Data Challenge: Netflix

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```r
library(broom)
library(knitr)
library(tidyverse)
```

```
## Warning in system("timedatectl", intern = TRUE): running command 'timedatectl'
## had status 1
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.6     v dplyr   1.0.7
## v tidyr   1.1.4     v stringr 1.4.0
## v readr   2.1.1     v forcats 0.5.1
```

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

```r
library(ggfortify)
library(readr)
library(stringi)
library(usethis)
```

EDA

```r
#read csv
netflix <- read_csv("netflix_titles.csv")
```

```
## Rows: 8807 Columns: 12
```

```
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (11): show_id, type, title, director, cast, country, date_added, rating,...
## dbl  (1): release_year
```

```
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```r
#year added to netflix column added (ranges from 2014-2021)
netflix <- netflix %>%
  mutate(year_added = as.integer(stri_sub(date_added, -4,-1)),
         release_year = as.integer(release_year),
         country = factor(country))
glimpse(netflix)
```

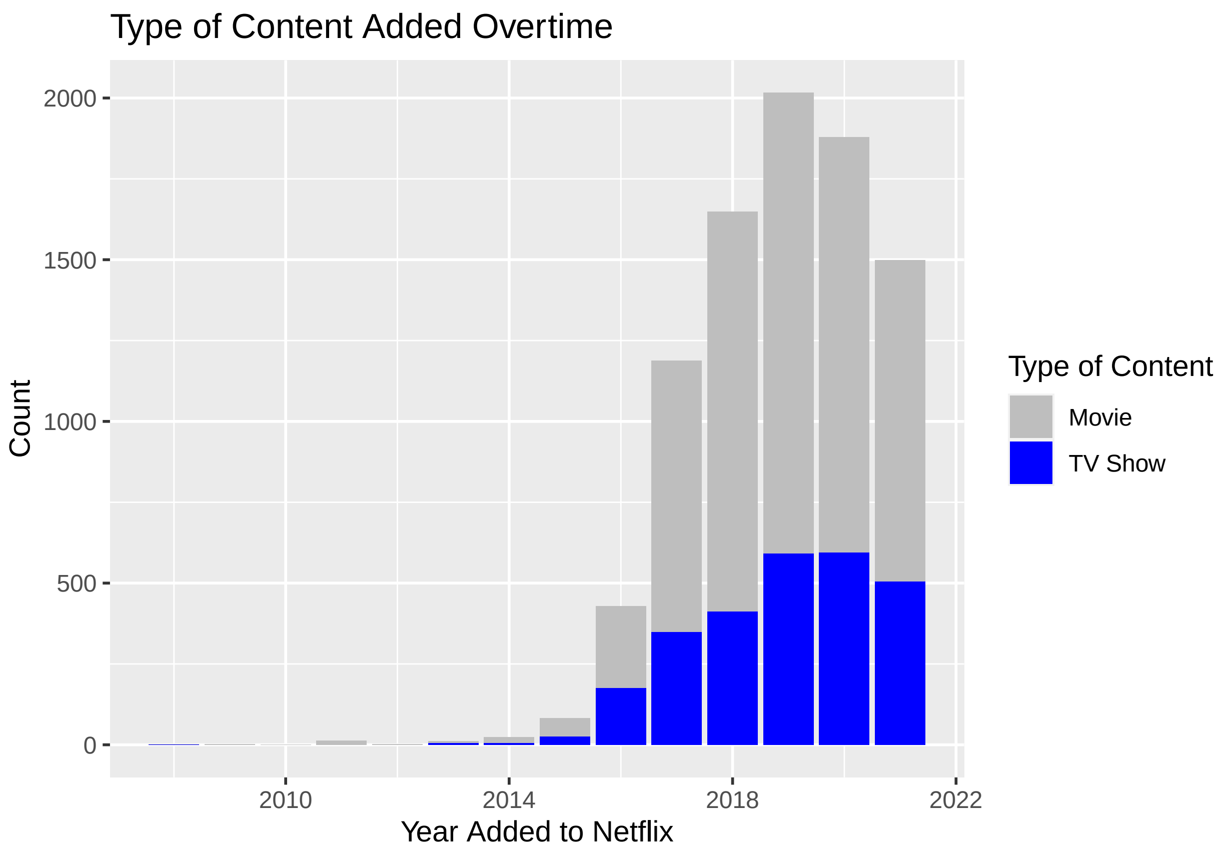
```
## Rows: 8,807
## Columns: 13
## $ show_id      <chr> "s1", "s2", "s3", "s4", "s5", "s6", "s7", "s8", "s9", "s1~
## $ type         <chr> "Movie", "TV Show", "TV Show", "TV Show", "TV Show", "TV ~
## $ title        <chr> "Dick Johnson Is Dead", "Blood & Water", "Ganglands", "Ja~
## $ director     <chr> "Kirsten Johnson", NA, "Julien Leclercq", NA, NA, "Mike F~
## $ cast         <chr> NA, "Ama Qamata, Khosi Ngema, Gail Mabalane, Thabang Mola~
## $ country      <fct> "United States", "South Africa", NA, NA, "India", NA, NA,~
## $ date_added   <chr> "September 25, 2021", "September 24, 2021", "September 24~
## $ release_year <int> 2020, 2021, 2021, 2021, 2021, 2021, 2021, 1993, 2021, 202~
## $ rating       <chr> "PG-13", "TV-MA", "TV-MA", "TV-MA", "TV-MA", "TV-MA", "PG~
## $ duration     <chr> "90 min", "2 Seasons", "1 Season", "1 Season", "2 Seasons~
## $ listed_in    <chr> "Documentaries", "International TV Shows, TV Dramas, TV M~
## $ description  <chr> "As her father nears the end of his life, filmmaker Kirst~
## $ year_added   <int> 2021, 2021, 2021, 2021, 2021, 2021, 2021, 2021, 2021, 202~
```

```
#split data into shows and movies
shows <- netflix %>%
  filter(type == "TV Show") %>%
  mutate(num_seasons = as.integer(substring(duration,-5,1)),
         year_added = factor(year_added))

movies <- netflix %>%
  filter(type == "Movie",
         !is.na(duration)) %>%
  mutate(num_mins = as.integer(stri_sub(duration,1, -5)),
         year_added = factor(year_added))
```

```
#ggplot(data = netflix, aes(x = year_added, y = #duration))
```

```
#1 TV shows and movies overtime

ggplot(data = netflix, mapping = aes(x = year_added, fill = type)) + geom_bar() + scale_fill_manual(valu
```

```
## Warning: Removed 10 rows containing non-finite values (stat_count).
```



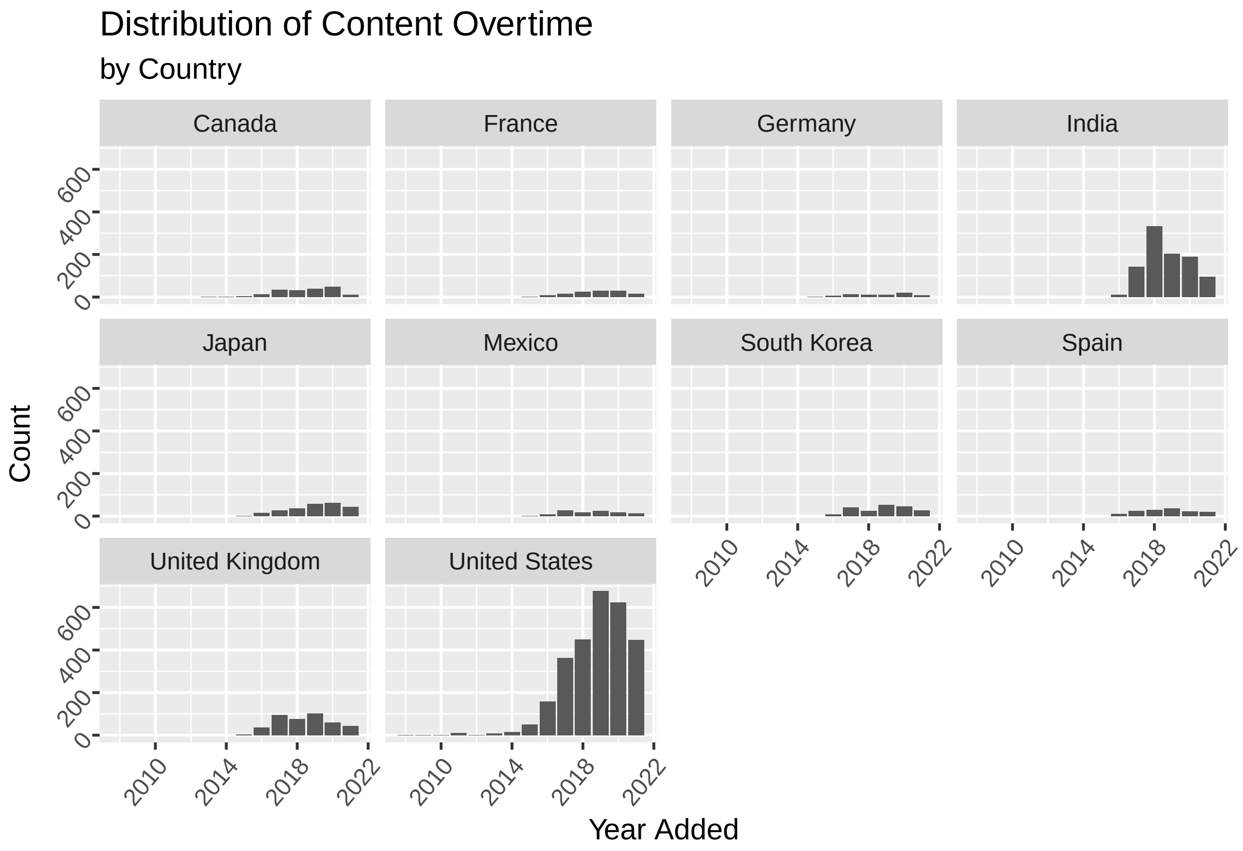
```
#ggplot(netflix, aes(x = year_added, color = type)) + geom_density() + theme(axis.text = element_text(a
```

```
#2 countries overtime

#split countries (since some had multiple)
country_eda <- netflix %>%
  filter(!is.na(country)) %>%
  separate_rows(country, sep = ',')
country_eda$country <- trimws(country_eda$country)


country_eda %>%
  group_by(country) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 123 x 2
## # Groups:   country [123]
##    country            n
##    <chr>          <int>
##  1 United States   3690
##  2 India           1046
##  3 United Kingdom   806
##  4 Canada           445
##  5 France           393
##  6 Japan            318
##  7 Spain            232
##   8 South Korea      231
##   9 Germany          226
##  10 Mexico           169
## # ... with 113 more rows
```

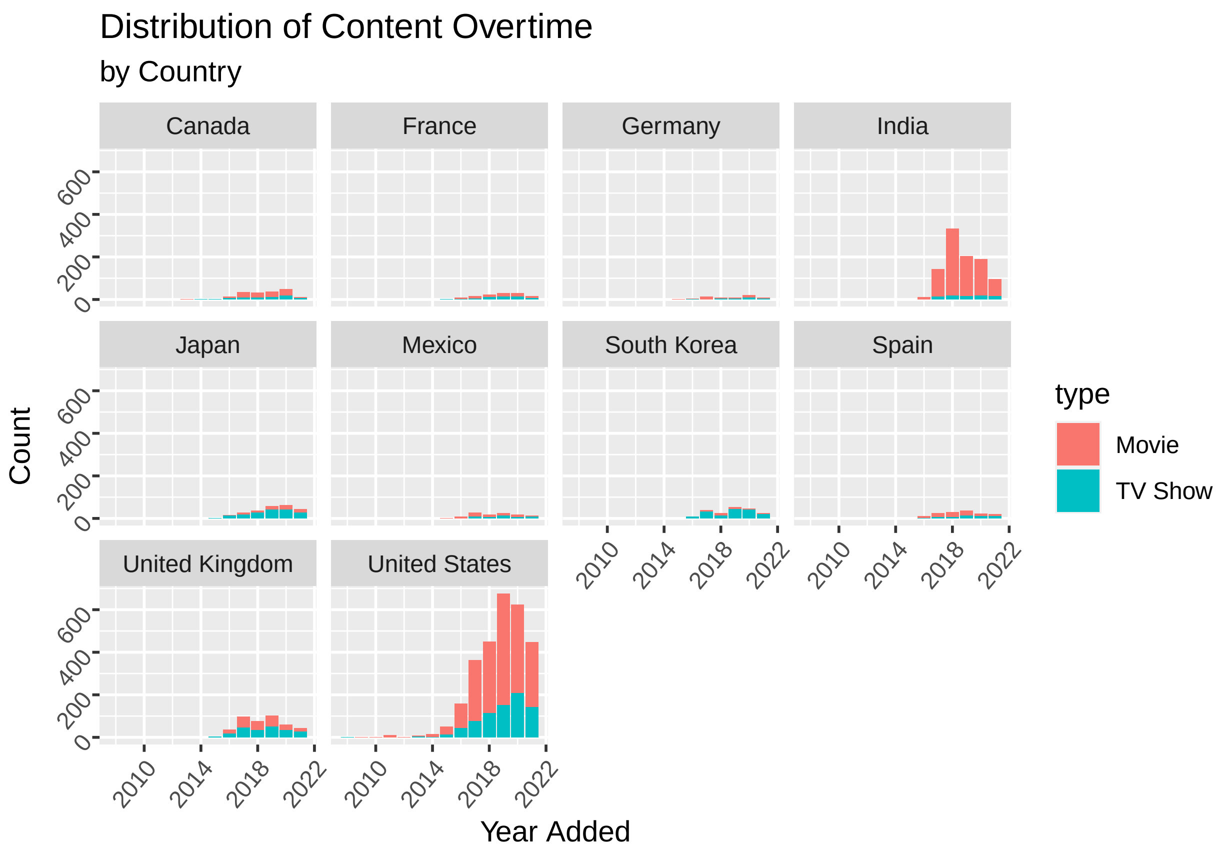
```
#top 10 countries based on frequency of content
x <- list("United States", "India", "United Kingdom","Canada", "France","Japan","Spain", "South Korea",

top_10_c <- netflix %>%
  filter(country %in% x,)

#overtime trends of content by country
ggplot(top_10_c, aes(x = year_added)) + geom_bar() + facet_wrap(.~country) + theme(axis.text = element_
```

```
## Warning: Removed 8 rows containing non-finite values (stat_count).
```



```
#overtime trends of movie/tv shows by country
ggplot(top_10_c, aes(x = year_added, fill = type)) + geom_bar() + facet_wrap(.~country) + theme(axis.te
```

```
## Warning: Removed 8 rows containing non-finite values (stat_count).
```

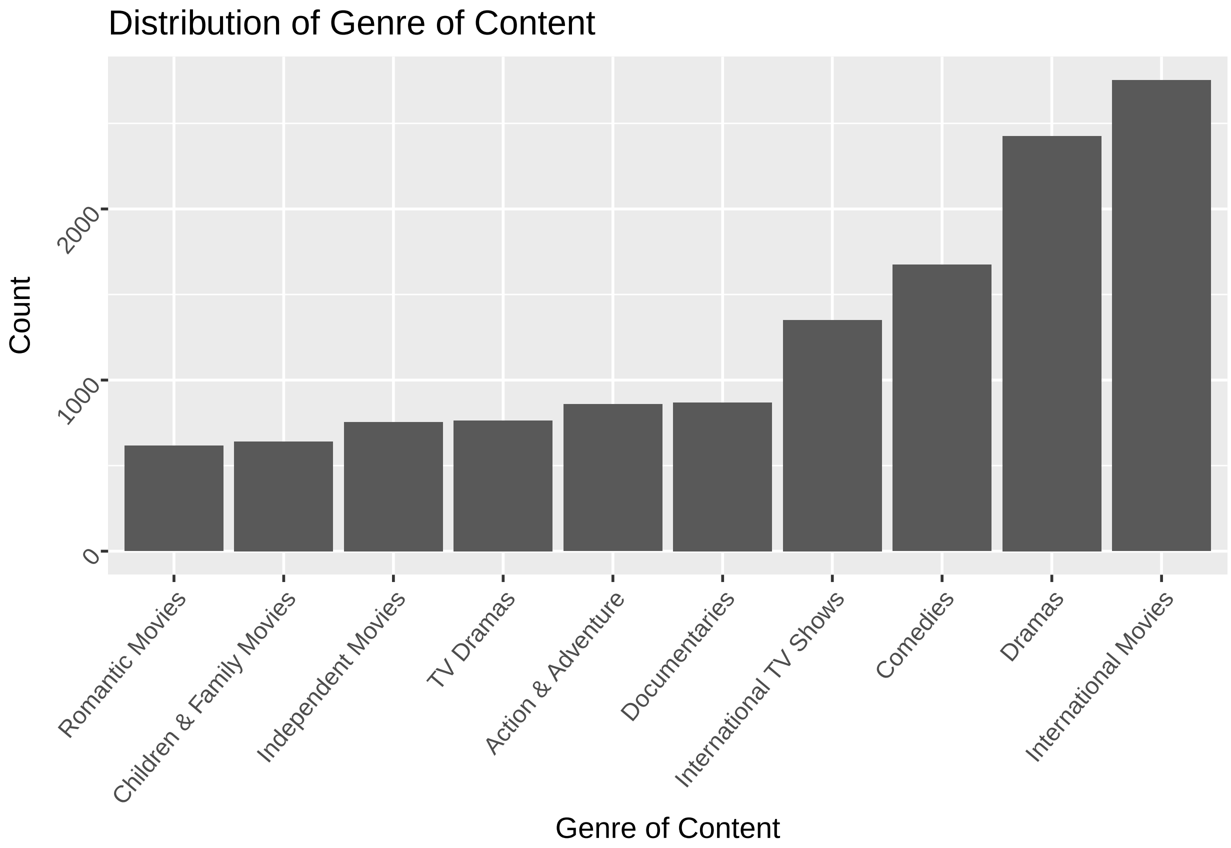


```
#3 genre overtime

netflix <- netflix %>%
  filter(!is.na(listed_in))


genres<-netflix%>%
  select(listed_in)%>%
  separate(listed_in, into = c('genre1','genre2','genre3'),", ", convert = TRUE)
```

```
## Warning: Expected 3 pieces. Missing pieces filled with `NA` in 5078 rows [1, 4,
## 7, 9, 10, 13, 14, 16, 17, 19, 23, 24, 28, 29, 30, 32, 35, 38, 39, 40, ...].
```

```
genres<-genres%>%unlist()


list_in<-tibble(
  list_in=genres)

genre_data <- list_in%>%
  group_by(list_in)%>%
  count()%>%
  filter(!is.na(list_in) && n>=600)


ggplot(genre_data, aes(n, reorder(list_in, fun=median, n)))+geom_histogram(stat = 'identity', show.legen
  labs(
    x='Count',
    y='Genre of Content',
    title='Distribution of Genre of Content') + coord_flip() + theme(axis.text = element_text(angle = 5
```

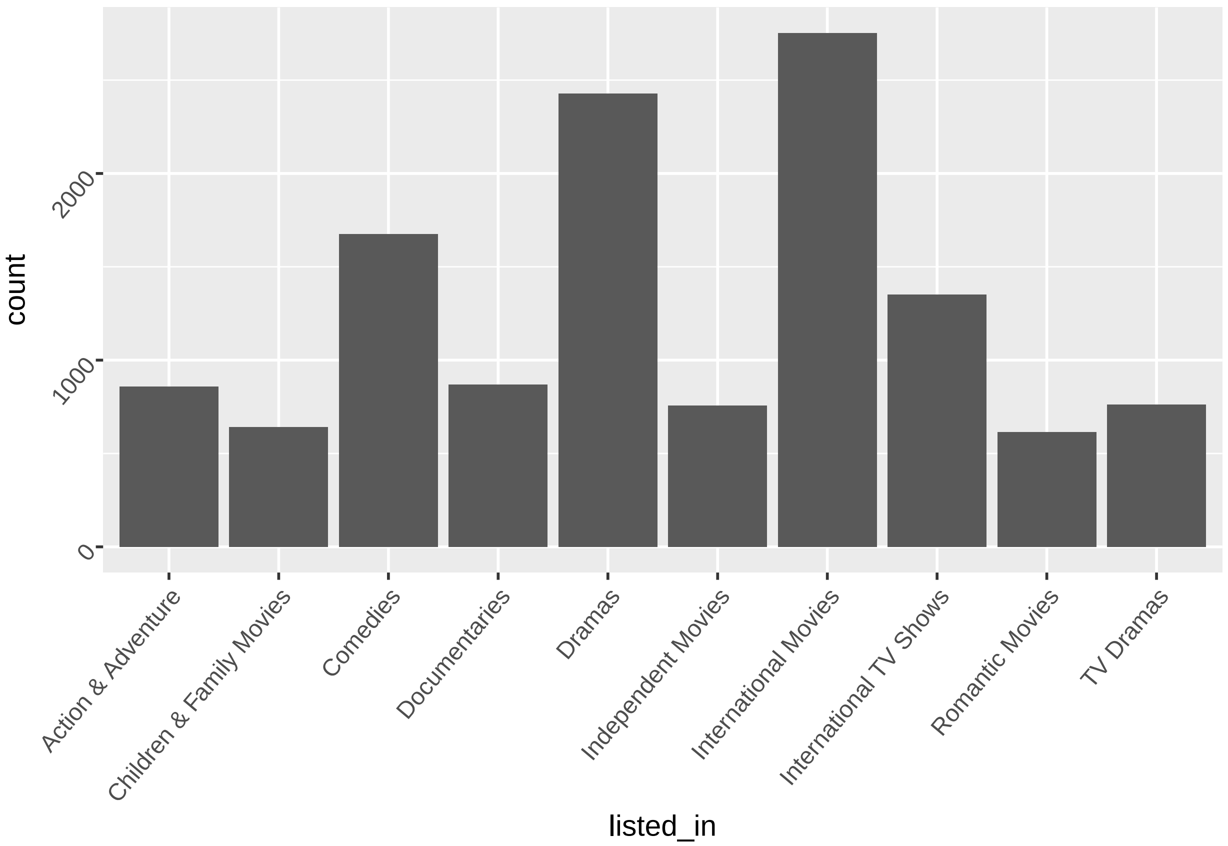
```
## Warning: Ignoring unknown parameters: binwidth, bins, pad
```



```
genre_eda <- netflix %>%
  filter(!is.na(listed_in)) %>%
  separate_rows(listed_in, sep = ",")
genre_eda$listed_in <- trimws(genre_eda$listed_in)


genre_eda %>%
  group_by(listed_in) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 42 x 2
## # Groups:   listed_in [42]
##    listed_in                  n
##    <chr>                  <int>
##  1 International Movies    2752
##  2 Dramas                  2427
##  3 Comedies                1674
##  4 International TV Shows  1351
##  5 Documentaries            869
##  6 Action & Adventure       859
##   7 TV Dramas                   763
##   8 Independent Movies          756
##   9 Children & Family Movies    641
##  10 Romantic Movies             616
## # ... with 32 more rows
```

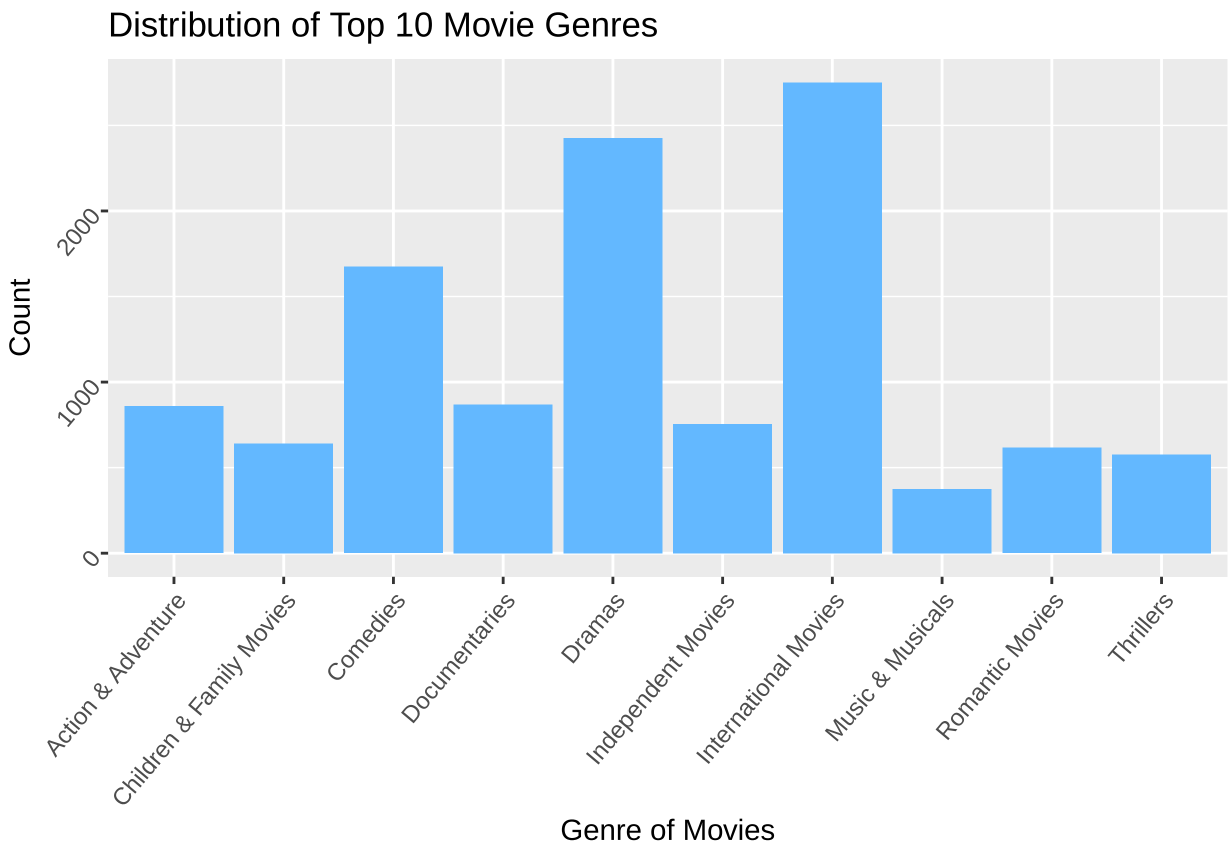
```
#top 10 genres
y <- list("International Movies", "Dramas", "Comedies", "International TV Shows", "Documentaries", "Acti

genre_eda %>%
  filter(listed_in %in% y) %>%
  ggplot(aes(x=listed_in)) + geom_bar()+ theme(axis.text = element_text(angle = 50, hjust = 1))
```



```
genre_eda_movies <- movies %>%
  filter(!is.na(listed_in)) %>%
  separate_rows(listed_in, sep = ",")
genre_eda_movies$listed_in <- trimws(genre_eda_movies$listed_in)

genre_eda_movies %>%
  group_by(listed_in) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 20 x 2
## # Groups:   listed_in [20]
##    listed_in                    n
##    <chr>                    <int>
##   1 International Movies      2752
##   2 Dramas                    2427
##   3 Comedies                  1674
##   4 Documentaries              869
##   5 Action & Adventure         859
##   6 Independent Movies         756
##   7 Children & Family Movies   641
##   8 Romantic Movies            616
##   9 Thrillers                  577
##  10 Music & Musicals           375
##  11 Horror Movies              357
##  12 Stand-Up Comedy            343
##  13 Sci-Fi & Fantasy           243
##  14 Sports Movies              219
##  15 Classic Movies             116
##  16 LGBTQ Movies               102
##  17 Anime Features              71
##  18 Cult Movies                 71
##  19 Faith & Spirituality        65
##  20 Movies                      54
```

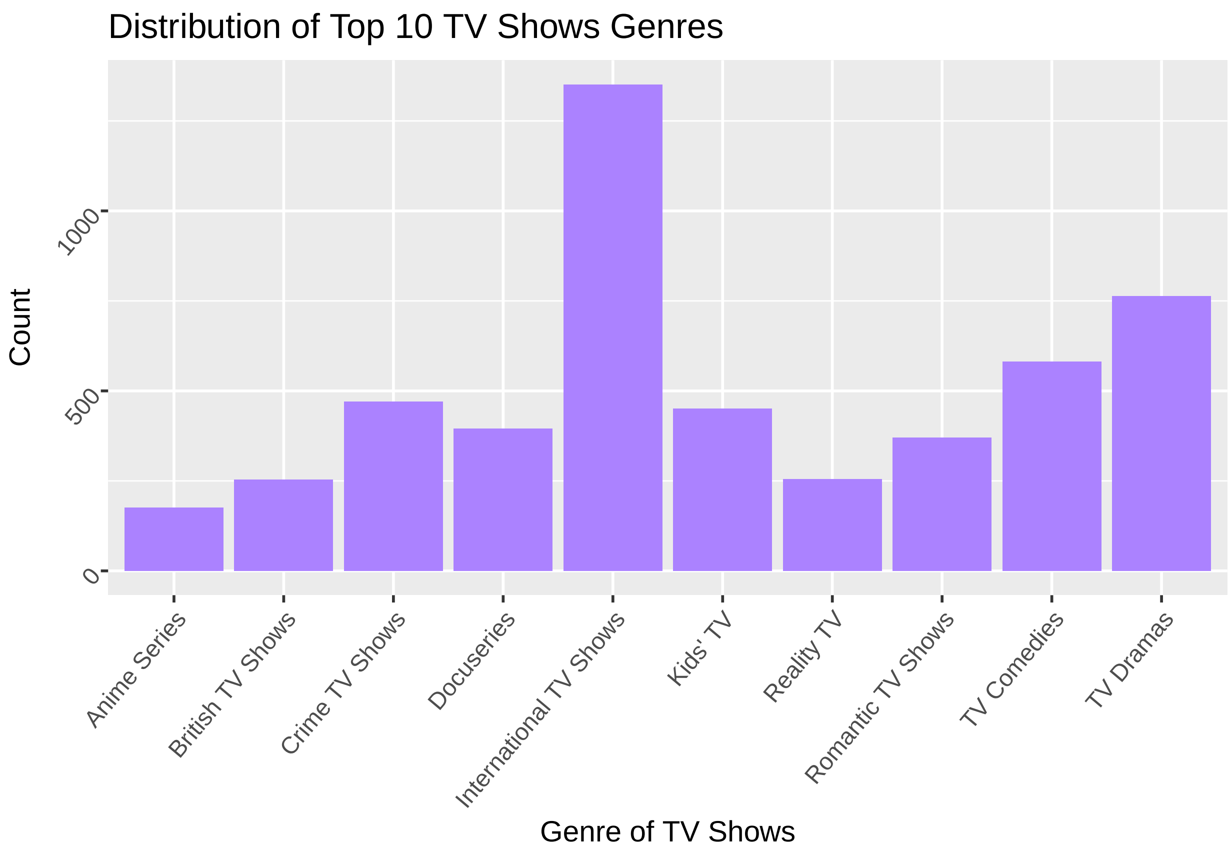
```
#top 10 movie genres
y1 <-list("International Movies", "Dramas", "Comedies", "Documentaries", "Action & Adventure", "Indepen

genre_eda_movies %>%
  filter(listed_in %in% y1) %>%
  ggplot(aes(x=listed_in)) + geom_bar(fill = "steelblue1")+ theme(axis.text = element_text(angle = 50,
```



```r
genre_eda_shows <- shows %>%
  filter(!is.na(listed_in)) %>%
  separate_rows(listed_in, sep = ",")
genre_eda_shows$listed_in <- trimws(genre_eda_shows$listed_in)

genre_eda_shows %>%
  group_by(listed_in) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 22 x 2
## # Groups:   listed_in [22]
##    listed_in                  n
##    <chr>                  <int>
##  1 International TV Shows  1351
##  2 TV Dramas                763
##  3 TV Comedies              581
##  4 Crime TV Shows           470
##  5 Kids' TV                 451
##  6 Docuseries               395
##  7 Romantic TV Shows        370
##  8 Reality TV               255
##  9 British TV Shows         253
## 10 Anime Series             176
## # ... with 12 more rows
```

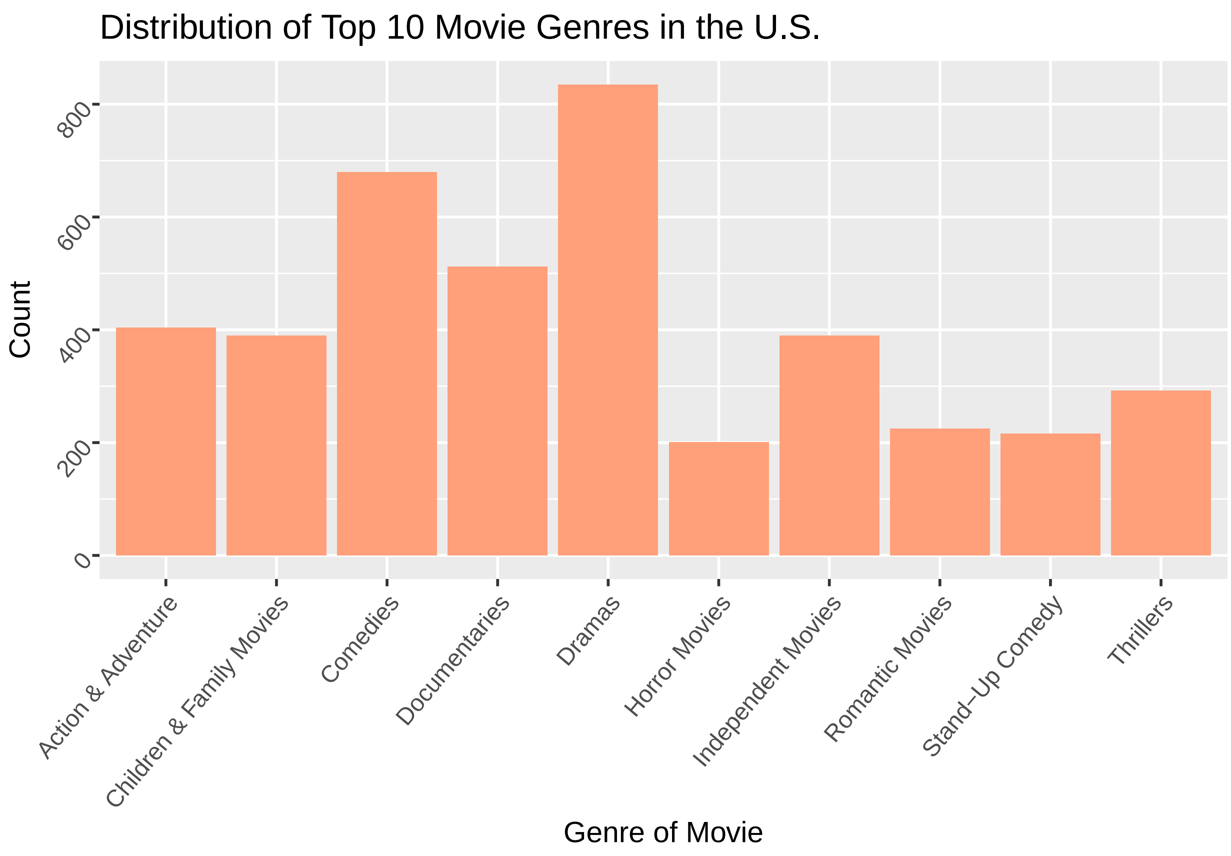
```r
#top 10 show genres
y2 <- list("International TV Shows", "TV Dramas", "TV Comedies", "Crime TV Shows", "Kids' TV", "Docuseri

genre_eda_shows %>%
  filter(listed_in %in% y2) %>%
  ggplot(aes(x = listed_in)) +geom_bar(fill = "mediumpurple1") +theme(axis.text = element_text(angle = 
```



```r
US_genre <- country_eda %>%
  filter(country == "United States",
         !is.na(listed_in)) %>%
  separate_rows(listed_in, sep = ",")
US_genre$listed_in <- trimws(US_genre$listed_in)


US_movie_genre <- US_genre %>%
  filter(type == "Movie")


US_movie_genre %>%
  group_by(listed_in) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 20 x 2
## # Groups:   listed_in [20]
##    listed_in                    n
##    <chr>                    <int>
##  1 Dramas                     835
##  2 Comedies                   680
##  3 Documentaries              512
##  4 Action & Adventure         404
##  5 Children & Family Movies   390
##  6 Independent Movies         390
##  7 Thrillers                  292
##  8 Romantic Movies            225
##  9 Stand-Up Comedy            216
## 10 Horror Movies              201
## 11 Sci-Fi & Fantasy           181
## 12 International Movies       166
## 13 Music & Musicals           147
## 14 Sports Movies              113
## 15 Classic Movies              81
## 16 LGBTQ Movies                63
## 17 Cult Movies                 52
## 18 Faith & Spirituality        42
## 19 Movies                      22
## 20 Anime Features               7
```

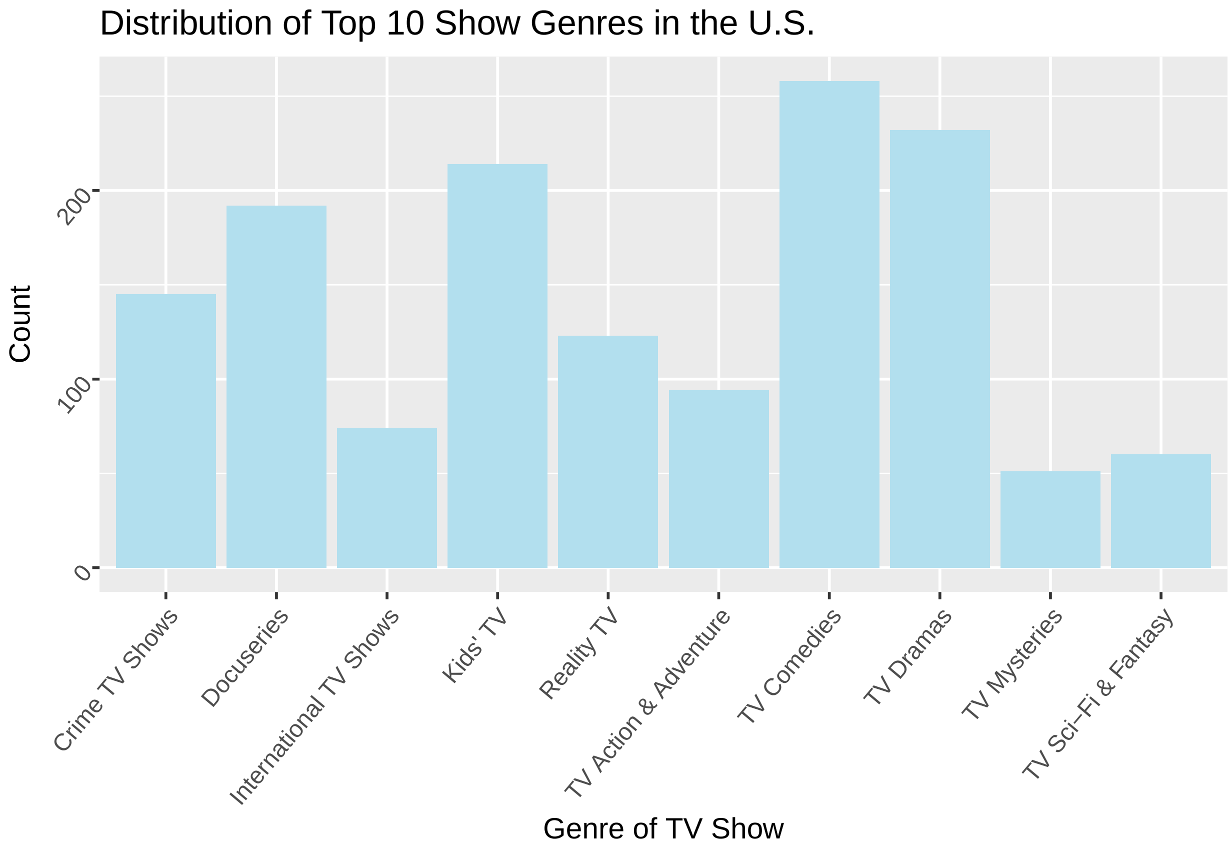
```
#top 10 movie genres in the U.S.
z <- list("Dramas", "Comedies", "Documentaries", "Action & Adventure", "Children & Family Movies", "Inde

US_movie_genre %>%
  filter(listed_in %in% z) %>%
  ggplot(aes(x = listed_in)) +geom_bar(fill = "lightsalmon") +theme(axis.text = element_text(angle = 50
```



```
US_show_genre <- US_genre %>%
  filter(type == "TV Show")

US_show_genre %>%
  group_by(listed_in) %>%
  count() %>%
  arrange(desc(n))
```

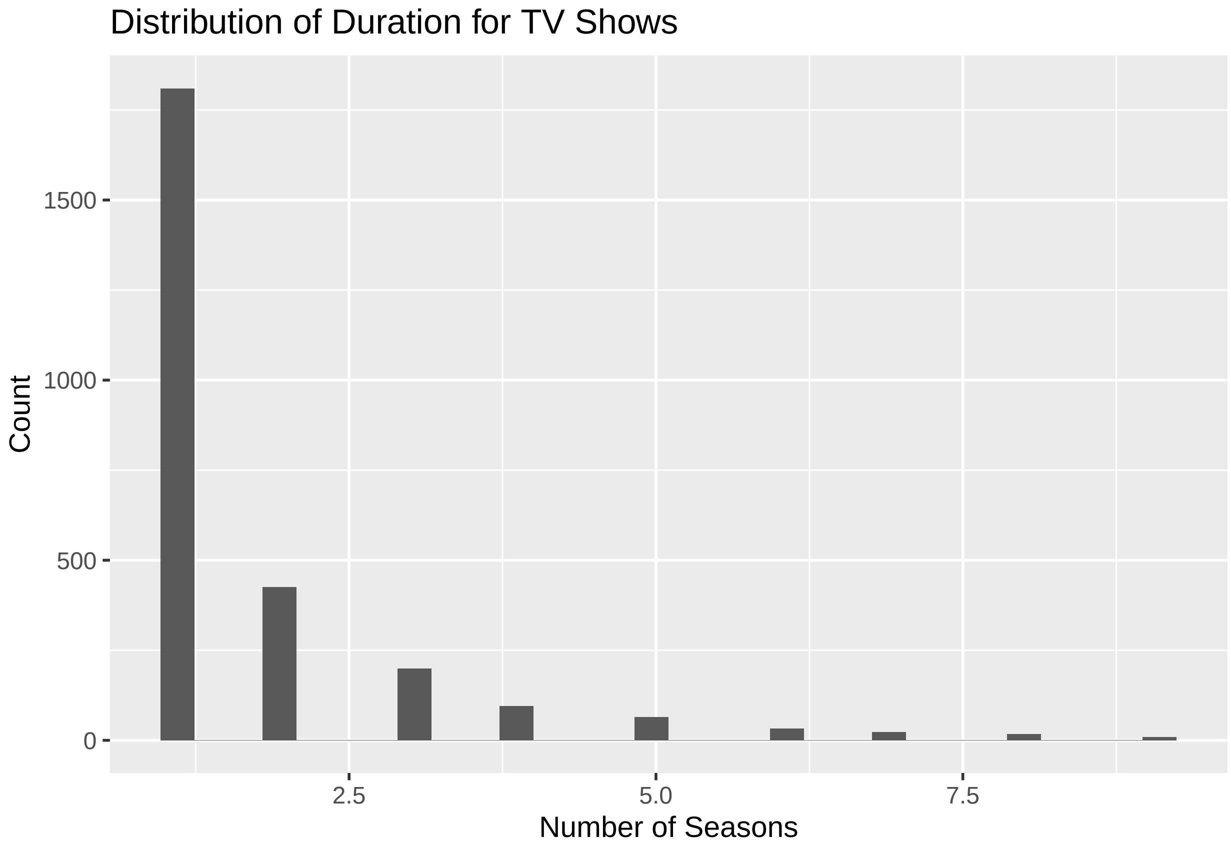
```
## # A tibble: 22 x 2
## # Groups:   listed_in [22]
##    listed_in                   n
##    <chr>                   <int>
##  1 TV Comedies               258
##  2 TV Dramas                 232
##  3 Kids' TV                  214
##  4 Docuseries                192
##  5 Crime TV Shows            145
##  6 Reality TV                123
##  7 TV Action & Adventure      94
##  8 International TV Shows     74
##  9 TV Sci-Fi & Fantasy        60
## 10 TV Mysteries               51
## # ... with 12 more rows
```

```
#top 10 show genres in the U.S.
z1<- list("TV Comedies", "TV Dramas", "Kids' TV", "Docuseries", "Crime TV Shows", "Reality TV", "TV Acti

US_show_genre %>%
  filter(listed_in %in% z1) %>%
  ggplot(aes(x = listed_in)) +geom_bar(fill = "lightblue2") +theme(axis.text = element_text(angle = 50,
```



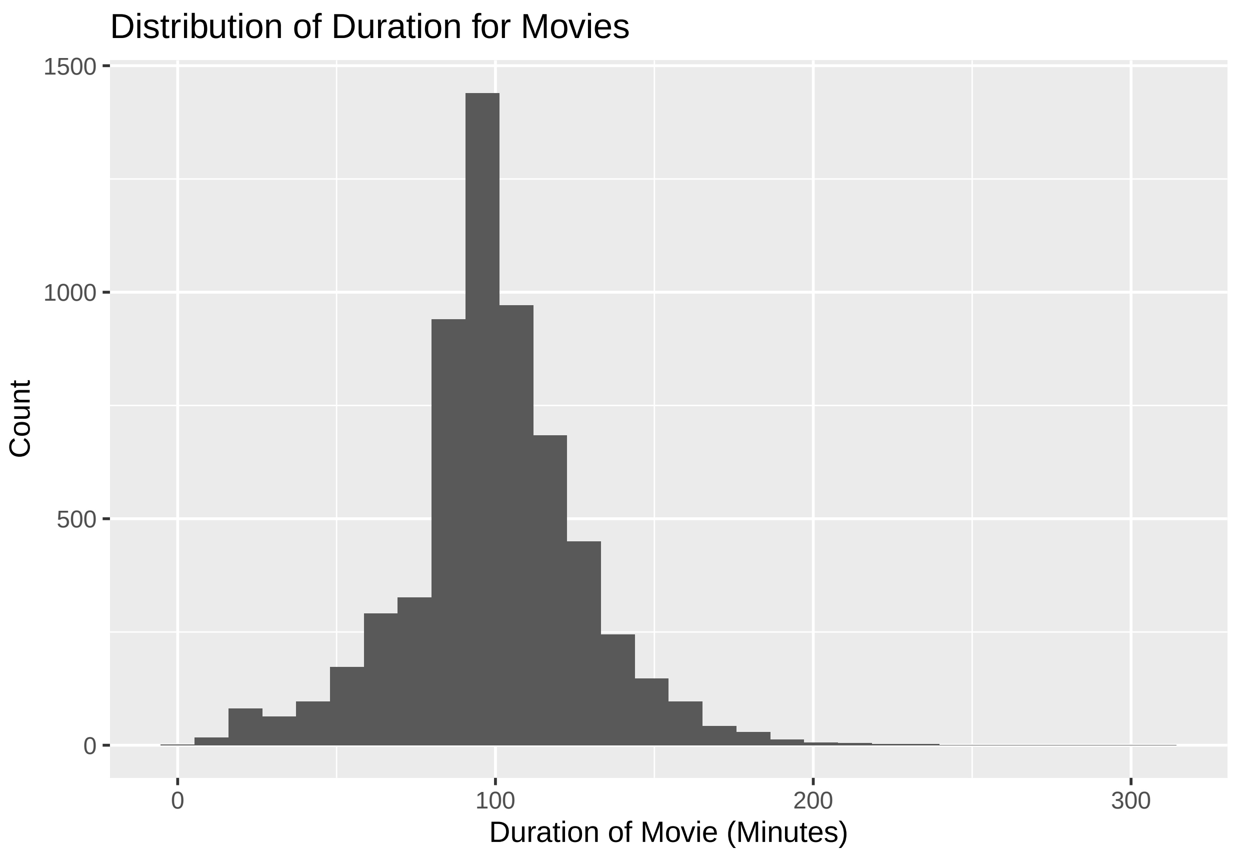
```
#4 duration overtime (shows then movies)
movies <- movies %>%
  group_by(year_added) %>%
  mutate(mean_dur = mean(num_mins),
         sd_dur = sd(num_mins))

ggplot(data = shows, mapping = aes(x = num_seasons)) + geom_histogram() + labs(title = "Distribution of
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

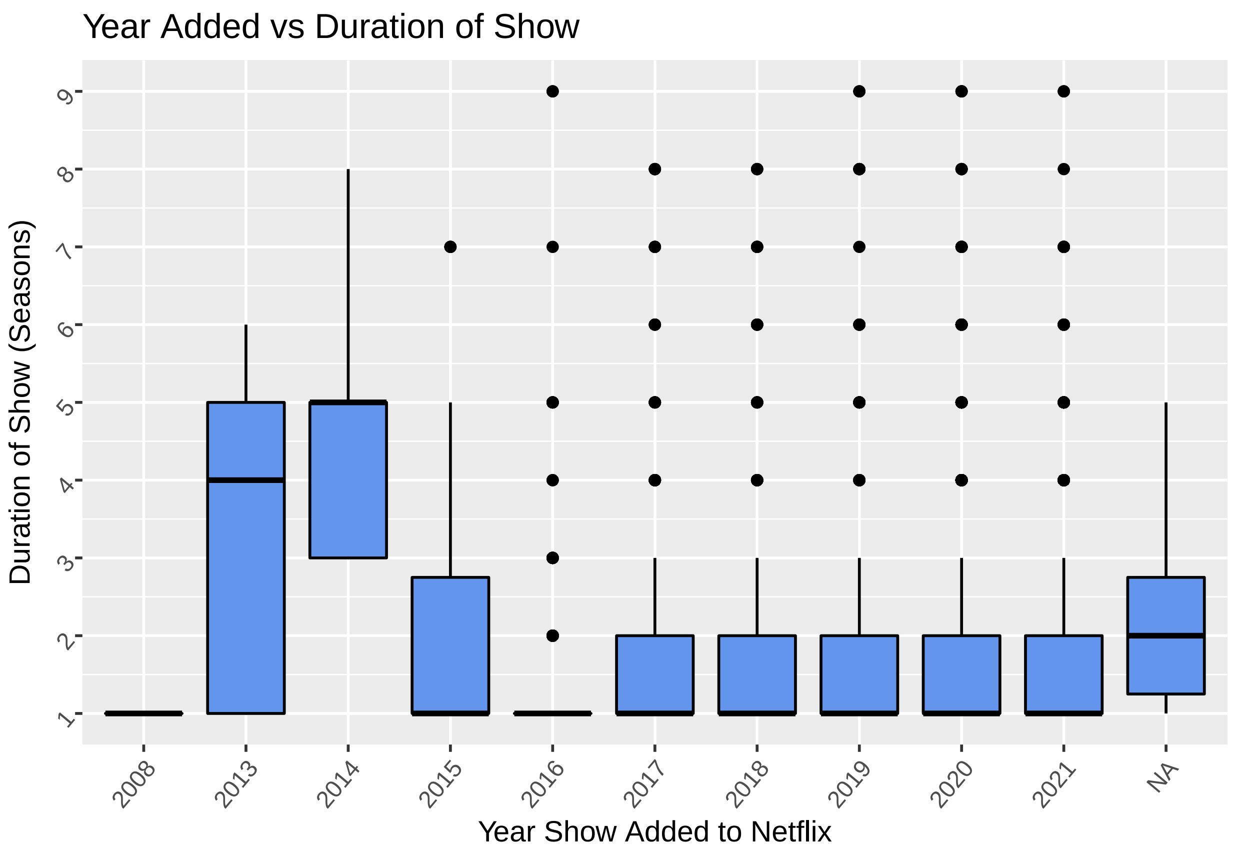


```
ggplot(data = movies, mapping = aes(x = num_mins)) + geom_histogram() + labs(title =  "Distribution of I
```

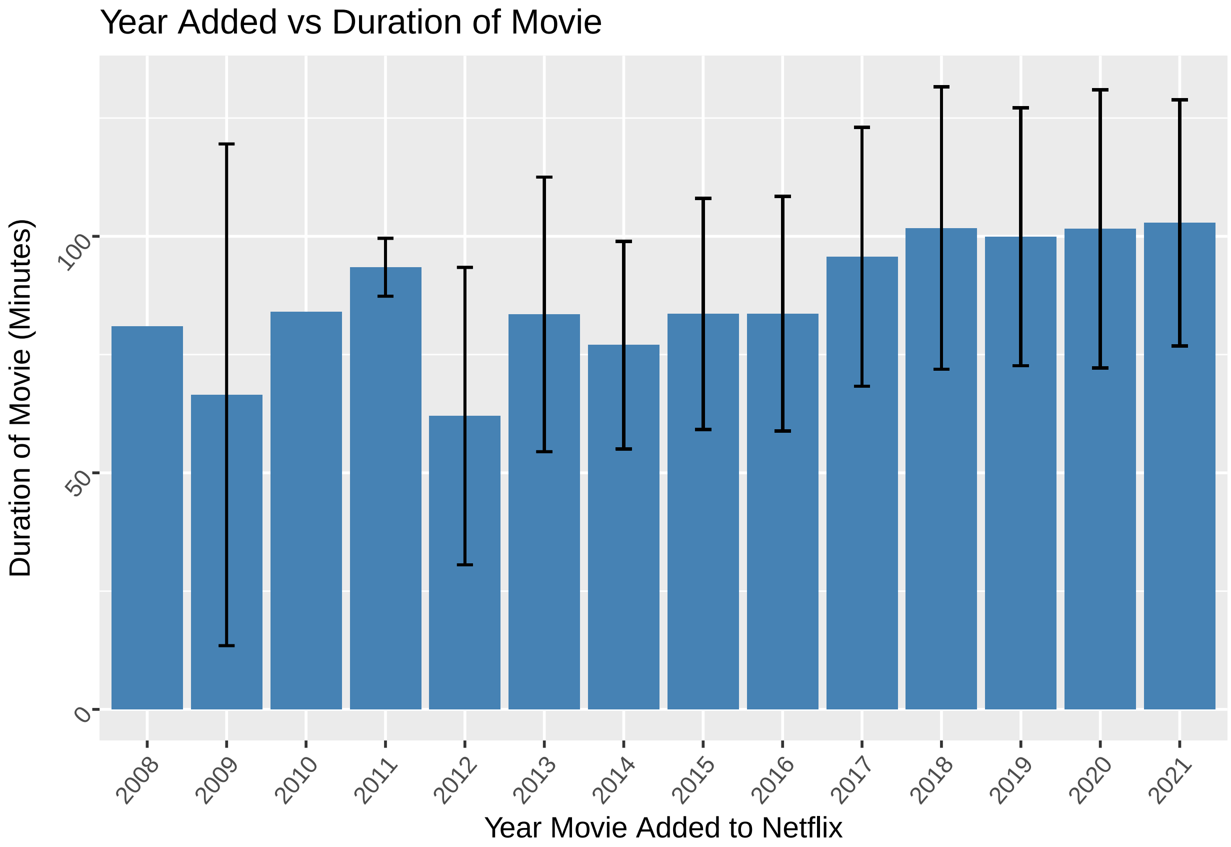
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



```
#because the distribution of shows is skewed we should use a box plot because it showcases the median d
ggplot(data = shows,mapping = aes(x = year_added, y = num_seasons)) + geom_boxplot(color = "black", fil
```

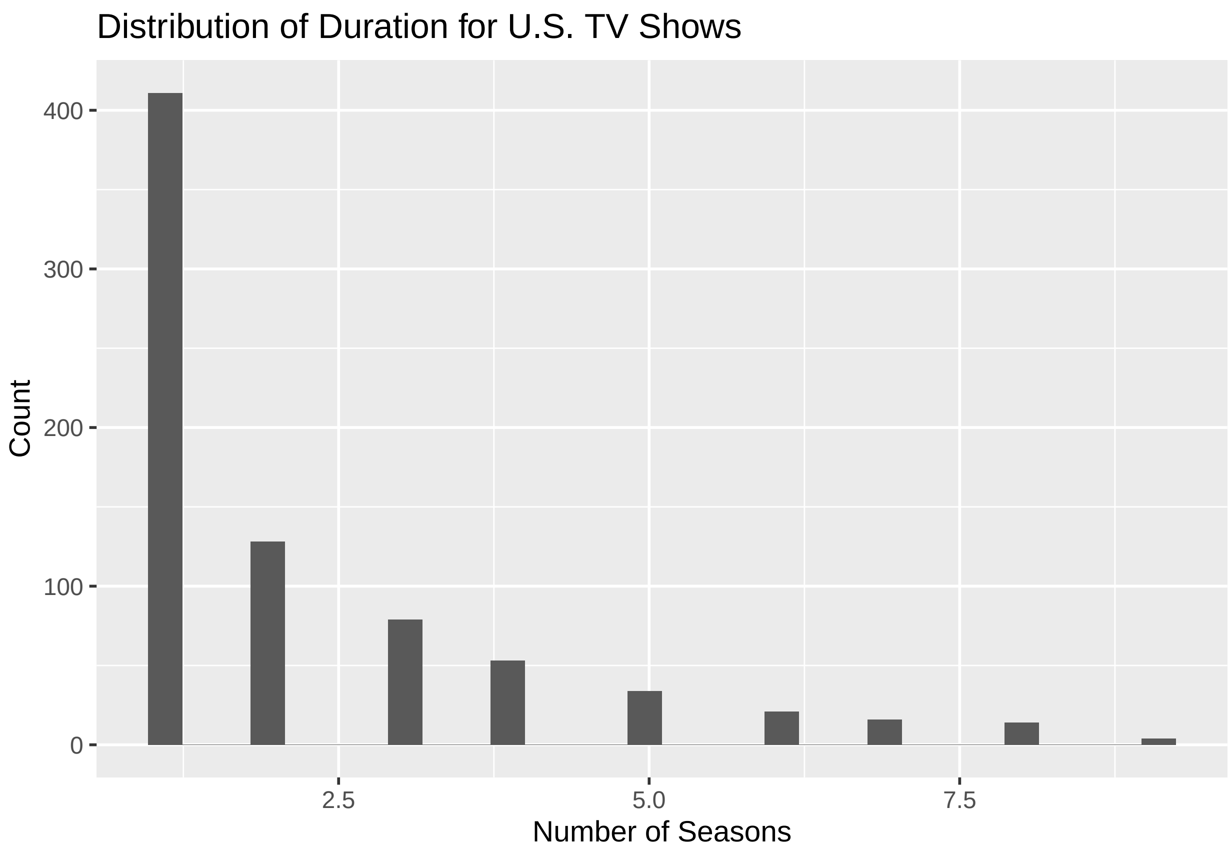


```
#because the distribution of movies is relatively normal we can use a histogram of the mean duration of

ggplot(movies, aes(x=year_added, y=mean_dur)) +
  geom_bar(position=position_dodge(), stat="identity",
           fill="steelblue") +
  geom_errorbar(aes(ymin=mean_dur-sd_dur, ymax=mean_dur+sd_dur), width=.2) + labs(title = "Year Added v
```



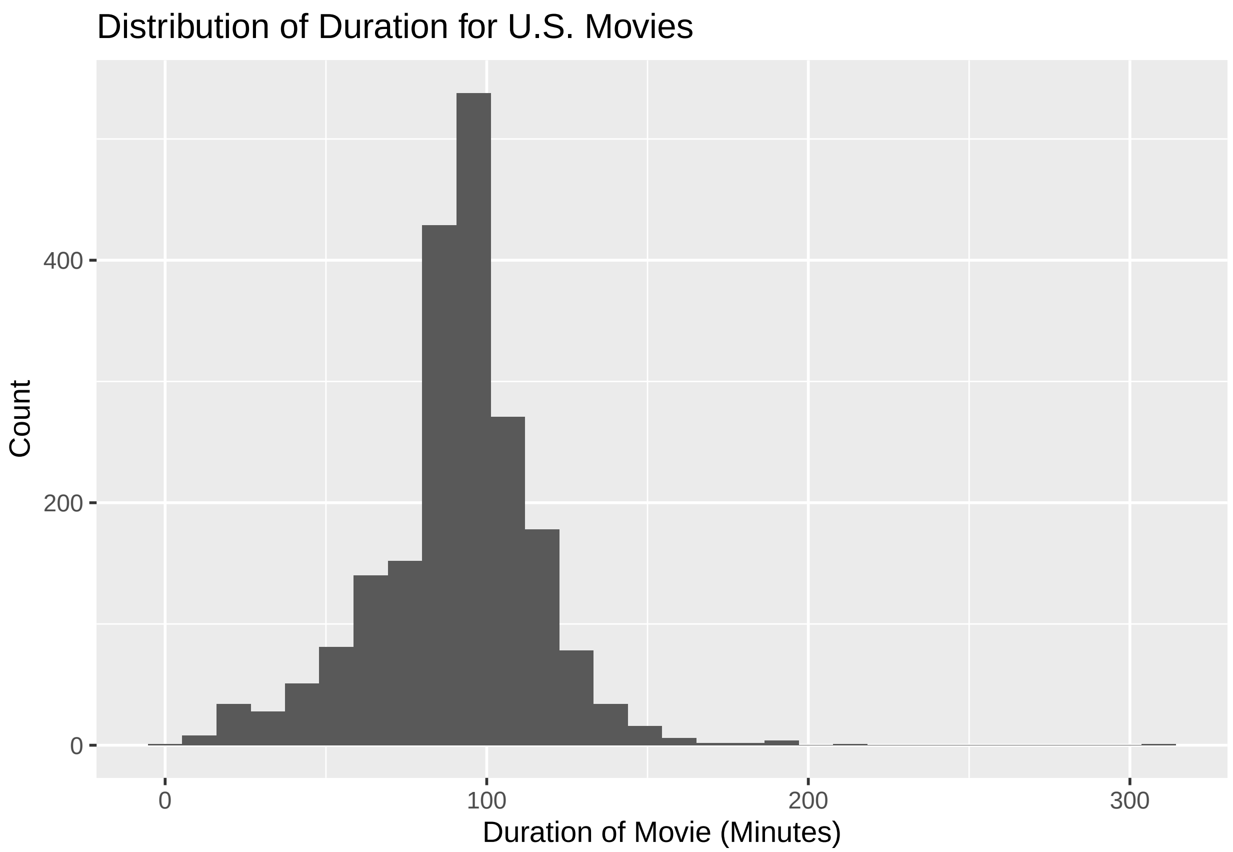
```
US_movies <- movies %>%
  filter(country == "United States",
         !is.na(duration))

US_shows <- shows %>%
  filter(country == "United States",
         !is.na(duration))

US_movies <- US_movies %>%
  group_by(year_added) %>%
  mutate(mean_dur = mean(num_mins),
         sd_dur = sd(num_mins))

ggplot(data = US_shows, mapping = aes(x = num_seasons)) + geom_histogram() + labs(title = "Distribution
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

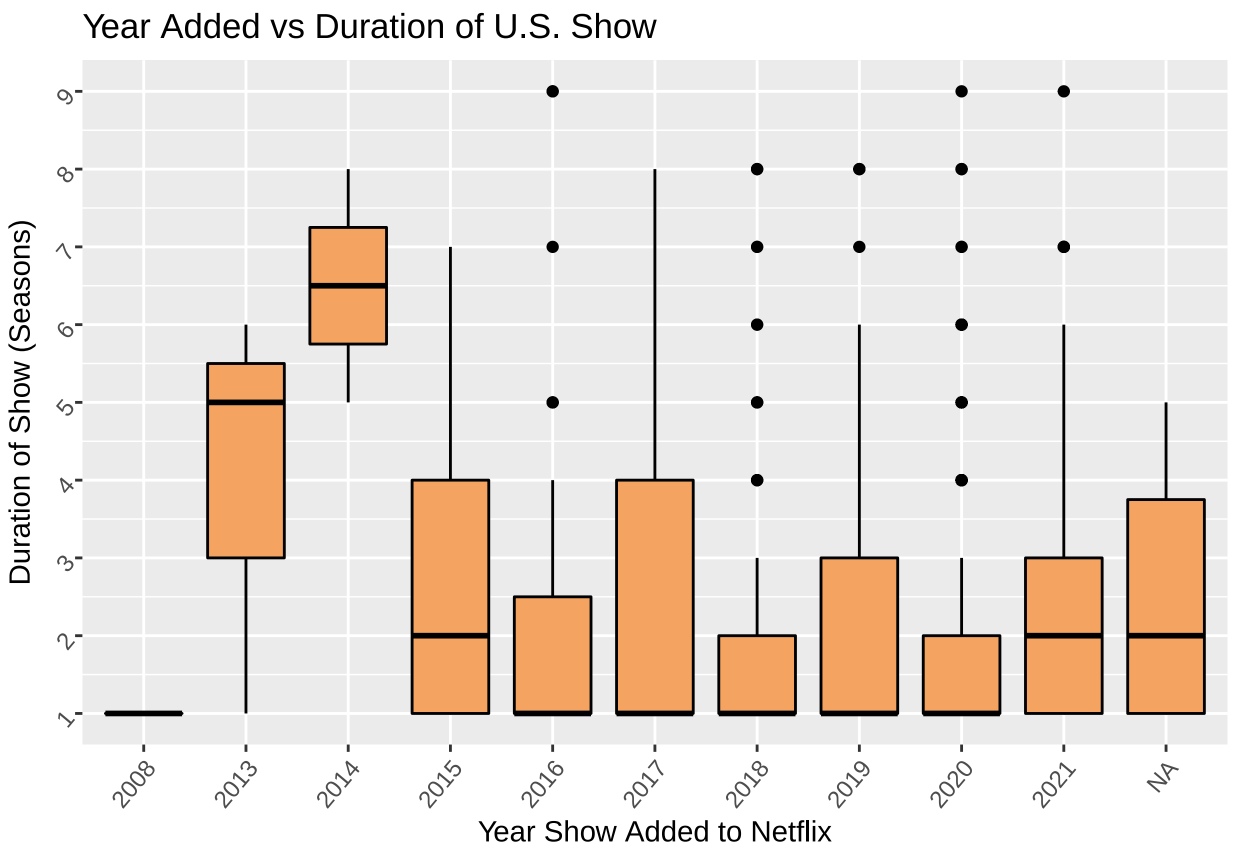


```
ggplot(data = US_movies, mapping = aes(x = num_mins)) + geom_histogram() + labs(title =  "Distribution
```

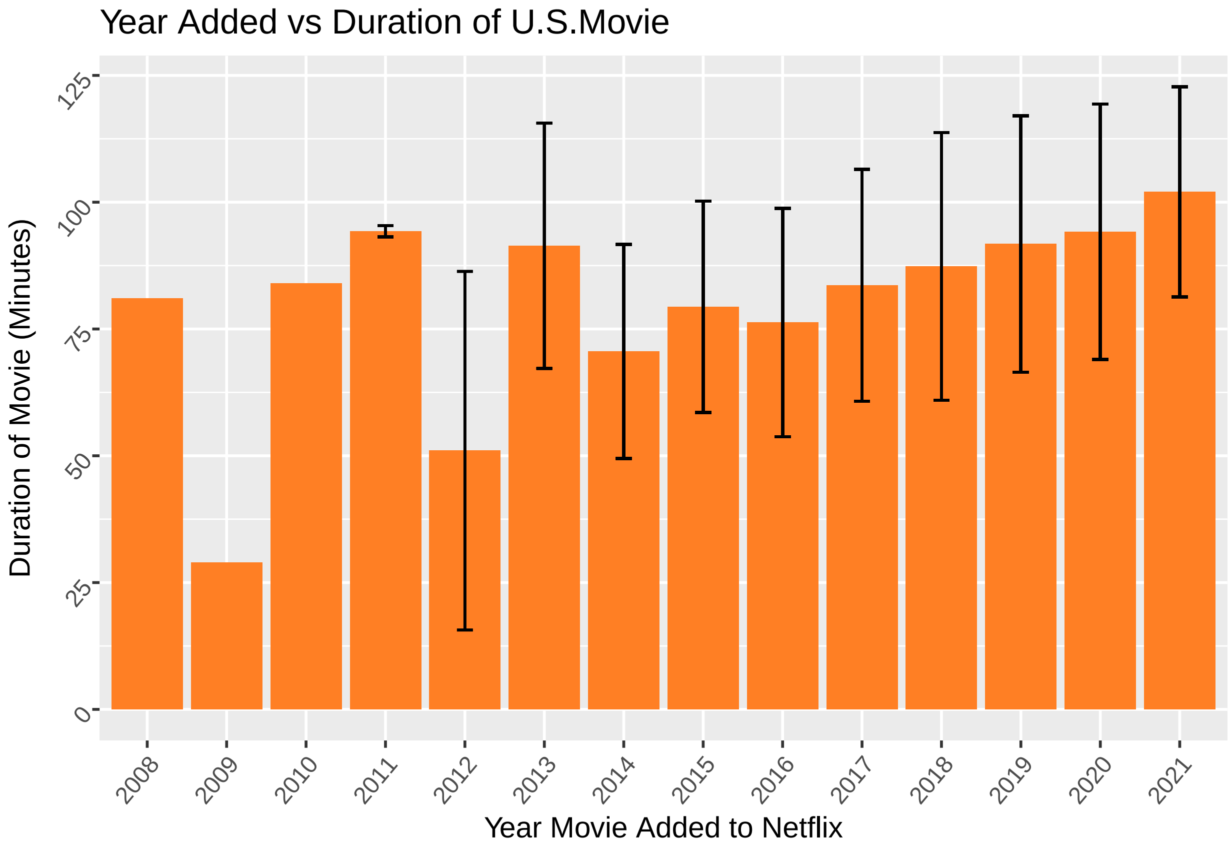
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



```
#because the distribution of shows is skewed we should use a box plot because it showcases the median d
ggplot(data = US_shows,mapping = aes(x = year_added, y = num_seasons)) + geom_boxplot(color = "black", 
```

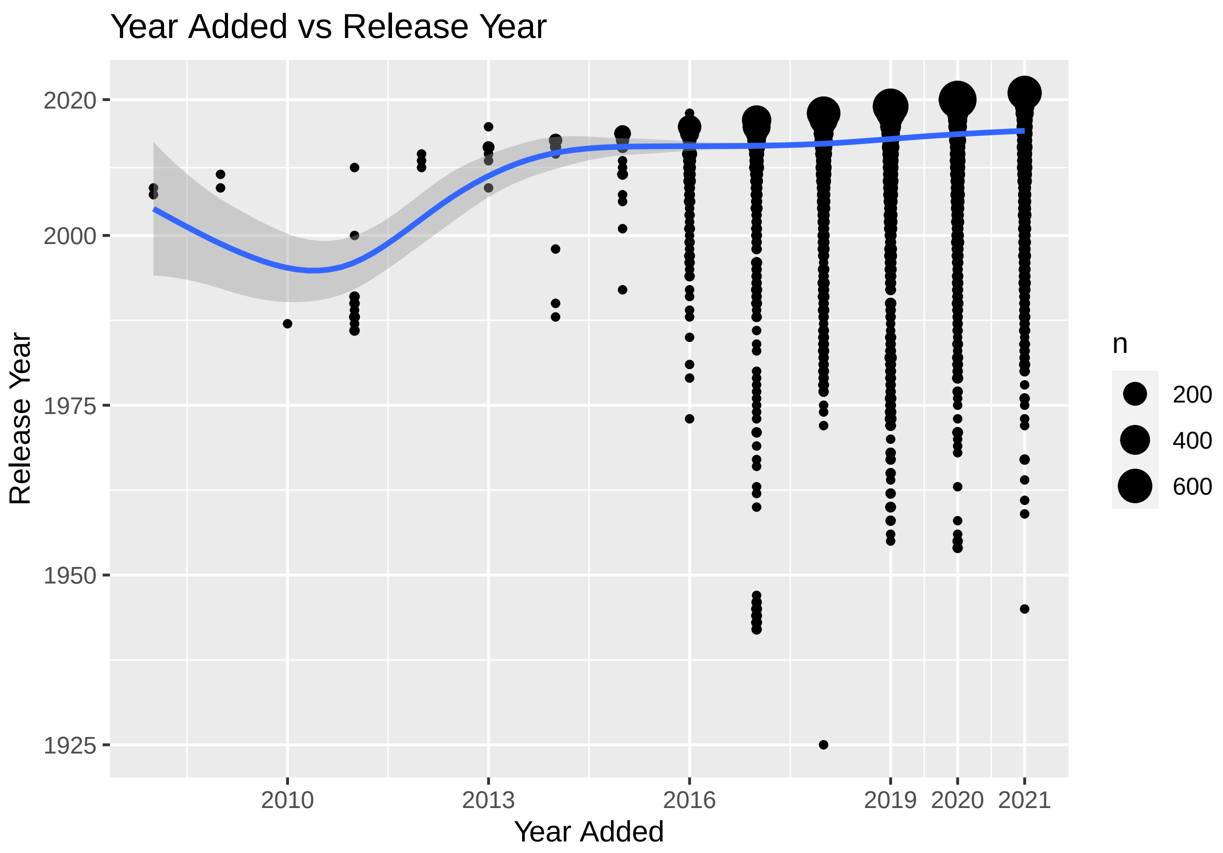


```
#because the distribution of movies is relatively normal we can use a histogram of the mean duration of
ggplot(US_movies, aes(x=year_added, y=mean_dur)) +
  geom_bar(position=position_dodge(), stat="identity",
           fill="chocolate1") +
  geom_errorbar(aes(ymin=mean_dur-sd_dur, ymax=mean_dur+sd_dur), width=.2) + labs(title = "Year Added v
```



```
#5 release year
releaseyr_eda <- netflix %>%
  filter(!is.na(release_year),
         !is.na(year_added))

ggplot(releaseyr_eda, mapping = aes(x = year_added, y = release_year)) + geom_count() +geom_smooth() +
```

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```



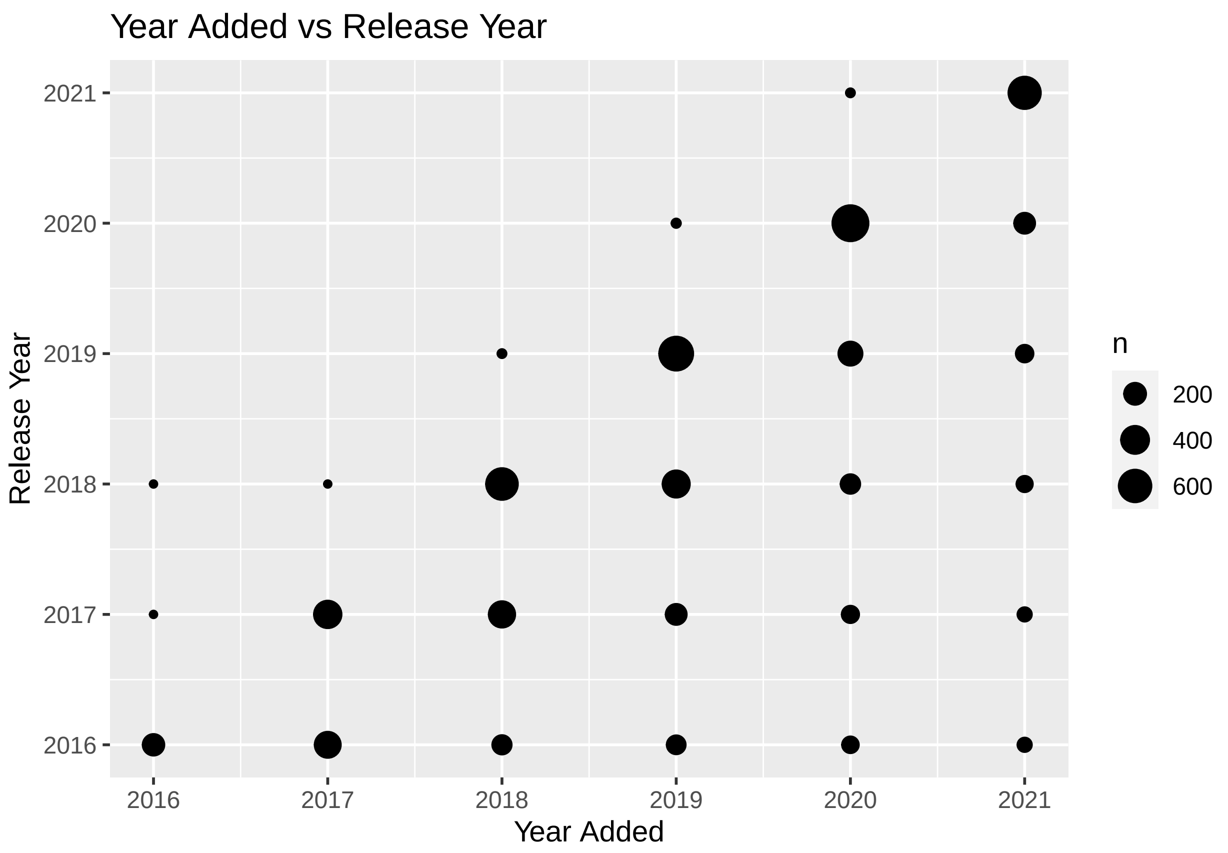
```
ggplot(releaseyr_eda, mapping = aes(x = year_added, y = release_year)) + geom_count() +geom_smooth() +xl
```

```
## Warning: Removed 3144 rows containing non-finite values (stat_sum).
```

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```

```
## Warning: Removed 3144 rows containing non-finite values (stat_smooth).
```

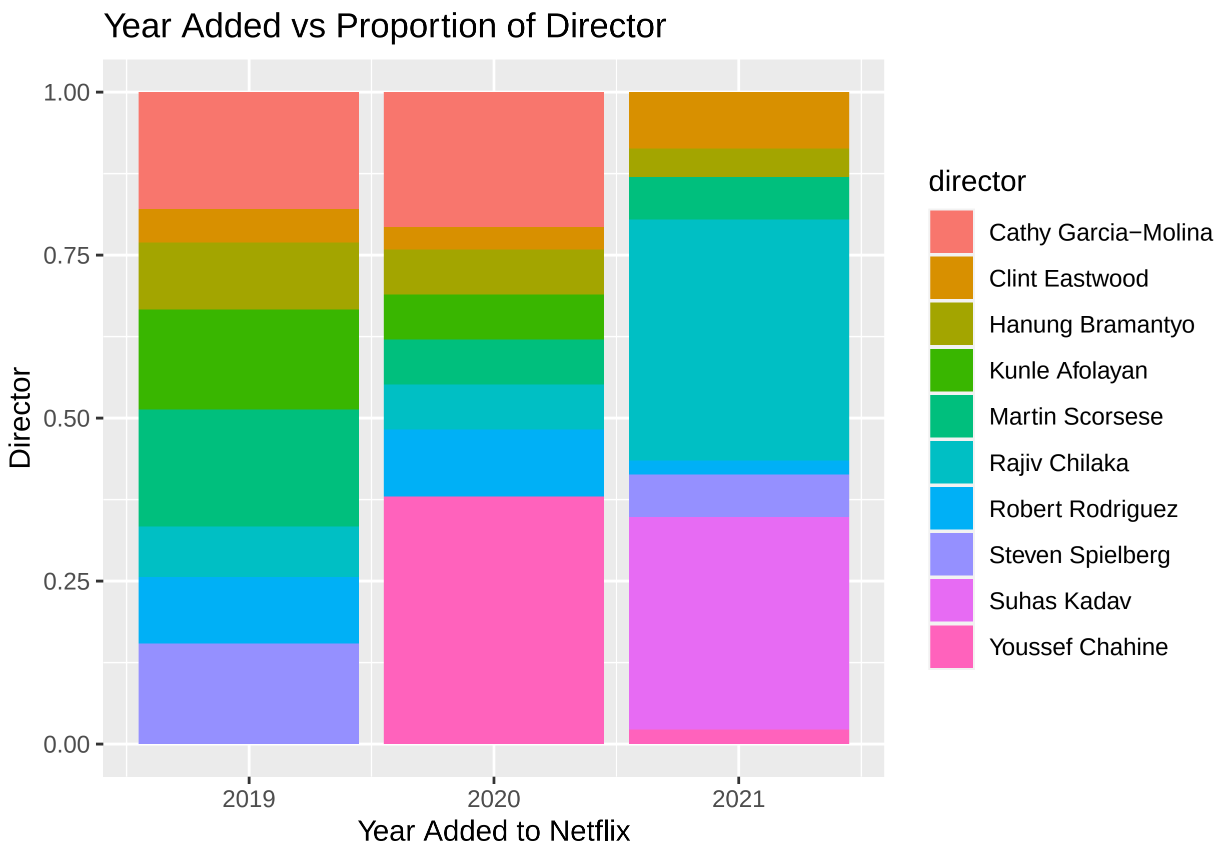
```
## Warning: Computation failed in `stat_smooth()`:
## x has insufficient unique values to support 10 knots: reduce k.
```



```
#6 directors overtime

director_eda <- netflix %>%
        filter(!is.na(director),
               year_added %in% c(2019,2020,2021)) %>%
  separate_rows(director, sep = ",")
director_eda$director <- trimws(director_eda$director)


director_eda %>%
  group_by(director) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 3,163 x 2
## # Groups:   director [3,163]
##    director                 n
##    <chr>                <int>
##  1 Rajiv Chilaka           22
##  2 Suhas Kadav             15
##  3 Cathy Garcia-Molina     13
##  4 Martin Scorsese         12
##  5 Youssef Chahine         12
##  6 Steven Spielberg         9
##  7 Hanung Bramantyo         8
##  8 Kunle Afolayan           8
##  9 Robert Rodriguez        8
## 10 Clint Eastwood          7
## # ... with 3,153 more rows
```

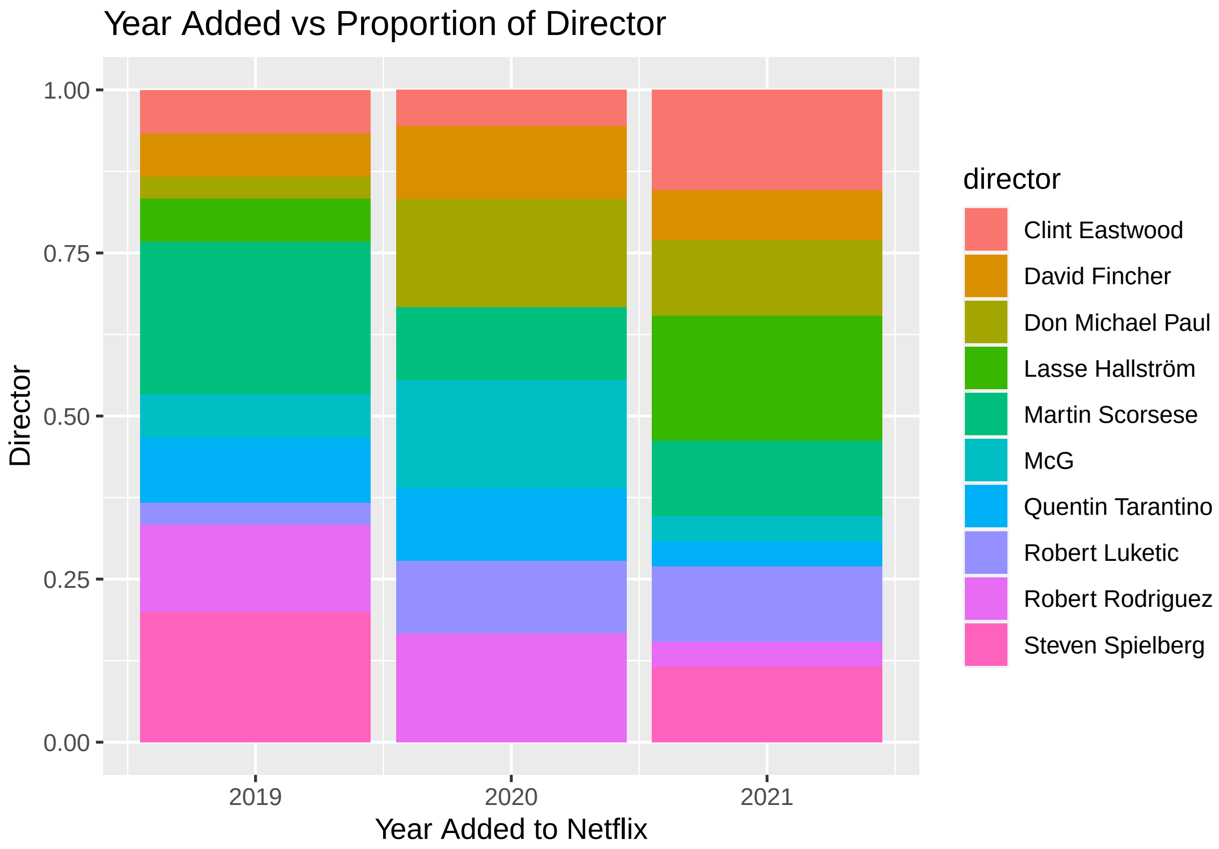
```
#top 10 directors over past 3 years
x2 <- list("Rajiv Chilaka", "Suhas Kadav","Cathy Garcia-Molina", "Martin Scorsese", "Youssef Chahine",

top_10_d <-director_eda %>%
  filter(director %in% x2)


ggplot(data = top_10_d, mapping = aes(x = year_added, fill = director)) + geom_bar(position = "fill")+
```



```
#6 directors overtime for US
US_director_eda <- country_eda %>%
        filter(!is.na(director),
               country == "United States",
               year_added %in% c(2019,2020,2021)) %>%
  separate_rows(director, sep = ",")
US_director_eda$director <- trimws(US_director_eda$director)


US_director_eda %>%
  group_by(director) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 1,455 x 2
## # Groups:   director [1,455]
##    director              n
##    <chr>             <int>
##  1 Martin Scorsese      12
##  2 Steven Spielberg      9
##  3 Robert Rodriguez      8
##  4 Clint Eastwood        7
##  5 Don Michael Paul      7
##  6 Lasse Hallström       7
##  7 David Fincher         6
##  8 McG                   6
##  9 Quentin Tarantino     6
## 10 Robert Luketic        6
## # ... with 1,445 more rows
```

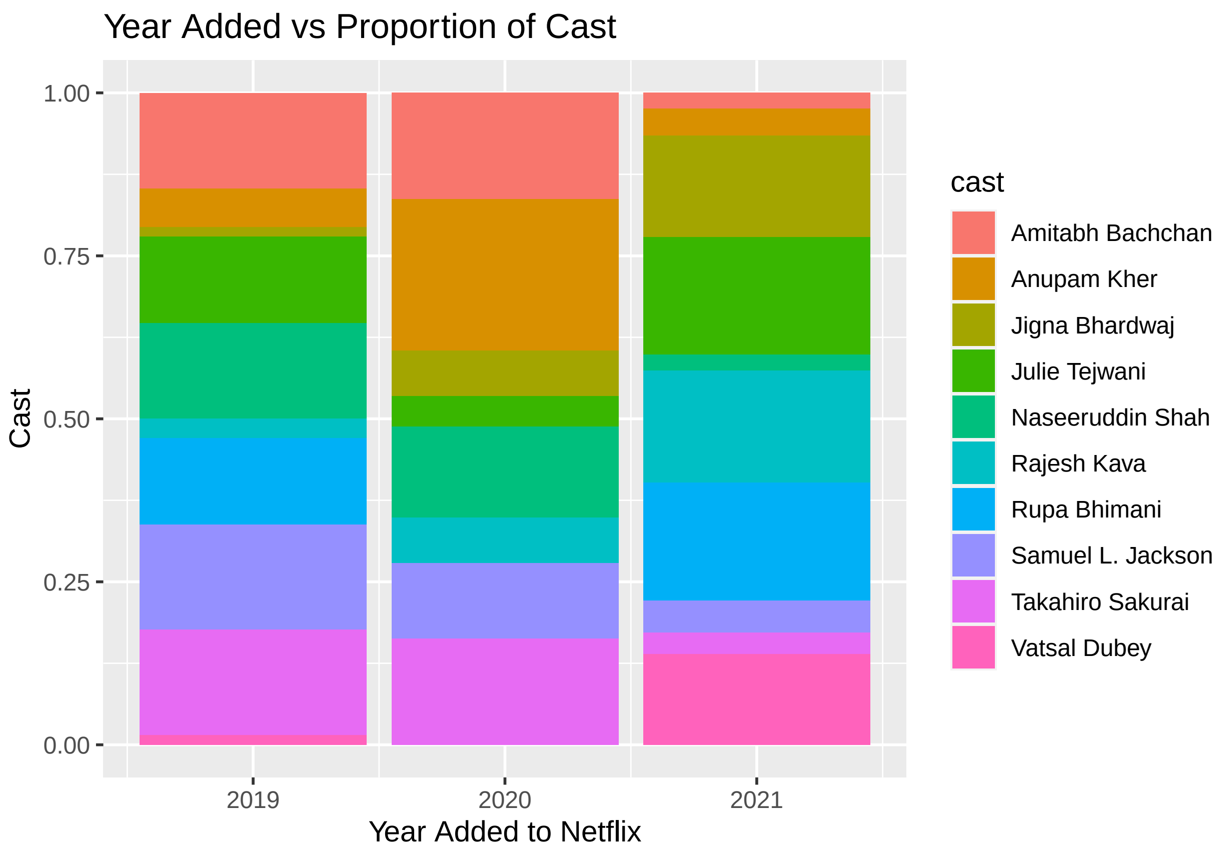
```
#top 10 directors in US
d <- list("Martin Scorsese", "Steven Spielberg", "Robert Rodriguez", "Clint Eastwood", "Don Michael Pau

top_10_d_US <-US_director_eda %>%
  filter(director %in% d)

ggplot(data = top_10_d_US, mapping = aes(x = year_added, fill = director)) + geom_bar(position = "fill"
```



```
#6 actors overtime
cast_eda <- netflix %>%
        filter(!is.na(cast),
               year_added %in% c(2019,2020,2021)) %>%
  separate_rows(cast, sep = ",")
cast_eda$cast <- trimws(cast_eda$cast)


cast_eda %>%
  group_by(cast) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 26,418 x 2
## # Groups:   cast [26,418]
##    cast                  n
##    <chr>             <int>
##  1 Julie Tejwani        33
##  2 Rupa Bhimani         31
##  3 Rajesh Kava          26
##  4 Jigna Bhardwaj       23
##  5 Samuel L. Jackson    22
##  6 Takahiro Sakurai     22
##  7 Amitabh Bachchan     20
##  8 Anupam Kher          19
##  9 Naseeruddin Shah     19
## 10 Vatsal Dubey         18
## # ... with 26,408 more rows
```

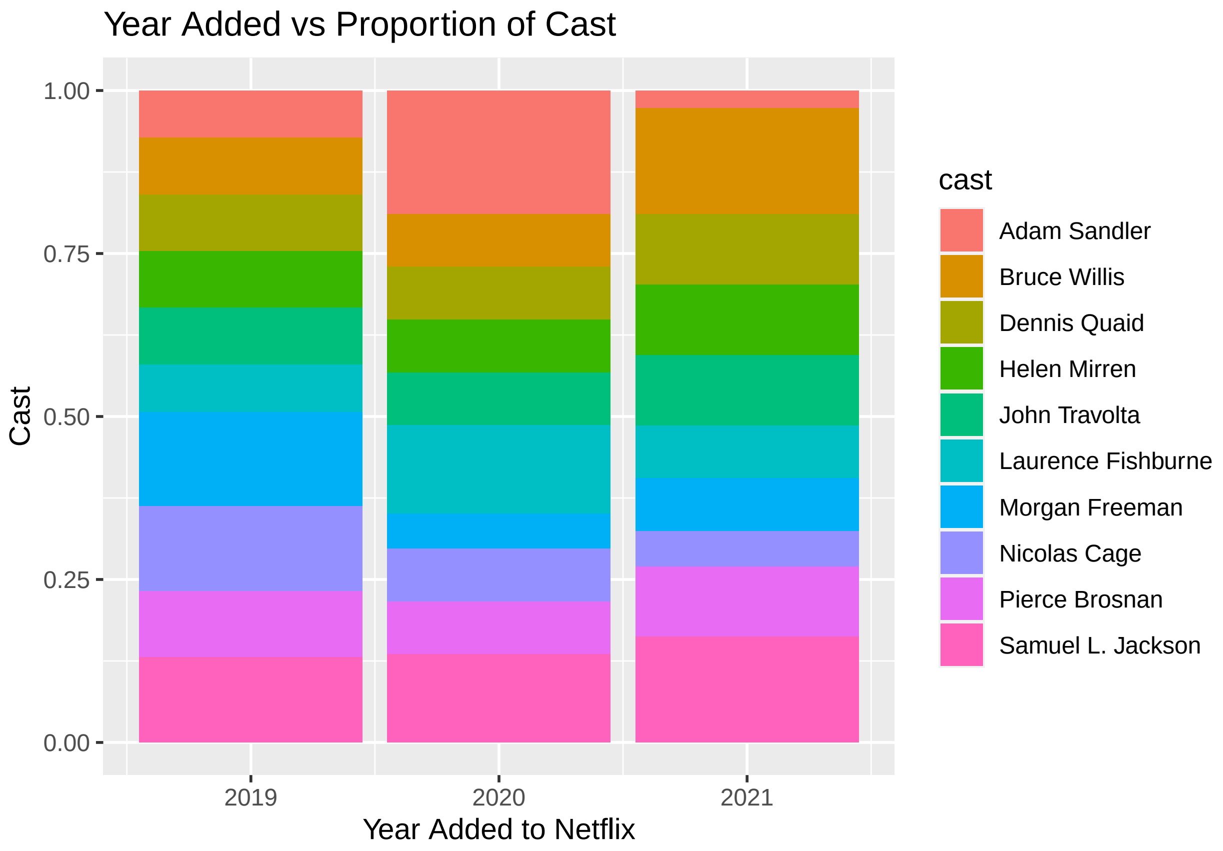
```
c <- list("Julie Tejwani", "Rupa Bhimani", "Rajesh Kava", "Jigna Bhardwaj", "Samuel L. Jackson","Takahi

top_10_cast <-cast_eda %>%
  filter(cast %in% c)

ggplot(data = top_10_cast, mapping = aes(x = year_added, fill = cast)) + geom_bar(position = "fill")+ la
```



```
US_cast_eda <- country_eda %>%
        filter(!is.na(cast),
               country == "United States",
               year_added %in% c(2019,2020,2021)) %>%
  separate_rows(cast, sep = ",")
US_cast_eda$cast <- trimws(US_cast_eda$cast)


US_cast_eda %>%
  group_by(cast) %>%
  count() %>%
  arrange(desc(n))
```

```
## # A tibble: 11,338 x 2
## # Groups:   cast [11,338]
##    cast                  n
##    <chr>             <int>
##  1 Samuel L. Jackson    20
##  2 Bruce Willis         15
##  3 Morgan Freeman       15
##  4 Nicolas Cage         14
##  5 Pierce Brosnan       14
##  6 Adam Sandler         13
##  7 Dennis Quaid         13
##  8 Helen Mirren         13
##  9 John Travolta        13
## 10 Laurence Fishburne    13
## # ... with 11,328 more rows
```

```
c1 <- list("Samuel L. Jackson", "Bruce Willis", "Morgan Freeman", "Nicolas Cage", "Pierce Brosnan", "Ada

top_10_UScast <-US_cast_eda %>%
  filter(cast %in% c1)

ggplot(data = top_10_UScast, mapping = aes(x = year_added, fill = cast)) + geom_bar(position = "fill")+
```



Possible Useful Variables

Shows: - country - date_added - release_year - duration (# of seasons) *dependent (measure of success) - rating - listed_in (genre) Most popular: - Drama - Documentary - Comedy

*most shows did not have a director listed

Movies: - director - country *dependent (measure of success) - date_added - release_year - rating - duration (# of minutes) - listed_in (genre) Most Popular: - Comedy - Animation - Drama

https://www.whats-on-netflix.com/news/what-movie-tv-genres-perform-well-in-the-netflix-top-10s/

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

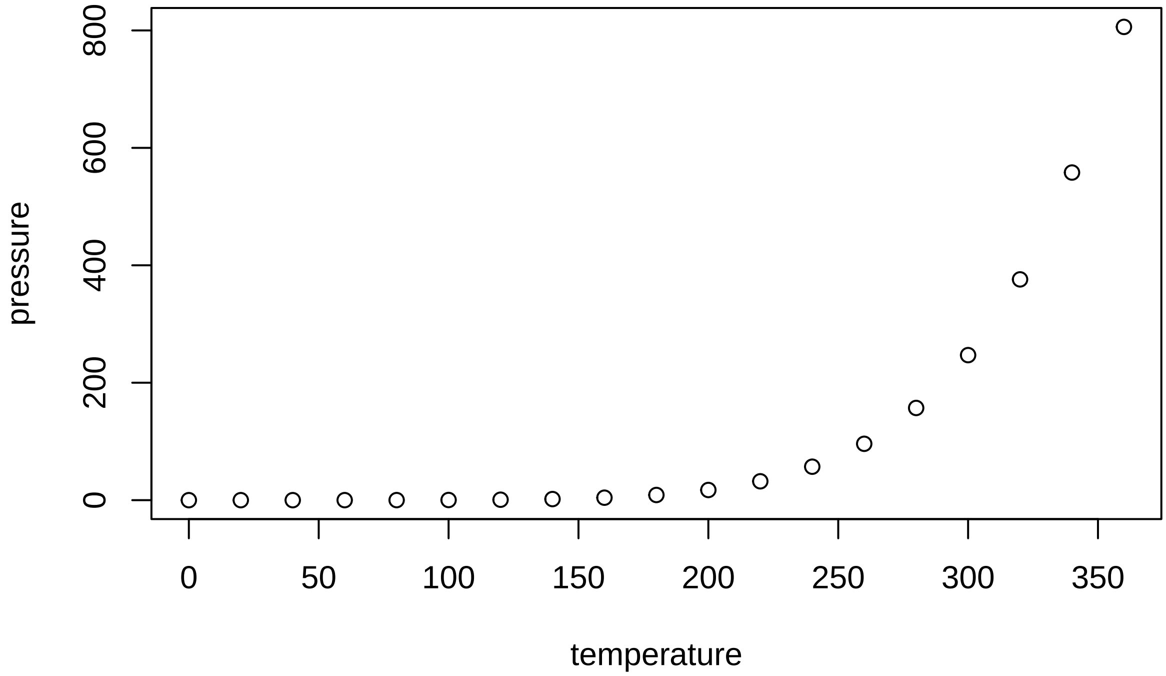
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed           dist       
##  Min.   : 4.0   Min.   :  2.00  
##  1st Qu.:12.0   1st Qu.: 26.00  
##  Median :15.0   Median : 36.00  
##  Mean   :15.4   Mean   : 42.98  
##  3rd Qu.:19.0   3rd Qu.: 56.00  
##  Max.   :25.0   Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.