

```
# uploading the libraries
library(dplyr)
library(tidyverse)
library(ggplot2)
library(lubridate)
library(tibble)
library(plotly)
library(gridExtra)
library(scales)
library(crayon)
webshot::install_phantomjs()
```

Introduction

Netflix has grown to be one of the top source of entertainment. The platform has recorded increase of 23 percent in paid memberships during the final quarters of 2019. The projects goal's was to see growth of the Netflix streaming library since 2008 up to early of 2021.

Data

The data set was given by kaggle and can be retrieved from: <https://www.kaggle.com/shivamb/netflix-shows>

```
# loads that data set
data<- read.csv("Eideted Netlfix sheet.csv")
```

Summary of the Data Set

The overall data set has 11 variables/columns and 7787 objects/rows.

```
# shows first 5 rows of the data set
head(data)
```

```
##   show_id   type title      director
## 1      s1 TV Show   3%
## 2      s2  Movie  7:19 Jorge Michel Grau
## 3      s3  Movie 23:59 Gilbert Chan
## 4      s4  Movie    9      Shane Acker
## 5      s5  Movie   21      Robert Luketic
## 6      s6 TV Show   46      Serdar Akar
##
## 1 João Miguel, Bianca Comparato, Michel Gomes, Rodolfo Valente, Vaneza Oliveira, Rafael Lozano, Vivian
## 2                                     Demián Bichir, Mariana
## 3                                     Tedd Chan, Stella Chung, Henley H
## 4                                     Elijah Wood, John C. Reilly, Jennifer Connelly, Christopher Plummer, C
## 5                                     Jim Sturgess, Kevin Spacey, Kate Bosworth, Aaron Yoo, Liza Lapira, Jacob Pitts, Laure
## 6                                     Erdal Beşikçioğlu, Yasemin Allen, Melis Birkan, Saygınoğlu Soysal, Berkan Akal, M
##
##           country      date_added release_year rating duration
## 1      Brazil  August 14, 2020      2020 TV-MA 4 Seasons
## 2      Mexico December 23, 2016      2016 TV-MA    93 min
## 3 Singapore December 20, 2018      2011    R    78 min
## 4 United States November 16, 2017      2009 PG-13    80 min
```

```
## 5 United States    January 1, 2020      2008 PG-13   123 min
## 6      Turkey      July 1, 2017       2016 TV-MA   1 Season
##                                listed_in
## 1  International TV Shows, TV Dramas, TV Sci-Fi & Fantasy
## 2                                Dramas, International Movies
## 3                                Horror Movies, International Movies
## 4 Action & Adventure, Independent Movies, Sci-Fi & Fantasy
## 5                                Dramas
## 6      International TV Shows, TV Dramas, TV Mysteries
```

```
# outputs the structure of the data set
str(data)
```

```
## 'data.frame':    7787 obs. of  11 variables:
## $ show_id      : chr  "s1" "s2" "s3" "s4" ...
## $ type         : chr  "TV Show" "Movie" "Movie" "Movie" ...
## $ title        : chr  "3%" "7:19" "23:59" "9" ...
## $ director     : chr  "" "Jorge Michel Grau" "Gilbert Chan" "Shane Acker" ...
## $ cast         : chr  "João Miguel, Bianca Comparato, Michel Gomes, Rodolfo Valente, Vaneza Oliveira" ...
## $ country      : chr  "Brazil" "Mexico" "Singapore" "United States" ...
## $ date_added   : chr  "August 14, 2020" "December 23, 2016" "December 20, 2018" "November 16, 2017" ...
## $ release_year : int   2020 2016 2011 2009 2008 2016 2019 1997 2019 2008 ...
## $ rating       : chr  "TV-MA" "TV-MA" "R" "PG-13" ...
## $ duration     : chr  "4 Seasons" "93 min" "78 min" "80 min" ...
## $ listed_in    : chr  "International TV Shows, TV Dramas, TV Sci-Fi & Fantasy" "Dramas, International Movies" ...
```

```
# outputs the summary of the data set
summary(data)
```

```
##      show_id          type          title          director
## Length:7787      Length:7787      Length:7787      Length:7787
## Class :character  Class :character  Class :character  Class :character
## Mode :character   Mode :character   Mode :character   Mode :character
##
##
##
##      cast          country      date_added      release_year
## Length:7787      Length:7787      Length:7787      Min.   :1925
## Class :character  Class :character  Class :character  1st Qu.:2013
## Mode :character   Mode :character   Mode :character   Median :2017
##                                     Mean    :2014
##                                     3rd Qu.:2018
##                                     Max.    :2021
##
##      rating      duration      listed_in
## Length:7787      Length:7787      Length:7787
## Class :character  Class :character  Class :character
## Mode :character   Mode :character   Mode :character
##
##
##
```

Overall Data Clean-up for the Data set: 1) Changed the format of the date_added column 2) Turned all the blank values into NA's 3) Used a fuction to get the mode of country, rating and date added. Used the mode values to replace the values that were NA's 4)Dropped columns director and cast 5)Categorized the rating to an age group

```
##      show_id      type title      director
## 1      s1 TV Show      3%      <NA>
## 2      s2      Movie      7:19 Jorge Michel Grau
## 3      s3      Movie      23:59      Gilbert Chan
## 4      s4      Movie      9      Shane Acker
## 5      s5      Movie      21      Robert Luketic
## 6      s6 TV Show      46      Serdar Akar
##
## 1 João Miguel, Bianca Comparato, Michel Gomes, Rodolfo Valente, Vaneza Oliveira, Rafael Lozano, Viv
## 2      Demiân Bichir, M
## 3      Tedd Chan, Stella Chung, Henley Hi
## 4      Elijah Wood, John C. Reilly, Jennifer Connelly, Christopher Plummer, C
## 5      Jim Sturgess, Kevin Spacey, Kate Bosworth, Aaron Yoo, Liza Lapira, Jacob Pitts, Lauren
## 6      Erdal BeÅvikÅSioÅYlu, Yasemin Allen, Melis Birkan, SaygÄn Soysal, Berkan Åzal, M
##      country      date_added release_year rating      duration
## 1      Brazil      August 14, 2020      2020      TV-MA 4 Seasons
## 2      Mexico      December 23, 2016      2016      TV-MA      93 min
## 3      Singapore      December 20, 2018      2011      R      78 min
## 4 United States      November 16, 2017      2009      PG-13      80 min
## 5 United States      January 1, 2020      2008      PG-13      123 min
## 6      Turkey      July 1, 2017      2016      TV-MA      1 Season
##      listed_in
## 1      International TV Shows, TV Dramas, TV Sci-Fi & Fantasy
## 2      Dramas, International Movies
## 3      Horror Movies, International Movies
## 4 Action & Adventure, Independent Movies, Sci-Fi & Fantasy
## 5      Dramas
## 6      International TV Shows, TV Dramas, TV Mysteries
```

```
# shows the number of NA's values in each columns
colSums(is.na(data_new2))
```

3

```

# gets mode for rating, data_added, and country and replaces NA's with the mode
getmode <- function(v) {
  uniqv <- unique(v)
  uniqv[which.max(tabulate(match(v,uniqv)))]
}
rating_mode<-getmode(data_new2$rating)
data_added_mode <- getmode(data_new2$date_added)
country_mode <-getmode(data_new2$country)

data_new2$rating[which(is.na(data_new2$rating))] <- rating_mode

data_new2$date_added[which(is.na(data_new2$date_added))]<- data_added_mode

data_new2$country[which(is.na(data_new2$country))] <- country_mode

# drops rows director and cast columns
data_new2 <- data_new2 %>% subset(select=-c(director,cast))

# shows total of NA's in each columns
colSums(is.na(data_new2))

```

```

##      show_id      type      title      country  date_added release_year
##          0          0          0          0          0          0
##      rating    duration  listed_in
##          0          0          0

```

```

# categorizes the rating to an age group
data_new2<-data_new2 %>% mutate(target_age=case_when(rating == 'TV-PG' ~ 'Older Kids', rating=='TV-MA' ~

```

Percentage of TV and Movie in Netflix

Here the next following code chunks are to make the visualization for “Percentage of TV and Movie in Netflix”. We start with creating a two new data frame one for Movie and TV.

```

# creates new data frame for Movie and TV
movie_df<- data_new2 %>% filter(type=='Movie')
head(movie_df)

```

```

##  show_id  type  title      country  date_added  release_year  rating  duration
##  1      s2 Movie  7:19      Mexico 2016-12-23      2016    TV-MA    93 min
##  2      s3 Movie 23:59      Singapore 2018-12-20      2011      R      78 min
##  3      s4 Movie   9 United States 2017-11-16      2009    PG-13    80 min
##  4      s5 Movie  21 United States 2020-01-01      2008    PG-13   123 min
##  5      s7 Movie 122      Egypt 2020-06-01      2019    TV-MA    95 min
##  6      s8 Movie 187 United States 2019-11-01      1997      R    119 min
##
##                                listed_in target_age
##  1                      Dramas, International Movies    Adults
##  2          Horror Movies, International Movies    Adults
##  3 Action & Adventure, Independent Movies, Sci-Fi & Fantasy    Teens
##  4                                Dramas    Teens
##  5          Horror Movies, International Movies    Adults
##  6                                Dramas    Adults

```

```
tv_df<- data_new2 %>% filter(type=='TV Show')
head(tv_df)
```

```
##   show_id   type                title                country
## 1      s1 TV Show                3%                Brazil
## 2      s6 TV Show                46                Turkey
## 3     s12 TV Show            1983 Poland, United States
## 4     s13 TV Show            1994                Mexico
## 5     s17 TV Show            9-Feb            United States
## 6    s25 TV Show â\200<SAINT SEIYA: Knights of the Zodiac          Japan
##   date_added release_year rating  duration
## 1 2020-08-14          2020  TV-MA  4 Seasons
## 2 2017-07-01          2016  TV-MA   1 Season
## 3 2018-11-30          2018  TV-MA   1 Season
## 4 2019-05-17          2019  TV-MA   1 Season
## 5 2019-03-20          2018  TV-14   1 Season
## 6 2020-01-23          2020  TV-14   2 Seasons
##                                     listed_in target_age
## 1 International TV Shows, TV Dramas, TV Sci-Fi & Fantasy  Adults
## 2      International TV Shows, TV Dramas, TV Mysteries  Adults
## 3      Crime TV Shows, International TV Shows, TV Dramas  Adults
## 4      Crime TV Shows, Docuseries, International TV Shows  Adults
## 5                  International TV Shows, TV Dramas    Teens
## 6                  Anime Series, International TV Shows    Teens
```

Using the new table I then added the total count of Movie and TV. Along with the total percentage of Movie and TV

```
# gets the total percentage and total count of Movies and Tv's
type_df <- data_new2 %>% group_by(type) %>% summarize(counts=n(),percentage=n()/nrow(data_new2))
type_df
```

```
## # A tibble: 2 x 3
##   type      counts percentage
##   <chr>      <int>      <dbl>
## 1 Movie        5377        0.691
## 2 TV Show       2410        0.309
```

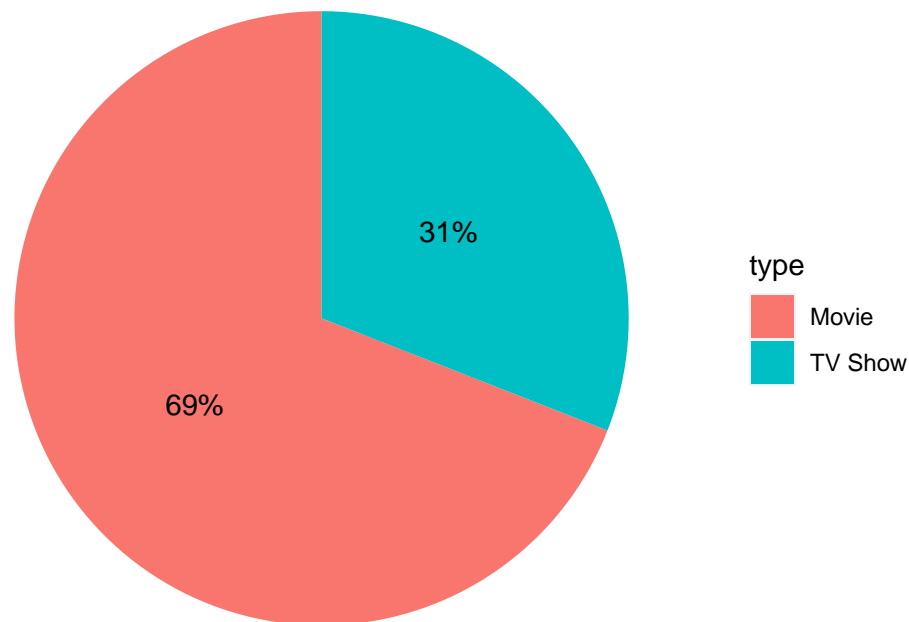
With type_df created I then added information to a pie chart called type_df_pie. Here we can see Movie is 69% of Netflix's streaming library while TV is 31%

```
# outputs a pie charts of the the total percentage and total count of Movies and Tv's
type_df_pie <- type_df %>% ggplot(aes(x="", y=percentage,fill=type))+
  geom_col(type="black")+
  coord_polar("y",start=0)+
  geom_text(aes(label=paste0(round(percentage*100,"%")),position = position_stack(vjust = 0.5))+ theme
```

```
## Warning: Ignoring unknown parameters: type
```

```
type_df_pie
```

Percentage of TV and Movie in Netflix



Amount of Netflix Content By Top 10 Countries

This visualization goes over the number Netflix content for the Top 10 Countries. We see from the visualization that many of the other countries have around the same amount of content, while the United States is the outlier with the most amount of content.

```
k<-strsplit(data_new2$country,split = ",") # splits values country columns
```

```
netds_countries<- data.frame(type = rep(data_new2$type, sapply(k, length)), country = unlist(k))  
head(netds_countries) # creates a data frame
```

```
##      type      country  
## 1 TV Show      Brazil  
## 2  Movie      Mexico  
## 3  Movie    Singapore  
## 4  Movie United States  
## 5  Movie United States  
## 6 TV Show      Turkey
```

```
netds_countries$country<- as.character(netds_countries$country) # converts country as character
```

```
amount_by_country <- netds_countries %>% group_by(country,type)%>% summarise(count=n()) # gets the total
```

'summarise()' has grouped output by 'country'. You can override using the '.groups' argument.

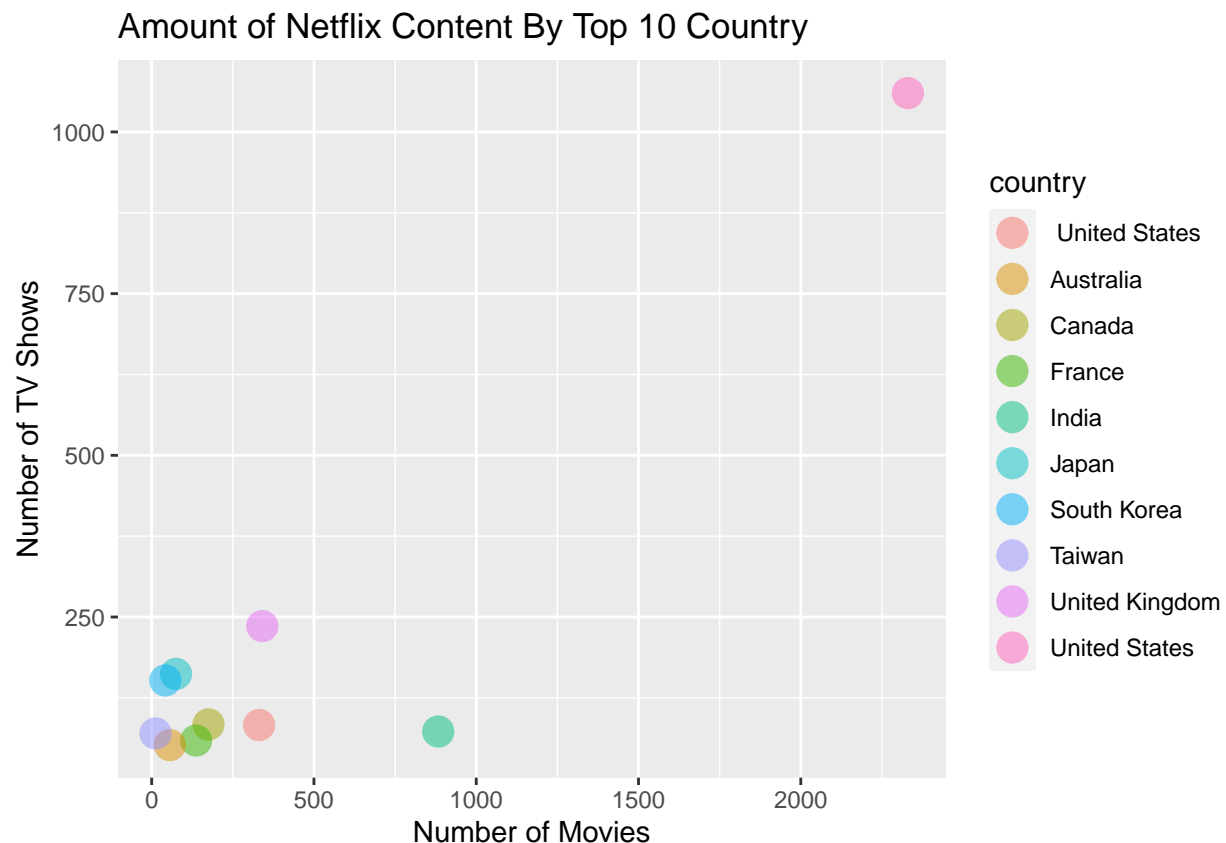
```
u <- reshape(data=data.frame(amount_by_country),idvar="country", # creates a data frame
              v.names = "count",
              timevar = "type",
              direction="wide") %>% arrange(desc(count.Movie)) %>%
              top_n(10)
```

Selecting by count.TV Show

```
names(u)[2] <- "Number_of_Movies" # changes column names
names(u)[3] <- "Number_of_TV_Shows"
```

```
u <- u[order(desc(u$Number_of_Movies + u$Number_of_TV_Shows)),] # orders the values in descending order
```

```
figure000 <- ggplot(u, aes(Number_of_Movies, Number_of_TV_Shows, colour=country))+ # outputs the geom_
  geom_point(size=5,alpha=0.5)+
  xlab("Number of Movies") + ylab("Number of TV Shows")+
  ggtitle("Amount of Netflix Content By Top 10 Country")
figure000 # outputs visualization
```



Amount of Netflix Content By Time

The visualization goes over the amount of Netflix content by time. We can see there was peak in both TV and Movie around 2019 but there was decrease during 2020.

```
f <- data_new2$title # converts the title columns into tibble format
f <-tibble(f)
data_new2$title <- f

# extracts the year from data_added column
data_new2$new_date <- year(data_new2$date_added)

# creates a new data frame with type and new_date
df_by_date <- data_new2$title %>%
  group_by(data_new2$new_date, data_new2$type) %>%
  na.omit(data_new2$new_date) %>%
  summarise(added_content_num = n())
```

'summarise()' has grouped output by 'data_new2\$new_date'. You can override using the '.groups' argument

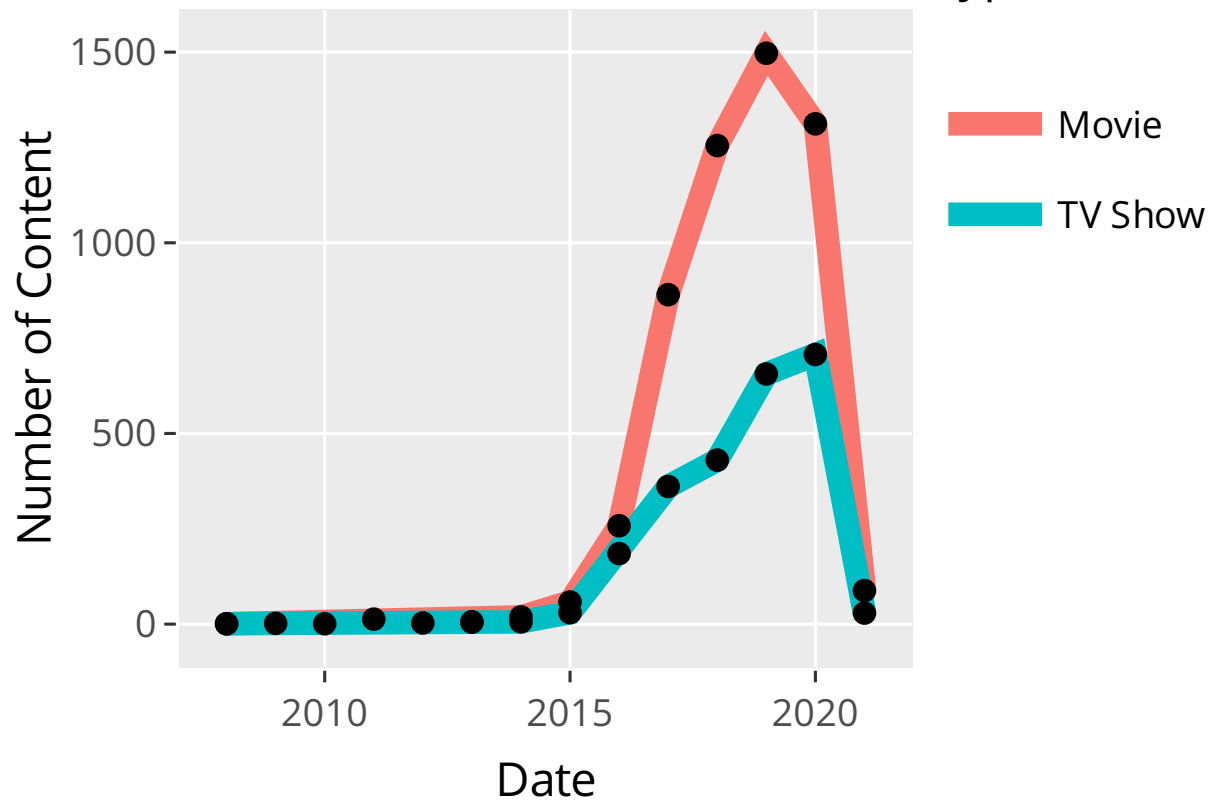
```
head(df_by_date)
```

```
## # A tibble: 6 x 3
## # Groups:   data_new2$new_date [5]
##   'data_new2$new_date' 'data_new2$type' added_content_num
##               <dbl> <chr>                <int>
## 1             2008 Movie                1
## 2             2008 TV Show                1
## 3             2009 Movie                2
## 4             2010 Movie                1
## 5             2011 Movie               13
## 6             2012 Movie                3
```

```
# type,new_date and added_content_num into variables
Type<- df_by_date$data_new2$type`
Date <- df_by_date$data_new2$new_date`
Content_Number <- df_by_date$added_content_num
par(mfrow= c(1,2))
# visualization of "Amount of Netflix Content By Time"
g1<- ggplot(df_by_date, aes(Date, Content_Number))+
  geom_line(aes(colour = Type),size=2)+
  geom_point() +
  xlab("Date") +
  ylab("Number of Content")+
  ggtitle("Amount of Netflix Content By Time")

ggplotly(g1, dynamicTicks = T)
```


Amount of Netflix Content By Time
Type



Amount of Content by Rating

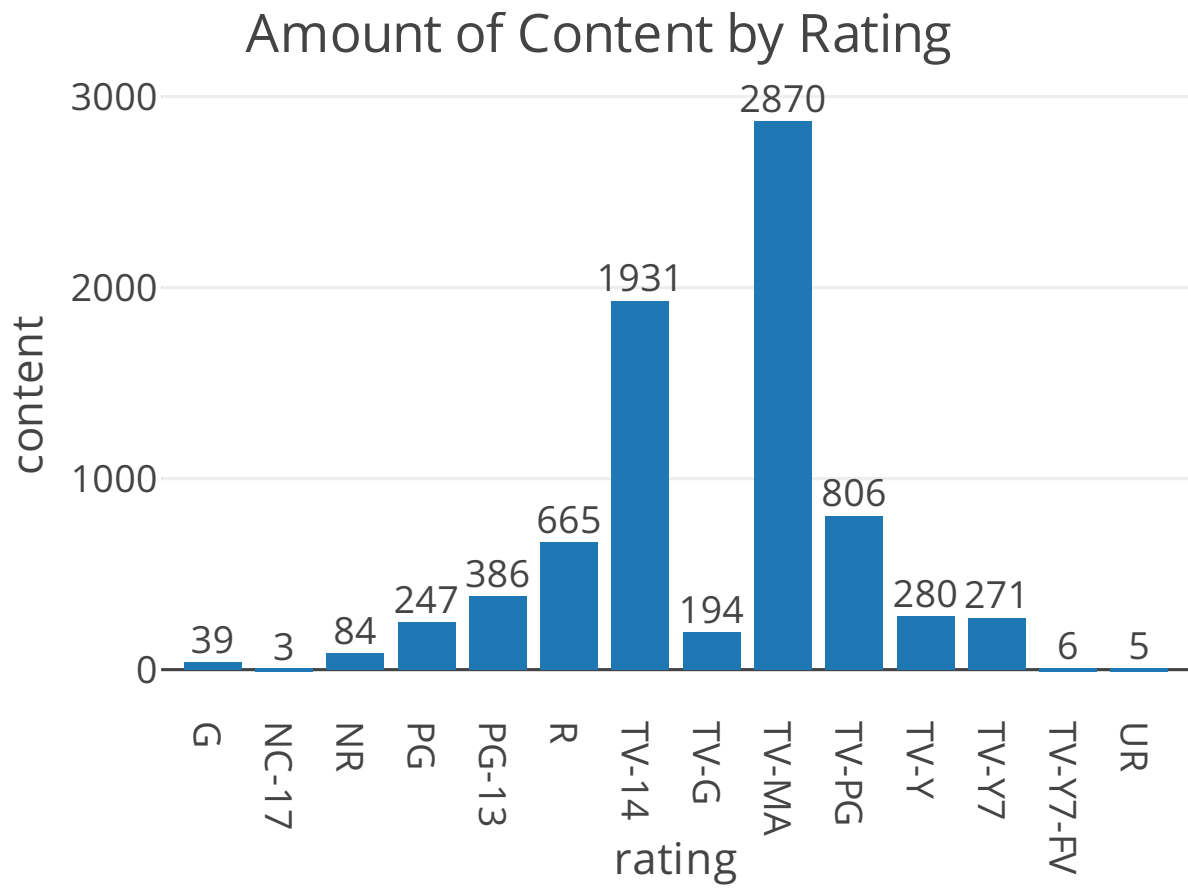
The visualization shows the amount of content by rating. When we see the bar chart we see the rating of TV-MA has the most with the amount of 2870.

```
# group_by's rating the total count of each
data_new3 <- data_new2$title %>% group_by(data_new2$rating) %>% summarise(content_num=n())

# renames columns to rating and content
names(data_new3) [1] <- "rating"
names(data_new3) [2] <- "content"

# visualization of 'Amount of Content by Rating'
figure_2 <- plot_ly(data_new3, x = ~rating ,y = ~ content, type = 'bar')
figure_2 <- figure_2 %>% layout(title = 'Amount of Content by Rating') %>% add_text(
  text = ~content,
  textposition = "top middle",
  cliponaxis = FALSE,showlegend = FALSE)

figure_2
```



Amount of Content By Rating (Movie vs. TV Show)

The next visualization goes more in depth with the a stacked bar chart to separate the amount of content by rating for Movie vs. TV Show.

```
# group_by's rating and type with the total count
data2<- data_new2$title %>% group_by(data_new2$rating,data_new2$type) %>% summarise(content_num=n())

## 'summarise()' has grouped output by 'data_new2$rating'. You can override using the '.groups' argument

#renames columns to rating. type, and content
names(data2) [1] <- "rating"
names(data2) [2] <- "type"
names(data2) [3] <- "content"

head(data2)

## # A tibble: 6 x 3
## # Groups:   rating [5]
##   rating type    content
##   <chr>  <chr>    <int>
## 1 G      Movie      39
## 2 NC-17  Movie       3
## 3 NR      Movie     79
## 4 NR      TV Show     5
## 5 PG      Movie    247
## 6 PG-13   Movie   386

# create new data frame
newdata2 <- reshape(data=data.frame(data2),idvar="rating",
                     v.names = "content",
                     timevar = "type",
                     direction="wide")

# changes columns names and and if NA prints 0
names(newdata2) [2] <- "Movie"
names(newdata2) [3] <- "TV Show"
newdata2$`TV Show`[is.na(newdata2$`TV Show`)] <- print(0)

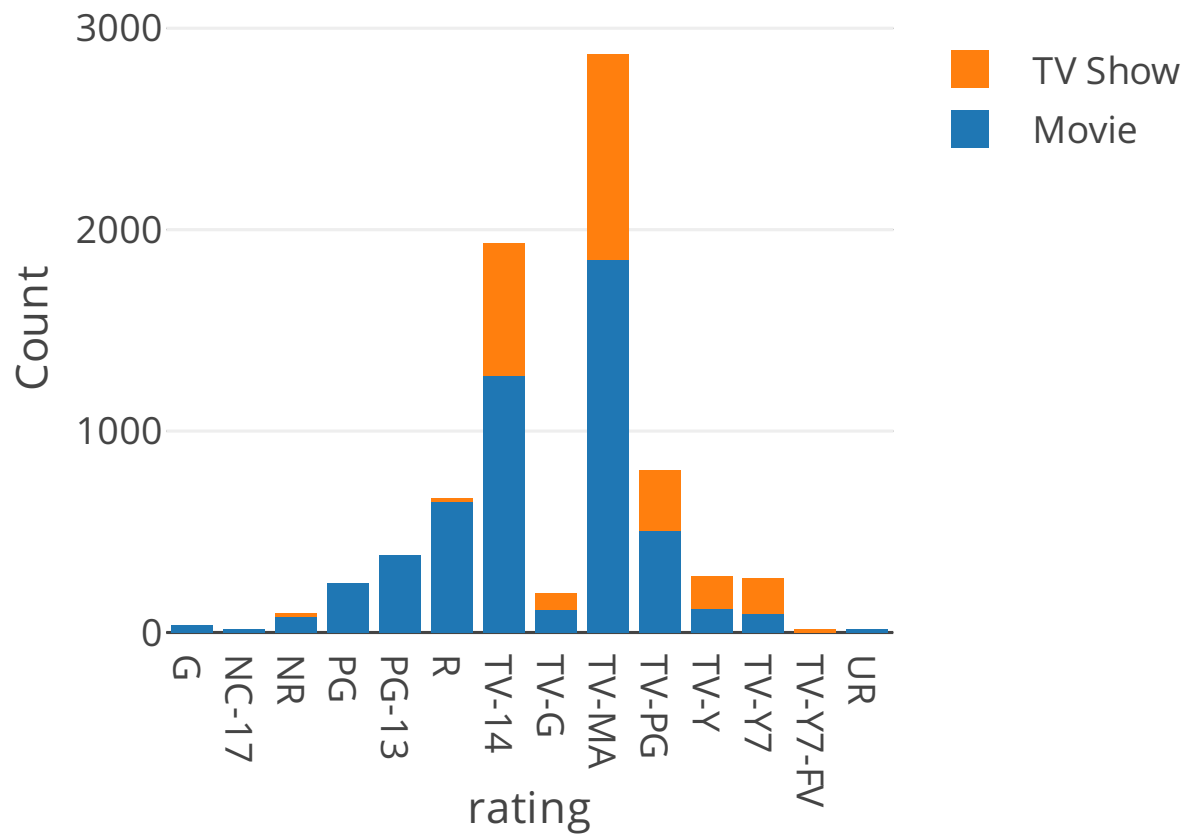
## [1] 0

# puts rating, Movie, and TV show into variables
rating <- newdata2$rating
Movie <- newdata2$Movie
Tv_Show <- newdata2$`TV Show`

# visualization for Amount of Content By Rating (Movie vs. TV Show)
figure3 <- plot_ly(newdata2, x = ~rating, y = ~Movie, type = 'bar', name = 'Movie')
figure3 <- figure3 %>% add_trace(y = ~Tv_Show, name = 'TV Show')
figure3 <- figure3 %>% layout(yaxis = list(title = 'Count'),
                             barmode = 'stack',
                             title=("Amount of Content By Rating (Movie vs. TV Show)"))
```

figure3

Amount of Content By Rating (Movie vs. TV Show)



Top 20 Genres On Netflix The visualization show the top 20 genres on Netflix. When see the genres on the bar graph we can see the international movie as the most amount of content of Netflix.

```
# converts listed_in to character
data_new2$listed_in<- as.character(data_new2$listed_in)

# splits listed_in values
t20 <- strsplit(data_new2$listed_in, split = ", ")

# creates data frame and converts to character
count_list_in <- data.frame(type=rep(data_new2$type,sapply(t20,length)),listed_in=unlist(t20))
count_list_in$listed_in <- as.character(gsub(",", "",count_list_in$listed_in))

# gets total count of each listed_in values
df_count_listed_in <- count_list_in %>%
  group_by(listed_in) %>%
  summarise(count = n()) %>%
  top_n(20)
```

Selecting by count

```
head(df_count_listed_in)
```

```
## # A tibble: 6 x 2
##   listed_in      count
##   <chr>         <int>
## 1 Action & Adventure    721
## 2 British TV Shows    232
## 3 Children & Family Movies  532
## 4 Comedies            1471
## 5 Crime TV Shows      427
## 6 Documentaries       786
```

```
# Visualization of "20 Top Genres On Netflix"
figure4 <- plot_ly(df_count_listed_in, x= ~listed_in, y= ~df_count_listed_in$count, type = "bar")
figure4 <- figure4 %>% layout(xaxis=list(categoryorder = "array",categoryarray =df_count_listed_in$list
  text = ~count,
  textposition = "top middle",
  cliponaxis = FALSE,showlegend = FALSE)
```

```
## Warning: Specifying width/height in layout() is now deprecated.
## Please specify in ggplotly() or plot_ly()
```

```
figure4
```

