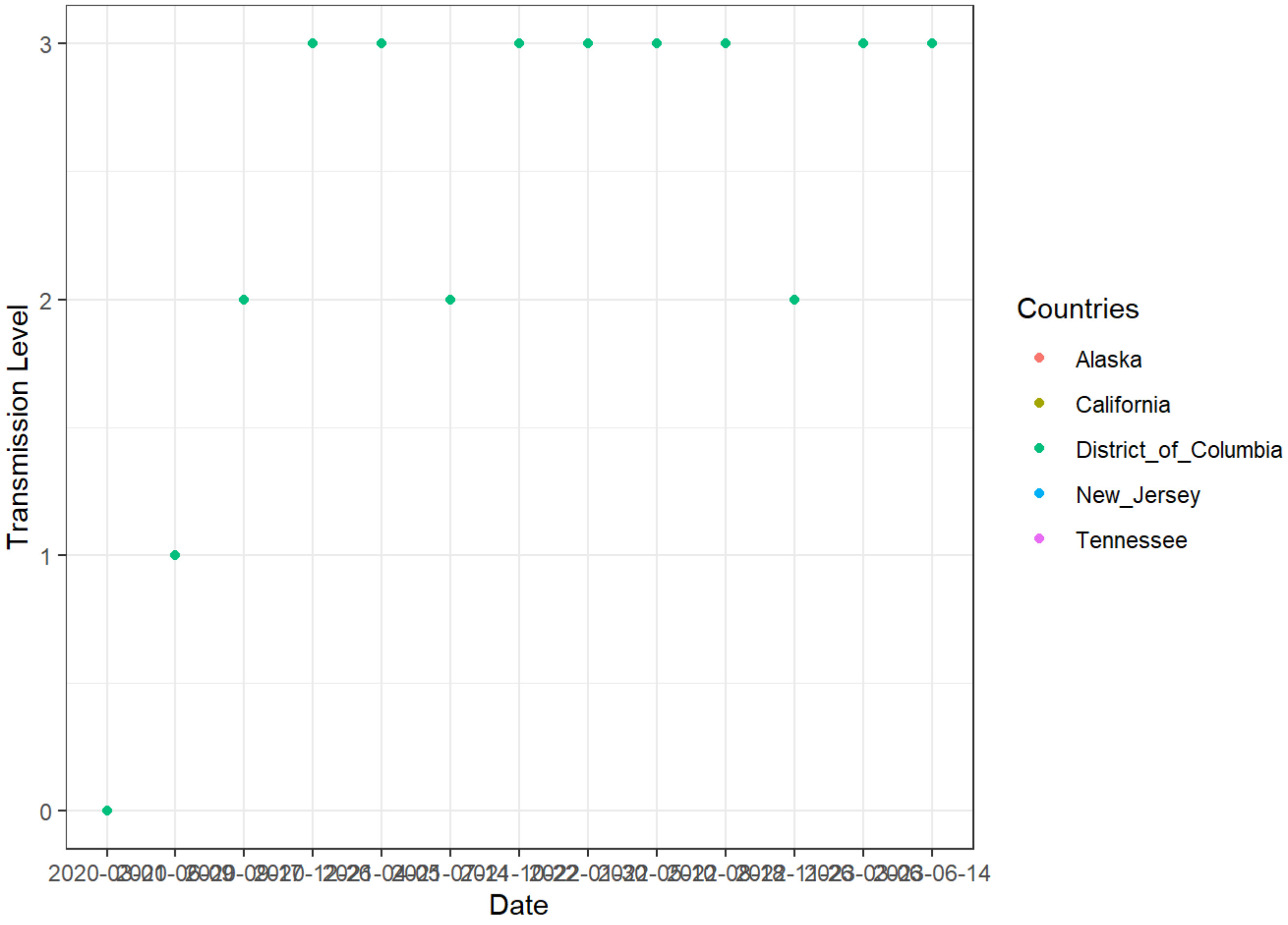
Step 6

Visualising the data

```
ggplot(data, aes(x=state,y=population)) + geom_bar(stat="identity") +labs(x="States",y="Popula
```



```
time_series_transmission[seq(1,1300,by=100),]%>%
  pivot_longer(cols=Alaska:District_of_Columbia,names_to="Countries",values_to="Transmission")
  ggplot(aes(x=Date,y=Transmission,colour=Countries,group=Countries)) +    geom_point(show.leg
```



Representing the data

```
data_to_plot <- tibble(Date_Alaska = time_series_cases$Alaska$date[seq(1,1300,by=100)], Cases_

data_to_plot
```

```
# A tibble: 13 × 10
   Date_Alaska Cases_Alaska Date_California Cases_California Date_New_Jersey
   <chr>              <int> <chr>                      <int> <chr>          
 1 2020-03-01            NA 2020-01-25                     1 2020-03-01     
 2 2020-06-09           620 2020-05-04                 56333 2020-06-09     
 3 2020-09-17          7413 2020-08-12                595097 2020-09-17     
 4 2020-12-26         45247 2020-11-20               1096427 2020-12-26     
 5 2021-04-05         63486 2021-02-28               3569578 2021-04-05     
 6 2021-07-14         71539 2021-06-08               3798225 2021-07-14     
 7 2021-10-22        132393 2021-09-16               4629146 2021-10-22     
 8 2022-01-30        211117 2021-12-25               5291605 2022-01-30     
 9 2022-05-10        252847 2022-04-04               9110544 2022-05-10     
10 2022-08-18        289203 2022-07-13              10365785 2022-08-18     
11 2022-11-26        299841 2022-10-21              11338846 2022-11-26     
12 2023-03-06        307377 2023-01-29              11980312 2023-03-06     
13 2023-06-14            NA 2023-05-09              12242634 2023-06-14     
# ℹ 5 more variables: Cases_New_Jersey <int>, Date_Tennessee <chr>,
#   Cases_Tennessee <int>, Date_District_of_Columbia <chr>,
#   Cases_District_of_Columbia <int>
```

Plotting subplots

```
install.packages("cowplot", repos = "http://cran.us.r-project.org")
```

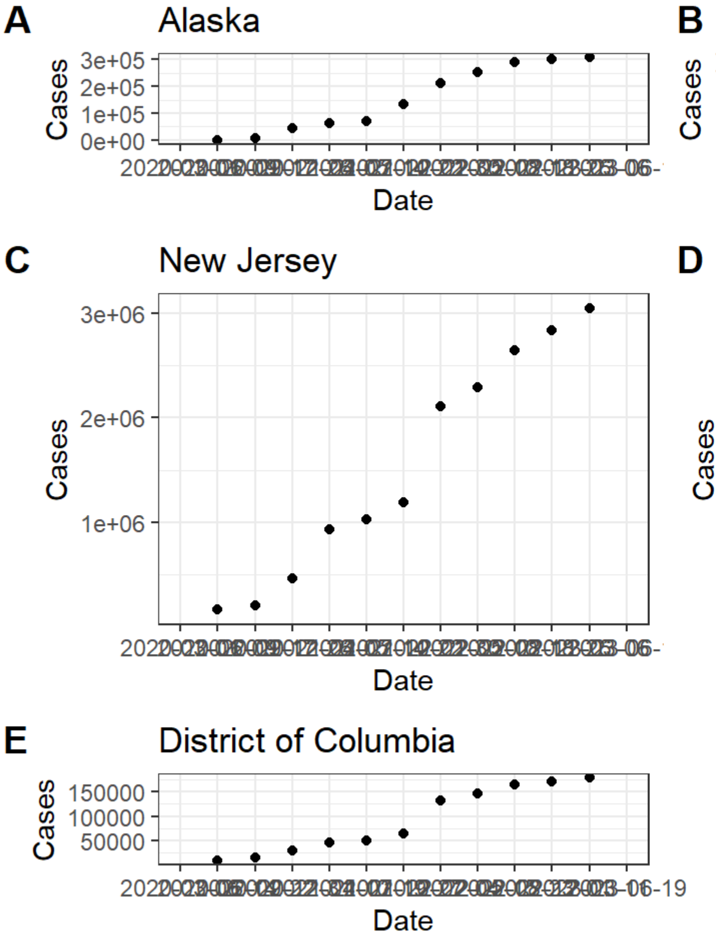
```
Installing package into 'C:/Users/Ariel/AppData/Local/R/win-library/4.2'
(as 'lib' is unspecified)

package 'cowplot' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
    C:\Users\Ariel\AppData\Local\Temp\Rtmpa4ksa8\downloaded_packages
```

```
library(cowplot)
```

```
Warning: package 'cowplot' was built under R version 4.2.3


Attaching package: 'cowplot'

The following object is masked from 'package:lubridate':

    stamp
```

```
fig1 <- ggplot(data_to_plot, aes(x=Date_Alaska,y=Cases_Alaska)) +  geom_point() + labs(x="Date

fig2 <- ggplot(data_to_plot, aes(x=Date_California,y=Cases_California)) +  geom_point() + labs

fig3 <- ggplot(data_to_plot, aes(x=Date_New_Jersey,y=Cases_New_Jersey)) +  geom_point() + labs

fig4 <- ggplot(data_to_plot, aes(x=Date_Tennessee,y=Cases_Tennessee)) +  geom_point() + labs(x

fig5 <- ggplot(data_to_plot, aes(x=Date_District_of_Columbia,y=Cases_District_of_Columbia)) +

plot_grid(fig1 + theme(legend.justification = c(0,1)),  fig2 + theme(legend.justification = c(
```

```
Warning: Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
```



Varying the size to play with the resolution

```
new_resolution  <-  plot_grid(
  fig1 + theme(legend.justification = c(0, 1), axis.text.x = element_text(size = 3)),
  fig2 + theme(legend.justification = c(1, 0), axis.text.x = element_text(size = 3)),
  fig3 + theme(legend.justification = c(0, 1), axis.text.x = element_text(size = 3)),
  fig4 + theme(legend.justification = c(1, 0), axis.text.x = element_text(size = 3)),
  fig5 + theme(legend.justification = c(0, 1), axis.text.x = element_text(size = 3)), align =
```

```
Warning: Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
```

```
ggsave("new_resolution.png", new_resolution, width = 10, height = 8, units = "in")
```

Varying the colours

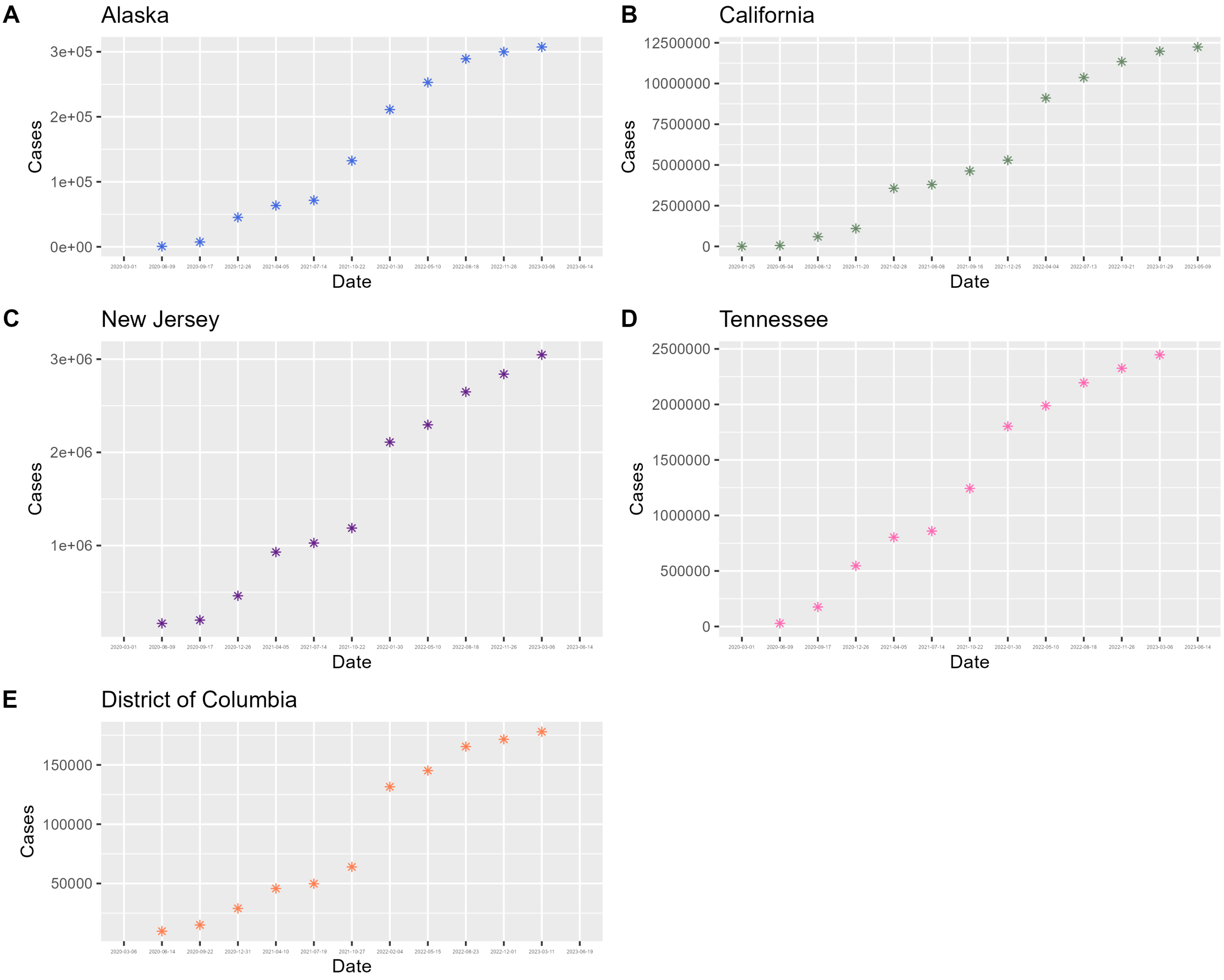
```
# Modify the color for each plot using the fill color for points as an example

fig1 <- ggplot(data_to_plot, aes(x=Date_Alaska,y=Cases_Alaska)) +  geom_point(color="royalblue

fig2 <- ggplot(data_to_plot, aes(x=Date_California,y=Cases_California)) +  geom_point(color="d

fig3 <- ggplot(data_to_plot, aes(x=Date_New_Jersey,y=Cases_New_Jersey)) +  geom_point(color="d
fig4 <- ggplot(data_to_plot, aes(x=Date_Tennessee,y=Cases_Tennessee)) +  geom_point(color="hot

fig5 <- ggplot(data_to_plot, aes(x=Date_District_of_Columbia,y=Cases_District_of_Columbia)) +

new_with_colors  <-  plot_grid(  fig1 + theme(legend.justification = c(0, 1), axis.text.x = el
```

```
Warning: Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
Removed 2 rows containing missing values (`geom_point()`).
```

```
# Save the combined plot with increased size

ggsave("new_with_colors.png", new_with_colors, width = 10, height = 8, units = "in")
```

Final Output:

```
knitr::include_graphics("new_with_colors.png")
```


A
Alaska
Cases
3e+05
2e+05
1e+05
0e+00
Date
B
California
Cases
Date
C
New Jersey
Cases
3e+06
2e+06
1e+06
Date
D
Tennessee
Cases
Date
E
District of Columbia
Cases
Date