MOVIE

ANWAR ABU ALHUSSEIN

Required packages

HEART FAILURE CLINICAL

PROJECT LINEAR REGRESSION

###* Loading Packages ###* ————————-

```
suppressPackageStartupMessages(library(tidyverse))
suppressPackageStartupMessages(library(caret))
suppressPackageStartupMessages(library(ggcorrplot))
suppressPackageStartupMessages(library(Metrics))
suppressPackageStartupMessages(library(corrplot))
suppressPackageStartupMessages(library(bannerCommenter))
suppressPackageStartupMessages(library(psych))
suppressPackageStartupMessages(library(WVPlots))
suppressPackageStartupMessages(library(PerformanceAnalytics))
suppressPackageStartupMessages(library(car))
suppressPackageStartupMessages(library(dplyr))
suppressPackageStartupMessages(library(ggplot2))
suppressPackageStartupMessages(library(outliers))
suppressPackageStartupMessages(library(broom))
suppressPackageStartupMessages(library(equatiomatic))
```

##==
Reading in the data == ##==

```
download.file("https://raw.githubusercontent.com/ABUALHUSSEIN/test/main/data/movie.csv",
              destfile = "movie.csv")
```

##source(destfile) ##ls() #=======================================

```
setwd("C:/Users/WAFA/Desktop")
movie <- read.csv("movie.csv",header=TRUE)
View(movie)
```

Missing Data. We are looking for the missing values

```
is.na(movie)
```

```
##        Movie  Year Sequel Sentiment Genre Ratings Gross Budget Screens Views
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## [168,] FALSE    FALSE    FALSE              FALSE
## [169,] FALSE    FALSE    FALSE              FALSE
## [170,] FALSE    FALSE    FALSE              FALSE
## [171,] FALSE    FALSE    FALSE              FALSE
## [172,] FALSE    FALSE    FALSE              FALSE
## [173,] FALSE    FALSE    FALSE              FALSE
## [174,] FALSE    FALSE    FALSE              FALSE
## [175,] FALSE    FALSE    FALSE              FALSE
## [176,] FALSE    FALSE    FALSE              FALSE
## [177,] FALSE    FALSE    FALSE              FALSE
## [178,] FALSE    FALSE    FALSE              FALSE
## [179,] FALSE    FALSE    FALSE              FALSE
## [180,] FALSE    FALSE    FALSE              FALSE
## [181,] FALSE    FALSE    FALSE              FALSE
## [182,] FALSE    FALSE    FALSE              FALSE
## [183,] FALSE    FALSE    FALSE              FALSE
## [184,] FALSE    FALSE    FALSE              FALSE
## [185,] FALSE    FALSE    FALSE              FALSE
## [186,] FALSE    FALSE    FALSE              FALSE
## [187,] FALSE    FALSE    FALSE              FALSE
## [188,] FALSE    FALSE    FALSE              FALSE
## [189,] FALSE    FALSE    FALSE              FALSE
## [190,] FALSE    FALSE    FALSE              FALSE
## [191,] FALSE    FALSE    FALSE              FALSE
## [192,] FALSE    FALSE    FALSE              FALSE
## [193,] FALSE    FALSE    FALSE              FALSE
## [194,] FALSE    FALSE    FALSE              FALSE
## [195,] FALSE    FALSE    FALSE              FALSE
## [196,] FALSE    FALSE    FALSE              FALSE
## [197,] FALSE    FALSE    FALSE              FALSE
## [198,] FALSE    FALSE    FALSE              FALSE
## [199,] FALSE    FALSE    FALSE              FALSE
## [200,] FALSE    FALSE    FALSE              FALSE
## [201,] FALSE    FALSE    FALSE              FALSE
## [202,] FALSE    FALSE    FALSE              FALSE
```

```
## [203,] FALSE    FALSE    FALSE              FALSE
## [204,] FALSE    FALSE    FALSE              FALSE
## [205,] FALSE    FALSE    FALSE              FALSE
## [206,] FALSE    FALSE    FALSE              FALSE
## [207,] FALSE    FALSE    FALSE              FALSE
## [208,] FALSE    FALSE    FALSE              FALSE
## [209,] FALSE    FALSE    FALSE              FALSE
## [210,] FALSE    FALSE    FALSE              FALSE
## [211,] FALSE    FALSE    FALSE              FALSE
## [212,] FALSE    FALSE    FALSE              FALSE
## [213,] FALSE    FALSE    FALSE              FALSE
## [214,] FALSE    FALSE    FALSE              FALSE
## [215,] FALSE    FALSE    FALSE              FALSE
## [216,] FALSE    FALSE    FALSE              FALSE
## [217,] FALSE    FALSE    FALSE              FALSE
## [218,] FALSE    FALSE    FALSE               TRUE
## [219,] FALSE    FALSE    FALSE               TRUE
## [220,] FALSE    FALSE    FALSE               TRUE
## [221,] FALSE    FALSE    FALSE               TRUE
## [222,] FALSE    FALSE    FALSE               TRUE
## [223,] FALSE    FALSE    FALSE               TRUE
## [224,] FALSE    FALSE    FALSE               TRUE
## [225,] FALSE    FALSE    FALSE               TRUE
## [226,] FALSE    FALSE    FALSE               TRUE
## [227,] FALSE    FALSE    FALSE               TRUE
## [228,] FALSE    FALSE    FALSE               TRUE
## [229,] FALSE    FALSE    FALSE               TRUE
## [230,] FALSE    FALSE    FALSE               TRUE
## [231,] FALSE    FALSE    FALSE               TRUE
## [232,]  TRUE     TRUE     TRUE               TRUE
```

```
sum(is.na(movie))
```

```
## [1] 59
```

Check the column names again,

```
colnames(movie)
```

```
##  [1] "Movie"               "Year"                "Sequel"
##  [4] "Sentiment"           "Genre"               "Ratings"
##  [7] "Gross"               "Budget"              "Screens"
## [10] "Views"               "Likes"               "Dislikes"
## [13] "Comments"            "Aggregate.Followers"
```

The names contain dots, I will substitute each dot with underscore "_"

```
var_names <- gsub("\\.", "_", colnames(movie))
var_names[14] <- "Aggregate_Followers"
var_names[14]
```

```
## [1] "Aggregate_Followers"
```

```
colnames(movie) <- var_names
colnames(movie)
```

```
##  [1] "Movie"               "Year"                "Sequel"
##  [4] "Sentiment"           "Genre"               "Ratings"
##  [7] "Gross"               "Budget"              "Screens"
## [10] "Views"               "Likes"               "Dislikes"
## [13] "Comments"            "Aggregate_Followers"
```

```
View(movie)
```

Gives the name of columns that do not have data ——————————

```
list_na <- colnames(movie)[ apply(movie, 2, anyNA) ]
list_na
```

```
##  [1] "Year"                "Sequel"              "Sentiment"
##  [4] "Genre"               "Ratings"             "Gross"
##  [7] "Budget"              "Screens"             "Views"
## [10] "Likes"               "Dislikes"            "Comments"
## [13] "Aggregate_Followers"
```

##==========
Now we need to compute of the mean with the argument na.rm = TRUE. #This argument is compulsory because the columns have missing data, # and this tells R to ignore them.
##==========

Create mean ——————————————————————————-

```
average_missing <- apply(movie[,colnames(movie) %in% list_na],
                         2,
                         mean,
                         na.rm =  TRUE)
average_missing
```

```
##               Year             Sequel          Sentiment              Genre
##       2.014294e+03       1.359307e+00       2.809524e+00       5.359307e+00
##            Ratings              Gross             Budget            Screens
##       6.441558e+00       6.806603e+07       4.792173e+07       2.209244e+03
##              Views              Likes           Dislikes           Comments
##       3.712851e+06       1.273254e+04       6.790519e+02       1.825701e+03
## Aggregate_Followers
##       3.038193e+06
```

Replace the NA Values ——————————————————————

##==========
##The verb mutate from the dplyr library is useful in creating a new variable. #We don't necessarily want to change the original column so we can create a new variable without the NA. #mutate is easy to use, # we just choose a variable name and define how to create this variable
##==========

```
movie_replace <- movie %>%
  mutate(replace_mean_Year  = ifelse(is.na(Year), average_missing[1], Year),
         replace_mean_Sequel = ifelse(is.na(Sequel), average_missing[2], Sequel),
         replace_mean_Sentiment = ifelse(is.na(Sentiment), average_missing[3], Sentiment),
         replace_mean_Genre = ifelse(is.na(Genre), average_missing[4], Genre),
         replace_mean_Ratings  = ifelse(is.na(Ratings), average_missing[5],Ratings),
         replace_mean_Gross  = ifelse(is.na(Gross), average_missing[6], Gross),
         replace_mean_Budget  = ifelse(is.na(Budget), average_missing[7], Budget),
         replace_mean_Screens  = ifelse(is.na(Screens), average_missing[8], Screens),
         replace_mean_Views  = ifelse(is.na(Views), average_missing[9], Views),
         replace_mean_Likes  = ifelse(is.na(Likes), average_missing[10],Likes),
         replace_mean_Dislikes = ifelse(is.na(Dislikes), average_missing[11],Dislikes),
         replace_mean_Comments = ifelse(is.na(Comments), average_missing[12], Comments),
         replace_mean_Aggregate_Followers  = ifelse(is.na(Aggregate_Followers),
                                                    average_missing[13], Aggregate_Followers))
```

Perform the replacement

```
sum(is.na(movie_replace$Year))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Sequel))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Sentiment))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Genre))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Ratings))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Gross))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$ Budget))
```

```
## [1] 2
```

```
sum(is.na(movie_replace$ Screens))
```

```
## [1] 11
```

```
sum(is.na(movie_replace$ Views))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Likes))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Dislikes))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Comments))
```

```
## [1] 1
```

```
sum(is.na(movie_replace$Aggregate_Followers))
```

```
## [1] 36
```

```
sum(is.na(movie_replace$replace_mean_Aggregate_Followers))
```

```
## [1] 0
```

My new Data.

Here I created a new frame for the data that do not contain na values

Select all columns that do not contain na values from a data by names ———

```
new_movie<- movie_replace %>%
  select(replace_mean_Year, replace_mean_Sequel,replace_mean_Sentiment,replace_mean_Genre,replace_mean_
      replace_mean_Gross,replace_mean_Budget,replace_mean_Screens,replace_mean_Views,
   replace_mean_Likes,replace_mean_Dislikes,replace_mean_Comments,replace_mean_Aggregate_Followers)
view(new_movie)
```

Table 1: new_movie

replace	replace_	Value	Sequel	replace_	replace_	Genre	Gross	Budget	Screens	Views	Likes	Dislikes	Comments	Aggregate_
2014	1	0	8	6.3	9.13e+08	4000000	45.000	3280543	4632	425	636	1120000		
2014	2	2	1	7.1	1.92e+08	5000000	3306.000	583289	3465	61	186	12350000		
2014	1	0	1	6.2	3.07e+07	2800000	2872.000	304861	328	34	47	483000		
2014	2	0	1	6.3	1.06e+08	3100000	3470.000	452917	2429	132	590	568000		
2014	2	0	8	4.7	1.73e+07	3500000	2310.000	3145573	12163	610	1082	1923800		
2014	1	0	3	4.6	2.90e+04	500000	2209.244	91137	112	7	1	310000		
2014	1	0	8	6.1	4.26e+07	4000000	3158.000	3013011	9595	419	1020	8153000		
2014	1	2	1	7.1	5.75e+06	2000000	818.000	1854103	2207	197	593	130655		
2014	1	3	10	6.5	2.60e+07	2800000	2714.000	2213659	2210	419	382	125646		
2014	1	0	8	6.1	4.86e+07	1250000	2253.000	5218079	11709	532	770	21697300		
2014	1	4	1	7.3	3.50e+08	5880000	3555.000	3927600	13143	573	3134	24300		
2014	1	0	8	5.7	1.52e+07	3000000	1762.000	519327	963	94	70	386400		
2014	1	0	15	5.4	8.43e+07	6500000	3185.000	19032902	38810	4382	4392	19420105		
2014	1	0	8	5.2	8.59e+07	6500000	3116.000	930006	5150	707	1484	5130800		
2014	3	0	3	4.4	8.30e+05	500000	65.000	595194	85	36	39	15112		
2014	1	2	8	6.6	1.18e+04	600000	18.000	3915978	6983	247	460	253000		
2014	1	0	8	6.3	7.23e+04	500000	25.000	1391527	2479	146	182	1658900		
2014	1	0	3	6.9	1.46e+07	7000000	31.000	1828235	7633	235	685	116100		
2014	1	29	12	7.9	2.22e+08	16500000	3761.000	4700023	14163	538	1293	199800		
2014	1	-1	3	6.6	2.16e+07	9000000	1823.000	1348142	4404	307	1033	888000		
2014	1	-2	8	6.5	4.63e+07	4000000	3555.000	7977747	18690	1940	2214	2417000		

replace	replace_1	replace_2	replace_3	replace_4	replace_5	replace_6	replace_7	replace_8	replace_9	replace_10	replace_11	replace_12	replace_13	replace_14	Aggregate_
2014	1	9	3	8.0	2.54e+07	4000000	771.000	1671367	4572	207	741	105000			
2014	1	0	1	5.7	2.03e+07	28000000	2647.000	2088644	6633	255	1235	3209000			
2014	1	2	3	6.5	1.87e+06	7000000	482.000	4398243	9202	454	1150	4769100			
2014	1	3	3	7.0	9.84e+03	1000000	2209.244	7128	1	0	0	2182			
2014	1	3	9	6.7	6.37e+06	3000000	382.000	2902492	9522	558	2296	3038193			
2014	2	5	1	7.8	2.60e+08	17000000	3938.000	760262	2918	66	837	8030000			
2014	2	-4	1	7.7	2.09e+08	17000000	3967.000	1735700	6772	187	889	114000			
2014	1	0	10	6.2	3.05e+07	30000000	97.000	465219	1348	72	162	744600			
2014	1	0	15	4.0	1.58e+07	7000000	2544.000	1844690	3728	581	729	9536			
2014	1	-4	2	6.8	1.51e+08	85000000	3936.000	463866	3400	152	987	1030000			
2014	2	-1	3	6.4	4.20e+07	36000000	3376.000	384448	1230	129	228	276750			
2014	1	0	1	6.3	5.59e+07	70000000	2209.244	9149892	26427	1342	5278	395500			
2014	1	0	3	6.8	2.88e+07	27000000	2781.000	522630	1248	153	227	147000			
2014	3	0	8	5.8	8.62e+07	35000000	3154.000	3287020	7698	446	1122	17064000			
2014	1	0	2	5.8	3.89e+07	13000000	3230.000	1488038	2571	553	643	88586			
2014	1	0	1	7.9	1.00e+08	17800000	3490.000	1556827	29251	1730	6439	5610000			
2014	1	1	3	6.3	2.34e+07	20000000	2800.000	1185072	24226	1343	2577	21500			
2014	1	0	1	5.7	8.69e+04	1500000	2209.244	735551	636	98	92	1060000			
2014	1	6	9	7.1	1.21e+06	24000000	66.000	6685088	8369	467	1580	13720000			
2014	1	3	1	7.6	8.57e+07	68000000	3313.000	2276605	3946	331	1286	1888000			
2014	1	-4	3	6.4	1.02e+05	1850000	8.000	1034480	6490	181	374	66600			
2014	1	0	3	5.0	6.08e+07	20000000	780.000	456564	1706	413	890	412000			
2014	1	0	10	6.1	1.04e+05	1000000	3.000	99427	47	10	12	3038193			
2014	1	2	1	6.5	2.01e+08	16000000	3952.000	1156609	2968	112	547	1870000			
2014	1	-11	3	8.2	1.68e+08	61000000	3014.000	396010	1390	58	342	20640000			
2014	1	0	1	8.1	3.33e+08	17000000	4080.000	1313548	8567	269	1285	2750000			
2014	1	0	8	5.6	3.01e+04	70000	9.000	924347	1406	107	132	5887700			
2014	1	-9	3	5.8	9.14e+07	12000000	2417.000	175017	461	34	133	3038193			
2014	1	-2	1	6.1	7.27e+07	10000000	3595.000	9324678	15479	1130	3925	9414000			
2014	2	-1	8	6.3	5.44e+07	42000000	93.000	1292235	5284	124	362	1650000			
2014	2	3	12	7.9	1.77e+08	145000000	4253.000	11472161	22779	862	2863	671000			
2014	1	14	3	6.8	5.05e+07	11000000	1272.000	9222933	41728	924	3609	1800000			
2014	1	0	3	6.1	2.75e+05	3932780	6.000	8210	6	0	0	58900			
2014	1	1	8	6.7	8.09e+06	20000000	645.000	1167941	2651	82	797	3038193			
2014	1	2	2	8.7	1.88e+08	16500000	3561.000	5421705	16635	751	4316	1865000			
2014	1	0	1	5.8	4.76e+07	50000000	3434.000	1270410	8886	569	3058	301000			
2014	1	-4	2	6.0	1.28e+08	50000000	2440.000	817242	4391	112	346	4720000			
2014	1	-9	15	6.9	1.47e+07	2000000	4.000	4877	6	1	1	3038193			
2014	5	4	1	6.2	5.05e+07	60000000	3387.000	3320754	4322	347	1105	147000			
2014	1	10	9	6.9	4.70e+07	40000000	2905.000	1438350	4028	133	543	27323			
2014	1	0	1	7.2	4.30e+07	20000000	2589.000	4846645	14722	405	2732	3038193			
2014	1	0	9	7.0	2.45e+06	5000000	374.000	3650720	6917	234	1119	1045200			
2014	1	0	1	7.8	1.28e+08	81000000	3204.000	2767873	46023	944	6946	5407000			
2014	1	-2	1	6.5	1.29e+05	2500000	28.000	289922	143	17	9	3038193			
2014	1	0	1	3.1	1.40e+07	16000000	1825.000	5611593	11187	2111	7595	116800			
2014	1	-5	8	6.5	8.24e+07	17000000	1534.000	4450824	7315	546	909	2356000			
2014	1	0	8	5.7	8.30e+03	2400000	2209.244	1222921	5553	193	335	1463000			
2014	1	0	7	4.8	2.47e+03	300000	3.000	30529	18	4	2	18100			
2014	1	1	1	6.4	1.27e+08	40000000	3173.000	1142964	2346	167	311	3038193			
2014	1	0	1	7.0	2.41e+08	18000000	3948.000	557012	3528	135	464	5633			
2014	1	0	8	6.3	3.48e+05	15000000	66.000	177465	595	39	71	644000			
2014	1	27	9	7.1	3.64e+07	25000000	3019.000	1470438	4314	168	511	130000			

replace	replace_1	replace_2	replace_3	replace_4	replace_5	replace_6	replace_7	replace_8	replace_9	replace_10	replace_11	replace_12	replace_13	Aggregate_
2014	1	0	8	5.4	1.04e+07	5000000	1044.000	667852	469	38	44	919000		
2014	1	13	12	6.9	1.12e+08	14500000	3934.000	277848	890	45	88	8839043		
2014	3	-1	2	6.5	5.12e+07	5000000	3194.000	3037329	6696	564	1061	9850000		
2014	1	0	8	6.3	4.01e+06	500000	255.000	446576	659	50	45	3038193		
2014	1	5	1	6.6	4.36e+07	6600000	3115.000	1451649	7342	533	2305	2594000		
2014	1	2	8	6.4	1.50e+08	18000000	3279.000	2554307	8722	298	693	14240000		
2014	3	2	2	6.3	1.14e+08	12700000	22.000	377925	13535	362	1221	6480000		
2014	1	-1	10	7.9	3.23e+07	8500000	2766.000	6082510	12522	543	2170	3038193		
2014	1	0	10	5.6	5.25e+07	13200000	2130.000	608230	895	118	387	1550500		
2014	1	6	1	5.9	1.01e+08	12500000	3567.000	13661095	41254	3812	18077	1810000		
2014	1	0	1	7.0	9.14e+07	5000000	3090.000	367551	700	19	37	648786		
2014	1	0	8	5.2	3.57e+04	600000	2209.244	5403836	187162	3145	24919	2720000		
2014	1	-4	15	4.4	5.08e+07	5000000	2061.000	11724815	30208	2150	4926	130000		
2014	1	14	8	7.2	7.61e+07	5500000	3303.000	2028767	3829	500	665	124000		
2014	1	0	15	5.0	3.25e+07	5000000	2867.000	105480	352	45	85	11444		
2014	1	8	12	6.8	8.33e+07	13200000	32.000	1223790	2934	123	226	47200		
2014	3	0	12	5.9	5.92e+07	5000000	3826.000	2117798	2124	485	626	3603000		
2014	1	0	1	5.6	2.32e+07	10000000	2658.000	355563	1568	106	267	370000		
2014	1	0	1	6.1	1.34e+08	25000000	2663.000	8429023	27484	977	2195	21586000		
2014	2	4	12	6.4	1.32e+08	10300000	3948.000	3849768	9783	704	1151	154400		
2014	1	7	1	6.2	5.86e+07	10000000	3372.000	3305047	11733	1077	4319	250000		
2014	1	1	9	6.6	3.09e+06	500000	371.000	909596	2214	186	632	3038193		
2014	1	0	8	7.5	3.74e+04	5000000	2209.244	827239	3221	89	432	217000		
2014	1	17	1	5.7	1.05e+07	3500000	2486.000	3466458	6096	411	977	3678000		
2014	1	-5	9	7.5	5.21e+07	20000000	2179.000	3743181	16782	565	4973	9224		
2014	1	0	3	5.4	1.76e+05	3000000	59.000	3726728	6221	405	1074	3038193		
2014	1	0	1	5.5	1.72e+07	9500000	2875.000	23360	36	5	5	804300		
2014	1	0	8	5.1	3.85e+07	4000000	3062.000	2757667	3030	418	251	4521000		
2014	2	0	10	6.6	1.38e+07	7500000	2894.000	5223362	18770	627	2796	8620000		
2014	1	2	9	5.5	5.97e+07	22000000	3260.000	943306	3006	325	1401	3185900		
2014	1	0	3	5.8	2.02e+04	600000	27.000	2426078	9230	184	373	33500		
2014	1	20	8	7.3	4.41e+07	13000000	18.000	4176181	9463	310	885	269849		
2014	3	6	1	6.1	8.93e+07	18000000	21.000	1544390	2975	136	380	216000		
2014	1	0	8	4.8	8.45e+07	20000000	3465.000	3429055	7682	675	727	727000		
2014	1	0	1	5.9	1.91e+08	12500000	3845.000	7908038	27312	3439	8533	1260000		
2014	1	0	8	6.1	2.60e+07	8000000	2809.000	6132551	14539	653	846	11783000		
2014	1	3	2	7.1	2.59e+06	9500000	1586.000	134353	280	43	308	3038193		
2014	2	6	1	6.8	2.03e+08	20000000	4324.000	3868577	4996	233	864	4520000		
2014	1	-3	3	6.9	9.24e+05	2000000	147.000	6501107	14139	890	2928	3038193		
2014	1	3	3	6.6	2.68e+07	26000000	8.000	5546710	15351	535	1271	48231		
2014	1	9	12	7.3	5.02e+07	5000000	12.000	5165441	17476	871	3229	10364000		
2014	1	5	12	6.8	5.08e+07	6000000	3464.000	2545852	3964	378	554	1280000		
2014	1	0	7	4.8	4.24e+03	7000000	2209.244	330363	406	52	92	3038193		
2014	1	-1	10	7.1	1.07e+07	12600000	809.000	2897407	5953	153	569	3038193		
2014	1	0	1	7.2	1.02e+08	5500000	3236.000	7075635	15858	574	1966	1800000		
2014	3	0	1	6.1	3.93e+07	9000000	90.000	14453673	33092	1336	5005	1480000		
2014	1	7	3	7.9	1.25e+08	12000000	3173.000	32626778	370552	4752	38363	4240000		
2014	1	0	8	7.0	2.82e+06	47921734	32.000	10747	4	1	1	818000		
2014	1	-2	10	6.1	3.36e+07	25000000	103.000	4790221	4740	454	773	2740000		
2014	1	6	3	6.5	4.51e+07	25000000	702.000	523457	2187	149	565	184100		
2014	1	10	3	7.4	2.72e+06	20000000	461.000	1303646	3306	211	564	759800		
2014	6	3	2	7.5	2.55e+08	25000000	3875.000	3554189	14152	262	1782	2613000		

replace	replace_1	replace_2	replace_3	replace_4	replace_5	replace_6	replace_7	replace_8	replace_9	replace_10	replace_11	replace_12	replace_13	replace_14	Aggregate_
2014	1	2	3	6.6	2.43e+06	16000000	4.000	26528	58	1	8	25748			
2014	1	11	8	7.3	5.42e+07	22000000	2023.000	24809	277	12	52	20700			
2014	3	2	2	6.8	3.37e+08	125000000	4151.000	3305417	14684	332	1176	31030000			
2014	1	0	3	5.0	2.82e+06	12000000	2209.244	309610	729	97	113	275873			
2014	1	9	9	8.1	9.11e+07	74000000	747.000	3047849	11748	253	1237	3038193			
2014	1	0	1	6.7	6.11e+06	44000000	78.000	623119	13331	1265	3430	6619435			
2014	1	2	10	7.5	4.71e+07	50000000	3003.000	1325872	4829	104	378	5563500			
2014	1	0	1	4.2	1.88e+07	70000000	2104.000	797229	1606	630	456	1174806			
2014	1	-2	12	7.8	2.58e+08	60000000	3775.000	4139159	1847	105	289	4690000			
2014	1	2	6	6.3	5.98e+06	64000000	1841.000	3381071	238	27	43	14586			
2014	1	2	1	6.8	1.02e+08	34000000	173.000	3156436	18124	213	2753	4734000			
2014	1	0	3	6.1	7.80e+07	70000000	3083.000	10649	21	1	0	3849			
2014	1	0	1	6.3	2.50e+07	15000000	2776.000	1935432	3089	155	567	148000			
2014	1	0	12	5.8	6.42e+07	42000000	3427.000	2269032	3046	546	554	3038193			
2014	1	2	8	7.1	5.12e+05	100000	20.000	1223891	1309	148	239	226000			
2014	1	-1	8	6.0	8.39e+07	40000000	3205.000	8479994	35071	2233	3479	2731000			
2014	2	-3	1	6.5	7.15e+07	90000000	2805.000	1142295	3895	193	882	49424			
2014	1	0	15	4.7	2.75e+06	6500000	685.000	4092871	8781	794	2046	420000			
2014	1	0	10	6.4	1.11e+06	12250000	5.000	702	1	0	1	9842			
2014	1	0	3	6.8	5.00e+05	31712311	2.000	253631	170	11	58	3038193			
2014	1	8	9	7.8	3.59e+07	15000000	15.000	3226251	18240	261	2104	8204			
2014	1	7	3	7.2	4.19e+06	22500000	320.000	3281842	4968	445	2099	1899400			
2014	2	-6	3	4.9	2.65e+07	70000000	2602.000	698	16	1	9	3086			
2014	2	0	8	5.7	6.52e+07	24000000	2225.000	2063089	5858	336	346	24388000			
2014	1	0	3	6.3	2.30e+07	10000000	3455.000	14141583	36646	1459	6811	5987			
2014	4	0	1	5.8	2.45e+08	210000000	4233.000	1709091	791	362	230	2814900			
2014	1	0	8	5.4	1.82e+06	2800000	449.000	473100	670	104	380	180100			
2014	1	0	9	7.2	1.16e+08	65000000	3131.000	6637551	19833	815	3403	269000			
2014	1	10	10	6.8	3.32e+06	6000000	291.000	476747	2079	166	232	2536000			
2014	1	0	3	6.6	3.01e+07	15000000	794.000	2805666	477	56	82	585000			
2014	1	2	3	8.6	1.31e+07	3300000	42.000	7750223	17541	631	2760	858000			
2014	1	11	3	6.9	2.80e+05	24878202	2.000	166612	571	36	70	3038193			
2014	1	0	2	7.2	3.79e+07	15000000	1061.000	5976092	9343	649	1333	781200			
2014	1	7	8	8.2	3.08e+06	3300000	4.000	697105	1023	39	429	3038193			
2014	1	0	3	6.2	2.25e+04	6000000	2965.000	719976	1312	76	189	1810000			
2014	1	0	8	6.7	3.59e+06	6000000	68.000	865690	1375	79	67	1818778			
2014	7	3	1	8.1	2.34e+08	200000000	3996.000	2285	9	0	1	10280000			
2014	1	0	9	6.2	7.17e+05	12000000	2.000	550734	894	44	77	168700			
2015	4	1	1	7.3	6.43e+08	150000000	4274.000	9143740	34746	1074	5107	6180000			
2015	2	21	1	7.8	4.58e+08	250000000	4276.000	10366624	31552	989	3843	10070000			
2015	7	-17	1	7.4	3.50e+08	190000000	4004.000	59056	330	8	39	11890000			
2015	1	2	12	8.6	3.45e+08	175000000	3946.000	1438926	4632	262	496	232000			
2015	2	-2	1	6.6	3.25e+07	74000000	4301.000	1341909	1607	764	48	250000			
2015	2	1	8	6.7	1.83e+08	290000000	3473.000	9214467	39824	998	1987	7336000			
2015	5	3	3	7.8	1.71e+08	150000000	3956.000	8748596	20352	649	1842	6605000			
2015	1	-2	8	6.7	1.77e+08	135000000	3708.000	10341782	24413	1675	3426	5070000			
2015	1	9	3	4.2	1.66e+08	40000000	3646.000	3185956	49900	13960	9119	946000			
2015	2	0	8	6.1	1.62e+08	74000000	3641.000	5536822	29411	1840	1281	184000			
2015	1	3	1	6.4	1.54e+08	110000000	3777.000	12632836	36508	2210	7559	9737600			
2015	4	-4	1	8.3	1.53e+08	150000000	3702.000	2732371	13030	497	1774	768700			
2015	1	5	9	8.3	1.35e+08	28000000	2757.000	8489700	12607	237	1560	55618			
2015	2	-6	2	6.4	1.30e+08	110000000	3875.000	2834800	5664	5746	66	4240000			

replace	replace_1	Year_replace	Sequel_replace	Sentiment_replace	Gross_replace	Runtime_replace	Budget_replace	Screens_replace	Views_replace	Likes_replace	Dislikes_replace	Comments_replace	Aggregate_
2015	1	0	1	7.3	1.10e+08	65000000	3711.000	6649290	20750	750	1666	265000	
2015	1	1	12	6.7	1.05e+08	85000000	3158.000	9511288	19903	2581	2955	2014000	
2015	1	1	12	6.6	9.32e+07	19000000	3972.000	999867	4212	66	250	1198000	
2015	1	6	8	6.1	9.04e+07	40000000	3175.000	10078326	26565	1418	2395	2939000	
2015	5	1	1	6.8	8.94e+07	15500000	3758.000	84870	265	13	63	3877901	
2015	2	5	8	6.6	8.13e+07	68000000	3442.000	6711914	29903	984	1767	10988000	
2015	2	15	1	4.3	7.10e+07	30000000	90.000	2389347	8809	935	892	1618000	
2015	1	10	1	5.6	7.10e+07	88000000	3723.000	5340100	26134	2007	3717	2466000	
2015	2	7	8	6.2	6.59e+07	14800000	3355.000	5128288	18475	858	1579	8392000	
2015	1	-8	8	6.7	6.45e+07	23000000	3003.000	4826940	10521	478	755	2284000	
2015	5	13	2	6.3	5.49e+07	31000000	3411.000	2554327	10062	464	871	2347000	
2015	1	20	1	4.0	5.27e+07	12000000	3995.000	7560211	24168	3524	7139	881000	
2015	1	-5	15	5.0	4.74e+07	35000000	3240.000	3651828	13998	969	2205	1066	
2015	1	0	1	5.5	4.74e+07	17600000	3181.000	3920842	10535	565	1668	7460000	
2015	1	11	3	7.3	4.25e+07	25000000	2991.000	1103670	50002	1005	3525	776000	
2015	1	0	1	7.0	4.19e+07	20000000	2855.000	2947239	19201	625	1842	2113	
2015	1	19	3	7.2	3.74e+07	34000000	3366.000	2393017	13291	369	584	324925	
2015	1	11	1	7.6	3.61e+07	5000000	1648.000	2513544	6970	270	1105	1655987	
2015	1	16	6	4.6	3.54e+07	4000000	2602.000	5588384	15144	913	1499	4599000	
2015	1	2	1	5.0	3.45e+07	35000000	3003.000	6964819	26601	1111	1293	1630000	
2015	1	2	8	6.6	3.40e+07	8500000	2575.000	1279289	56001	2083	4102	6714000	
2015	1	19	10	7.4	3.33e+07	11000000	258.000	6495	82	3	7	675000	
2015	1	6	3	7.1	3.24e+07	30000000	3108.000	1841293	5879	314	634	788000	

```
sum(is.na(new_movie))
```

```
## [1] 0
```

Select all columns that do not contain na values from a data by index ———

```
new_movie<- movie_replace  %>% select(15:27)
sum(is.na(new_movie))
```

```
## [1] 0
```

Other Ways of replace the NA Values ——————————————

```
new_movie<- data.frame(
  sapply(
    movie,
    function(x) ifelse(is.na(x),
                       mean(x, na.rm = TRUE),
                       x)))
new_movie
```

```
##                                  Movie             Year           Sequel
## 1                             13 Sins             2014                1
## 2                       22 Jump Street             2014                2
## 3                       3 Days to Kill             2014                1
```

```
## 4                    300: Rise of an Empire 2014 2
## 5                         A Haunted House 2 2014 2
## 6                           A Long Way Off 2014 1
## 7          A Million Ways to Die in the West 2014 1
## 8                       A Most Violent Year 2014 1
## 9                 A Walk Among the Tombstones 2014 1
## 10                          About Last Night 2014 1
## 11                           American Sniper 2014 1
## 12                           And So It Goes 2014 1
## 13                                Annabelle 2014 1
## 14                                    Annie 2014 1
## 15         Atlas Shrugged: Who Is John Galt? 2014 3
## 16                                 Barefoot 2014 1
## 17           Better Living Through Chemistry 2014 1
## 18                        Beyond the Lights 2014 1
## 19                                Big Hero 6 2014 1
## 20                           Black or White 2014 1
## 21                                  Blended 2014 1
## 22                                  Boyhood 2014 1
## 23                           Brick Mansions 2014 1
## 24                                     Cake 2014 1
## 25                                Camp X-Ray 2014 1
## 26                                Cantinflas 2014 1
## 27       Captain America: The Winter Soldier 2014 2
## 28            Dawn of the Planet of the Apes 2014 2
## 29                     Deliver Us from Evil 2014 1
## 30                                Devil's Due 2014 1
## 31                                  Divergent 2014 1
## 32                           Dolphin Tale 2 2014 2
## 33                           Dracula Untold 2014 1
## 34                                Draft Day 2014 1
## 35                         Dumb and Dumber To 2014 3
## 36                              Earth to Echo 2014 1
## 37                          Edge of Tomorrow 2014 1
## 38                              Endless Love 2014 1
## 39                             Falcon Rising 2014 1
## 40                                Foxcatcher 2014 1
## 41                                      Fury 2014 1
## 42                          God Help the Girl 2014 1
## 43                             God's Not Dead 2014 1
## 44                               God's Pocket 2014 1
## 45                                   Godzilla 2014 1
## 46                                  Gone Girl 2014 1
## 47                     Guardians of the Galaxy 2014 1
## 48                             Happy Christmas 2014 1
## 49                          Heaven Is for Real 2014 1
## 50                                   Hercules 2014 1
## 51                          Horrible Bosses 2 2014 2
## 52                 How to Train Your Dragon 2 2014 2
## 53                                 If I Stay 2014 1
## 54                 In the Name of My Daughter 2014 1
## 55                               Inherent Vice 2014 1
## 56                                Interstellar 2014 1
## 57                           Into the Storm 2014 1
```

```
## 58                            Into the Woods  2014   1
## 59                                It Follows  2014   1
## 60                  Jack Ryan: Shadow Recruit  2014   5
## 61                               Jersey Boys  2014   1
## 62                                  John Wick  2014   1
## 63                          Kill the Messenger  2014   1
## 64                Kingsman: The Secret Service  2014   1
## 65                               Kung Fu Jungle  2014   1
## 66                                  Left Behind  2014   1
## 67                                Let's Be Cops  2014   1
## 68                               Life After Beth  2014   1
## 69                                     Locker 13  2014   1
## 70                                          Lucy  2014   1
## 71                                   Maleficent  2014   1
## 72                             Maps to the Stars  2014   1
## 73                            Million Dollar Arm  2014   1
## 74                               Moms' Night Out  2014   1
## 75                        Mr. Peabody & Sherman  2014   1
## 76                          Muppets Most Wanted  2014   3
## 77                                   My Old Lady  2014   1
## 78                               Need for Speed  2014   1
## 79                                   Neighbors  2014   1
## 80    Night at the Museum: Secret of the Tomb  2014   3
## 81                                 Nightcrawler  2014   1
## 82                                 No Good Deed  2014   1
## 83                                         Noah  2014   1
## 84                                    Non-Stop  2014   1
## 85                                    Not Cool  2014   1
## 86                                       Ouija  2014   1
## 87                                  Paddington  2014   1
## 88       Paranormal Activity: The Marked Ones  2014   1
## 89                        Penguins of Madagascar  2014   1
## 90                         Planes: Fire & Rescue  2014   3
## 91                                     Pompeii  2014   1
## 92                                  Ride Along  2014   1
## 93                                       Rio 2  2014   2
## 94                                    RoboCop  2014   1
## 95                                   Rosewater  2014   1
## 96                                  Rudderless  2014   1
## 97                                    Sabotage  2014   1
## 98                                       Selma  2014   1
## 99                                      Serena  2014   1
## 100                               Seventh Son  2014   1
## 101                                  Sex Tape  2014   1
## 102            Sin City: A Dame to Kill For  2014   2
## 103                               Son of God  2014   1
## 104                                  Song One  2014   1
## 105                               St. Vincent  2014   1
## 106                                   Taken 3  2014   3
## 107                                     Tammy  2014   1
## 108            Teenage Mutant Ninja Turtles  2014   1
## 109                     That Awkward Moment  2014   1
## 110                               The Admiral  2014   1
## 111                   The Amazing Spider-Man 2  2014   2
```

```
## 112                              The Babadook 2014 1
## 113                            The Best of Me 2014 1
## 114                           The Book of Life 2014 1
## 115                              The Boxtrolls 2014 1
## 116                           The Devil's Hand 2014 1
## 117                                  The Drop 2014 1
## 118                              The Equalizer 2014 1
## 119                           The Expendables 3 2014 3
## 120                       The Fault in Our Stars 2014 1
## 121  The Fluffy Movie: Unity Through Laughter 2014 1
## 122                                The Gambler 2014 1
## 123                                  The Giver 2014 1
## 124                                The Good Lie 2014 1
## 125 The Hobbit: The Battle of the Five Armies 2014 6
## 126                                The Homesman 2014 1
## 127                    The Hundred-Foot Journey 2014 1
## 128     The Hunger Games: Mockingjay - Part 1 2014 3
## 129                                The Identical 2014 1
## 130                           The Imitation Game 2014 1
## 131                                The Interview 2014 1
## 132                                    The Judge 2014 1
## 133                     The Legend of Hercules 2014 1
## 134                             The Lego Movie 2014 1
## 135                                   The Loft 2014 1
## 136                             The Maze Runner 2014 1
## 137                           The Monuments Men 2014 1
## 138                            The November Man 2014 1
## 139                                 The Nut Job 2014 1
## 140                              The One I Love 2014 1
## 141                             The Other Woman 2014 1
## 142                           The Purge: Anarchy 2014 2
## 143                                The Pyramid 2014 1
## 144                                  The Rover 2014 1
## 145                               The Salvation 2014 1
## 146                    The Theory of Everything 2014 1
## 147                             The Water Diviner 2014 1
## 148      The Woman in Black 2: Angel of Death 2014 2
## 149                       Think Like a Man Too 2014 2
## 150                               Transcendence 2014 1
## 151           Transformers: Age of Extinction 2014 4
## 152                                       Tusk 2014 1
## 153                                    Unbroken 2014 1
## 154                               Veronica Mars 2014 1
## 155                  When the Game Stands Tall 2014 1
## 156                                   Whiplash 2014 1
## 157                                  White God 2014 1
## 158                                       Wild 2014 1
## 159                                  Wild Tales 2014 1
## 160                               Winter's Tale 2014 1
## 161                             Wish I Was Here 2014 1
## 162                  X-Men: Days of Future Past 2014 7
## 163                          Yves Saint Laurent 2014 1
## 164                              Jurassic World 2015 4
## 165                    Avengers: Age of Ultron 2015 2
```

```
## 166                                Furious 7 2015 7
## 167                               Inside Out 2015 1
## 168                                  Minions 2015 2
## 169                            Pitch Perfect 2 2015 2
## 170       Mission: Impossible - Rogue Nation 2015 5
## 171                                     Home 2015 1
## 172                      Fifty Shades of Grey 2015 1
## 173  The SpongeBob Movie: Sponge Out of Water 2015 2
## 174                                San Andreas 2015 1
## 175                          Mad Max: Fury Road 2015 4
## 176                     Straight Outta Compton 2015 1
## 177                                  Insurgent 2015 2
## 178                                        Spy 2015 1
## 179                                  Trainwreck 2015 1
## 180                                Tomorrowland 2015 1
## 181                                   Get Hard 2015 1
## 182                          Terminator Genisys 2015 5
## 183                                      Ted 2 2015 2
## 184                     Paul Blart: Mall Cop 2 2015 2
## 185                                      Pixels 2015 1
## 186                              Magic Mike XXL 2015 2
## 187                          The Wedding Ringer 2015 1
## 188                                    Vacation 2015 5
## 189                               Fantastic Four 2015 1
## 190                                  Poltergeist 2015 1
## 191                             Jupiter Ascending 2015 1
## 192                           The Age of Adaline 2015 1
## 193                                         Max 2015 1
## 194                            The Longest Ride 2015 1
## 195                                    The Gift 2015 1
## 196                             The Boy Next Door 2015 1
## 197                                  Hot Pursuit 2015 1
## 198                                    The DUFF 2015 1
## 199                                Woman in Gold 2015 1
## 200                                    Entourage 2015 1
## 201                                  Paper Towns 2015 1
## 202                           The Lazarus Effect 2015 1
## 203                                   Sinister 2 2015 2
## 204                          Ricki and the Flash 2015 1
## 205                              Project Almanac 2015 1
## 206                            Hitman: Agent 47 2015 1
## 207                                        Dope 2015 1
## 208                     Hot Tub Time Machine 2 2015 2
## 209                             American Ultra 2015 1
## 210                                 The Gunman 2015 1
## 211                                  Mortdecai 2015 1
## 212                                  Blackhat 2015 1
## 213           Me and Earl and the Dying Girl 2015 1
## 214                           The Vatican Tapes 2015 1
## 215                                    Maggie 2015 1
## 216                                  Americons 2015 1
## 217                                  Road Hard 2015 1
## 218                                    Ant-Man 2015 1
## 219                                  Southpaw 2015 1
```

```
## 220                              Ex Machina             2015                1
## 221                  The Man from U.N.C.L.E.             2015                1
## 222                              Cinderella             2015                1
## 223                                 Chappie             2015                1
## 224                           Brotherly Love             2015                1
## 225                           Run All Night              2015                1
## 226     The Second Best Exotic Marigold Hotel             2015                2
## 227                                Child 44             2015                1
## 228                                   Aloha             2015                1
## 229                     Unfinished Business             2015                1
## 230                              War Room             2015                1
## 231                            The Gallows             2015                1
## 232                                         2014.29437229437 1.35930735930736
##            Sentiment            Genre          Ratings            Gross
## 1                  0                8              6.3             9130
## 2                  2                1              7.1         1.92e+08
## 3                  0                1              6.2         30700000
## 4                  0                1              6.3         1.06e+08
## 5                  0                8              4.7         17300000
## 6                  0                3              4.6            29000
## 7                  0                8              6.1         42600000
## 8                  2                1              7.1          5750000
## 9                  3               10              6.5          2.6e+07
## 10                 0                8              6.1         48600000
## 11                 4                1              7.3          3.5e+08
## 12                 0                8              5.7         15200000
## 13                 0               15              5.4         84300000
## 14                 0                8              5.2         85900000
## 15                 0                3              4.4           830000
## 16                 2                8              6.6            11800
## 17                 0                8              6.3            72300
## 18                 0                3              6.9         14600000
## 19                29               12              7.9         2.22e+08
## 20                -1                3              6.6         21600000
## 21                -2                8              6.5         46300000
## 22                 9                3                8          25400000
## 23                 0                1              5.7         20300000
## 24                 2                3              6.5          1870000
## 25                 3                3                7             9840
## 26                 3                9              6.7          6370000
## 27                 5                1              7.8          2.6e+08
## 28                -4                1              7.7         2.09e+08
## 29                 0               10              6.2         30500000
## 30                 0               15                4         15800000
## 31                -4                2              6.8         1.51e+08
## 32                -1                3              6.4          4.2e+07
## 33                 0                1              6.3         55900000
## 34                 0                3              6.8         28800000
## 35                 0                8              5.8         86200000
## 36                 0                2              5.8         38900000
## 37                 0                1              7.9            1e+08
## 38                 1                3              6.3         23400000
## 39                 0                1              5.7             8690
## 40                 6                9              7.1          1210000
```

```
## 41    3    1    7.6    85700000
## 42   -4    3    6.4      102000
## 43    0    3      5    60800000
## 44    0   10    6.1      104000
## 45    2    1    6.5    2.01e+08
## 46  -11    3    8.2    1.68e+08
## 47    0    1    8.1    3.33e+08
## 48    0    8    5.6       30100
## 49   -9    3    5.8    91400000
## 50   -2    1    6.1    72700000
## 51   -1    8    6.3    54400000
## 52    3   12    7.9    1.77e+08
## 53   14    3    6.8    50500000
## 54    0    3    6.1      275000
## 55    1    8    6.7     8090000
## 56    2    2    8.7    1.88e+08
## 57    0    1    5.8    47600000
## 58   -4    2      6    1.28e+08
## 59   -9   15    6.9    14700000
## 60    4    1    6.2    50500000
## 61   10    9    6.9     4.7e+07
## 62    0    1    7.2     4.3e+07
## 63    0    9      7     2450000
## 64    0    1    7.8    1.28e+08
## 65   -2    1    6.5      129000
## 66    0    1    3.1     1.4e+07
## 67   -5    8    6.5    82400000
## 68    0    8    5.7        8300
## 69    0    7    4.8        2470
## 70    1    1    6.4    1.27e+08
## 71    0    1      7    2.41e+08
## 72    0    8    6.3      348000
## 73   27    9    7.1    36400000
## 74    0    8    5.4    10400000
## 75   13   12    6.9    1.12e+08
## 76   -1    2    6.5    51200000
## 77    0    8    6.3     4010000
## 78    5    1    6.6    43600000
## 79    2    8    6.4     1.5e+08
## 80    2    2    6.3    1.14e+08
## 81   -1   10    7.9    32300000
## 82    0   10    5.6    52500000
## 83    6    1    5.9    1.01e+08
## 84    0    1      7    91400000
## 85    0    8    5.2       35700
## 86   -4   15    4.4    50800000
## 87   14    8    7.2    76100000
## 88    0   15      5    32500000
## 89    8   12    6.8    83300000
## 90    0   12    5.9    59200000
## 91    0    1    5.6    23200000
## 92    0    1    6.1    1.34e+08
## 93    4   12    6.4    1.32e+08
## 94    7    1    6.2    58600000
```

```
## 95     1   9   6.6   3090000
## 96     0   8   7.5     37400
## 97    17   1   5.7  10500000
## 98    -5   9   7.5  52100000
## 99     0   3   5.4    176000
## 100    0   1   5.5  17200000
## 101    0   8   5.1  38500000
## 102    0  10   6.6  13800000
## 103    2   9   5.5  59700000
## 104    0   3   5.8     20200
## 105   20   8   7.3  44100000
## 106    6   1   6.1  89300000
## 107    0   8   4.8  84500000
## 108    0   1   5.9  1.91e+08
## 109    0   8   6.1   2.6e+07
## 110    3   2   7.1   2590000
## 111    6   1   6.8  2.03e+08
## 112   -3   3   6.9    924000
## 113    3   3   6.6  26800000
## 114    9  12   7.3  50200000
## 115    5  12   6.8  50800000
## 116    0   7   4.8      4240
## 117   -1  10   7.1  10700000
## 118    0   1   7.2  1.02e+08
## 119    0   1   6.1  39300000
## 120    7   3   7.9  1.25e+08
## 121    0   8     7   2820000
## 122   -2  10   6.1  33600000
## 123    6   3   6.5  45100000
## 124   10   3   7.4   2720000
## 125    3   2   7.5  2.55e+08
## 126    2   3   6.6   2430000
## 127   11   8   7.3  54200000
## 128    2   2   6.8  3.37e+08
## 129    0   3     5   2820000
## 130    9   9   8.1  91100000
## 131    0   1   6.7   6110000
## 132    2  10   7.5  47100000
## 133    0   1   4.2  18800000
## 134   -2  12   7.8  2.58e+08
## 135    2   6   6.3   5980000
## 136    2   1   6.8  1.02e+08
## 137    0   3   6.1   7.8e+07
## 138    0   1   6.3   2.5e+07
## 139    0  12   5.8  64200000
## 140    2   8   7.1    512000
## 141   -1   8     6  83900000
## 142   -3   1   6.5  71500000
## 143    0  15   4.7   2750000
## 144    0  10   6.4   1110000
## 145    0   3   6.8      5000
## 146    8   9   7.8  35900000
## 147    7   3   7.2   4190000
## 148   -6   3   4.9  26500000
```

```
## 149                0                8               5.7          65200000
## 150                0                3               6.3           2.3e+07
## 151                0                1               5.8          2.45e+08
## 152                0                8               5.4           1820000
## 153                0                9               7.2          1.16e+08
## 154               10               10               6.8           3320000
## 155                0                3               6.6          30100000
## 156                2                3               8.6          13100000
## 157               11                3               6.9            280000
## 158                0                2               7.2          37900000
## 159                7                8               8.2           3080000
## 160                0                3               6.2             22500
## 161                0                8               6.7           3590000
## 162                3                1               8.1          2.34e+08
## 163                0                9               6.2            717000
## 164                1                1               7.3          6.43e+08
## 165               21                1               7.8          4.58e+08
## 166              -17                1               7.4           3.5e+08
## 167                2               12               8.6          3.45e+08
## 168               -2                1               6.6          3.25e+08
## 169                1                8               6.7          1.83e+08
## 170                3                3               7.8          1.71e+08
## 171               -2                8               6.7          1.77e+08
## 172                9                3               4.2          1.66e+08
## 173                0                8               6.1          1.62e+08
## 174                3                1               6.4          1.54e+08
## 175               -4                1               8.3          1.53e+08
## 176                5                9               8.3          1.35e+08
## 177               -6                2               6.4           1.3e+08
## 178                0                1               7.3           1.1e+08
## 179                1               12               6.7          1.05e+08
## 180                1               12               6.6          93200000
## 181                6                8               6.1          90400000
## 182                1                1               6.8          89400000
## 183                5                8               6.6          81300000
## 184               15                1               4.3           7.1e+07
## 185               10                1               5.6           7.1e+07
## 186                7                8               6.2          65900000
## 187               -8                8               6.7          64500000
## 188               13                2               6.3          54900000
## 189               20                1                 4          52700000
## 190               -5               15                 5          47400000
## 191                0                1               5.5          47400000
## 192               11                3               7.3          42500000
## 193                0                1                 7          41900000
## 194               19                3               7.2          37400000
## 195               11                1               7.6          36100000
## 196               16                6               4.6          35400000
## 197                2                1                 5          34500000
## 198                2                8               6.6           3.4e+07
## 199               19               10               7.4          33300000
## 200                6                3               7.1          32400000
## 201                6                3               6.9          31400000
## 202                7                8               5.2          25800000
```

```
## 203              -38                1              5.5          1.9e+07
## 204               25                3              6.1        23500000
## 205                7                8              6.4        22300000
## 206               10                8              5.9        16100000
## 207                2                8              7.5        16800000
## 208                9                8              5.1        12300000
## 209               21                1              6.5        10900000
## 210                3                8              5.8        10600000
## 211               -2                8              5.5         7610000
## 212                4                3              5.4         7100000
## 213               15                8              8.2         6740000
## 214               -2               15              4.5         1710000
## 215               10                3              5.6          131000
## 216                0                3              7.3          129000
## 217               14                3              6.3          106000
## 218               18                1              7.8        1.69e+08
## 219                6                1              7.7        49500000
## 220                3                3              7.7        25400000
## 221                8                6              7.6        34600000
## 222                2                8              7.1        2.01e+08
## 223                8                1                7        31600000
## 224                0                8              6.9          444000
## 225                3                8              6.6        26400000
## 226               26                1              6.6        33100000
## 227                4                4              6.4         1210000
## 228               13               15              5.5         2.1e+07
## 229                7                8              5.4        10200000
## 230               10                1              5.4        12300000
## 231               -5               15              4.4        22600000
## 232 2.80952380952381 5.35930735930736 6.44155844155844 68066033.2034632
##               Budget          Screens            Views            Likes
## 1              4e+06               45          3280543             4632
## 2              5e+07             3306           583289             3465
## 3            2.8e+07             2872           304861              328
## 4            1.1e+08             3470           452917             2429
## 5            3500000             2310          3145573            12163
## 6              5e+05 2209.2443438914            91137              112
## 7              4e+07             3158          3013011             9595
## 8              2e+07              818          1854103             2207
## 9            2.8e+07             2714          2213659             2210
## 10          12500000             2253          5218079            11709
## 11          58800000             3555          3927600            13143
## 12             3e+07             1762           519327              963
## 13           6500000             3185         19032902            38810
## 14           6.5e+07             3116           930006             5150
## 15             5e+06               65           595194               85
## 16             6e+06               18          3915978             6983
## 17             5e+06               25          1391527             2479
## 18             7e+06               31          1828235             7633
## 19          1.65e+08             3761          4700023            14163
## 20             9e+06             1823          1348142             4404
## 21             4e+07             3555          7977747            18690
## 22             4e+06              771          1671367             4572
## 23           2.8e+07             2647          2088644             6633
```

```
## 24            7e+06             482          4398243             9202
## 25            1e+06 2209.2443438914             7128                1
## 26            3e+06             382          2902492             9522
## 27          1.7e+08            3938           760262             2918
## 28          1.7e+08            3967          1735700             6772
## 29            3e+07              97           465219             1348
## 30            7e+06            2544          1844690             3728
## 31          8.5e+07            3936           463866             3400
## 32          3.6e+07            3376           384448             1230
## 33            7e+07 2209.2443438914          9149892            26427
## 34          2.7e+07            2781           522630             1248
## 35          3.5e+07            3154          3287020             7698
## 36          1.3e+07            3230          1488038             2571
## 37         1.78e+08            3490         15568277            29251
## 38            2e+07            2800         11850723            24226
## 39          4500000 2209.2443438914           735551              636
## 40          2.4e+07              66          6685088             8369
## 41          6.8e+07            3313          2276605             3946
## 42          1850000               8          1034480             6490
## 43            2e+06             780           456564             1706
## 44            1e+06               3            99427               47
## 45          1.6e+08            3952          1156609             2968
## 46          6.1e+07            3014           396010             1390
## 47          1.7e+08            4080          1313548             8567
## 48            70000               9           924347             1406
## 49          1.2e+07            2417           175017              461
## 50            1e+08            3595          9324678            15479
## 51          4.2e+07              93          1292235             5284
## 52         1.45e+08            4253         11472161            22779
## 53          1.1e+07            1272          9222933            41728
## 54       8932779.93               6             8210                6
## 55            2e+07             645          1167941             2651
## 56         1.65e+08            3561          5421705            16635
## 57            5e+07            3434          4270410             8886
## 58            5e+07            2440           817242             4391
## 59            2e+06               4             4877                6
## 60            6e+07            3387          3320754             4322
## 61            4e+07            2905          1438350             4028
## 62            2e+07            2589          4846645            14722
## 63            5e+06             374          3650720             6917
## 64          8.1e+07            3204          2767873            46023
## 65          2.5e+07              28           289922              143
## 66          1.6e+07            1825          5611593            11187
## 67          1.7e+07            1534          4450824             7315
## 68          2400000 2209.2443438914          1222921             5553
## 69            3e+05               3            30529               18
## 70            4e+07            3173          1142964             2346
## 71          1.8e+08            3948           557012             3528
## 72          1.5e+07              66           177465              595
## 73          2.5e+07            3019          1470438             4314
## 74            5e+06            1044           667852              469
## 75         1.45e+08            3934           277848              890
## 76            5e+07            3194          3037329             6696
## 77            5e+06             255           446576              659
```

```
## 78           6.6e+07            3115          1451649             7342
## 79           1.8e+07            3279          2554307             8722
## 80          1.27e+08              22          3779254            13535
## 81           8500000            2766          6082510            12522
## 82          13200000            2130           608230              895
## 83          1.25e+08            3567         13661095            41254
## 84             5e+07            3090           367551              700
## 85             6e+05 2209.2443438914          5403836           187162
## 86             5e+06            2061         11724815            30208
## 87           5.5e+07            3303          2028767             3829
## 88             5e+06            2867           105480              352
## 89          1.32e+08              32          1223790             2934
## 90             5e+07            3826          2117798             2124
## 91             1e+08            2658           355563             1568
## 92           2.5e+07            2663          8429023            27484
## 93          1.03e+08            3948          3849768             9783
## 94             1e+08            3372          3305047            11733
## 95             5e+06             371           909596             2214
## 96             5e+06 2209.2443438914           827239             3221
## 97           3.5e+07            2486          3466458             6096
## 98             2e+07            2179          3743181            16782
## 99             3e+07              59          3726728             6221
## 100          9.5e+07            2875            23360               36
## 101            4e+07            3062          2757667             3030
## 102          6.5e+07            2894          5223362            18770
## 103          2.2e+07            3260           943306             3006
## 104            6e+06              27          2426078             9230
## 105          1.3e+07              18          4176181             9463
## 106          4.8e+07              21          1544390             2975
## 107            2e+07            3465          3429055             7682
## 108         1.25e+08            3845          7908038            27312
## 109            8e+06            2809          6132551            14539
## 110          9500000            1586           134353              280
## 111            2e+08            4324           386857             4996
## 112            2e+06             147          6501107            14139
## 113          2.6e+07               8          5546710            15351
## 114            5e+07              12          5165441            17476
## 115            6e+07            3464          2545852             3964
## 116            7e+06 2209.2443438914           330363              406
## 117         12600000             809          2897407             5953
## 118          5.5e+07            3236          7075635            15858
## 119            9e+07              90         14453673            33092
## 120          1.2e+07            3173         32626778           370552
## 121 47921730.0467826             432            10747                4
## 122          2.5e+07             103          4790221             4740
## 123          2.5e+07             702           523457             2187
## 124            2e+07             461          1303646             3306
## 125          2.5e+08            3875          3554189            14152
## 126          1.6e+07               4            26528               58
## 127          2.2e+07            2023            24809              277
## 128         1.25e+08            4151          3305417            14684
## 129          1.2e+07 2209.2443438914           309610              729
## 130          1.4e+07             747          3047849            11748
## 131          4.4e+07              78          6231191            13331
```

```
## 132           5e+07          3003          1325872          4829
## 133           7e+07          2104           797229          1606
## 134           6e+07          3775           439159          1847
## 135         1.4e+07          1841           381071           238
## 136         3.4e+07           173          3156436         18124
## 137           7e+07          3083            10649            21
## 138         1.5e+07          2776          1935432          3089
## 139         4.2e+07          3427          2269032          3046
## 140           1e+05            20          1223891          1309
## 141           4e+07          3205          8479994         35071
## 142           9e+06          2805          1142295          3895
## 143         6500000           685          4092871          8781
## 144        12250000             5              702             1
## 145      11712310.56             2           253631           170
## 146         1.5e+07            15          3226251         18240
## 147        22500000           320          3281842          4968
## 148           1e+06          2602              698            16
## 149         2.4e+07          2225          2063089          5858
## 150           1e+08          3455         14141585         36646
## 151         2.1e+08          4233           170909           791
## 152         2800000           449           473100           670
## 153         6.5e+07          3131          6637551         19833
## 154           6e+06           291           476747          2079
## 155         1.5e+07           794           280566           477
## 156         3300000            42          7750223         17541
## 157      2487820.27             2           166612           571
## 158         1.5e+07          1061          5976092          9343
## 159         3300000             4           697105          1023
## 160           6e+07          2965           719976          1312
## 161           6e+06            68           865690          1375
## 162           2e+08          3996             2285             9
## 163         1.2e+07             2           550734           894
## 164         1.5e+08          4274          9143740         34746
## 165         2.5e+08          4276         10366624         31552
## 166         1.9e+08          4004            59056           330
## 167        1.75e+08          3946          1438926          4632
## 168         7.4e+07          4301          1341909          1607
## 169         2.9e+07          3473          9214467         39824
## 170         1.5e+08          3956          8748596         20352
## 171        1.35e+08          3708         10341783         24413
## 172           4e+07          3646         31859569         49900
## 173         7.4e+07          3641          5536822         29411
## 174         1.1e+08          3777         12632836         36508
## 175         1.5e+08          3702          2732371         13030
## 176         2.8e+07          2757           848970         12607
## 177         1.1e+08          3875          2834800          5664
## 178         6.5e+07          3711          6649290         20750
## 179         3.5e+07          3158          9511288         19903
## 180         1.9e+08          3972           999867          4212
## 181           4e+07          3175         10078326         26565
## 182        1.55e+08          3758            84870           265
## 183         6.8e+07          3442          6711914         29903
## 184           3e+07            90          2389347          8809
## 185         8.8e+07          3723          5340100         26134
```

```
## 186         14800000            3355          5128288            18475
## 187          2.3e+07            3003          4826940            10521
## 188          3.1e+07            3411          2554327            10062
## 189          1.2e+08            3995          7560211            24168
## 190          3.5e+07            3240          3651828            13998
## 191         1.76e+08            3181          3920842            10535
## 192          2.5e+07            2991         11036701            50002
## 193            2e+07            2855          2947239            19201
## 194          3.4e+07            3366          2393017            13291
## 195            5e+06            1648          2513544             6970
## 196            4e+06            2602          5588384            15144
## 197          3.5e+07            3003          6964819            26601
## 198          8500000            2575         12792898            56001
## 199          1.1e+07             258             6495               82
## 200            3e+07            3108          1841293             5879
## 201          1.2e+07            3031          2854910            23254
## 202          3300000            2666          4442147            10605
## 203            1e+07            2766         11037833            36874
## 204          1.8e+07            1603           638374             4018
## 205          1.2e+07            2893          6646785            16041
## 206          3.5e+07            3261         13154873            46684
## 207            7e+05            2002            50444              238
## 208          1.4e+07            2880            11496              194
## 209          2.8e+07            2778          2996539             1874
## 210            4e+07            2816          3098749             4311
## 211            6e+07            2648          3850758            13363
## 212            7e+07            2567          2409338             6923
## 213            8e+06              34          4032265            18398
## 214          8495000             420          1364537             3824
## 215          4500000              79          5085068            14359
## 216            4e+06              14            63724              115
## 217          1500000              22            44963              109
## 218          1.3e+08            3856          9597644            32558
## 219            3e+07            2772         11476882            40496
## 220          1.5e+07            1255           419470             2218
## 221          7.5e+07            3638          5216680            20010
## 222          9.5e+07            3845         10164908            22726
## 223          4.9e+07            3201          7384182            23597
## 224          1900000             200           890619             6352
## 225            5e+07            3171          5671767            10073
## 226            1e+07            1573           831044             2427
## 227            5e+07              66          3701061             9325
## 228          3.7e+07            2815          7119456            18803
## 229          3.5e+07            2777          3450614             6823
## 230            3e+06 2209.2443438914            66872              400
## 231            1e+05            2720           659772             2841
## 232 47921730.0467826 2209.2443438914 3712851.29004329 12732.5367965368
##             Dislikes        Comments Aggregate_Followers
## 1                425             636             1120000
## 2                 61             186            12350000
## 3                 34              47              483000
## 4                132             590              568000
## 5                610            1082             1923800
## 6                  7               1              310000
```

```
## 7              419            1020            8153000
## 8              197             593             130655
## 9              419             382             125646
## 10             532             770           21697300
## 11             573            3134              24300
## 12              94              70             386400
## 13            4382            4392           19420105
## 14             707            1484            5130800
## 15              36              39              15112
## 16             247             460             253000
## 17             146             182            1658900
## 18             235             685             116100
## 19             538            1293             199800
## 20             307            1033             888000
## 21            1940            2214            2417000
## 22             207             741             105000
## 23             255            1235            3209000
## 24             454            1150            4769100
## 25               0               0               2182
## 26             558            2296 3038193.44897959
## 27              66             837            8030000
## 28             187             889             114000
## 29              72             162             744600
## 30             581             729               9536
## 31             152             987            1030000
## 32             129             228             276750
## 33            1342            5278             395500
## 34             153             227             147000
## 35             446            1122           17064000
## 36             553             643              88586
## 37            1730            6439            5610000
## 38            1343            2577              21500
## 39              98              92            1060000
## 40             467            1580           13720000
## 41             331            1286            1888000
## 42             181             374              66600
## 43             413             890             412000
## 44              10              12 3038193.44897959
## 45             112             547            1870000
## 46              58             342           20640000
## 47             269            1285            2750000
## 48             107             132            5887700
## 49              34             133 3038193.44897959
## 50            1130            3925            9414000
## 51             124             362            1650000
## 52             862            2863             671000
## 53             924            3609            1800000
## 54               0               0              58900
## 55              82             797 3038193.44897959
## 56             751            4316            1865000
## 57             569            3058             301000
## 58             112             346            4720000
## 59               1               1 3038193.44897959
## 60             347            1105             147000
```

```
## 61                133              543               27323
## 62                405             2732  3038193.44897959
## 63                234             1119             1045200
## 64                944             6946             5407000
## 65                 17                9  3038193.44897959
## 66               2111             7595              116800
## 67                546              909             2356000
## 68                193              335             1463000
## 69                  4                2               18100
## 70                167              311  3038193.44897959
## 71                135              464                5633
## 72                 39               71              644000
## 73                168              511              130000
## 74                 38               44              919000
## 75                 45               88             8839043
## 76                564             1061             9850000
## 77                 50               45  3038193.44897959
## 78                533             2305             2594000
## 79                298              693            14240000
## 80                362             1221             6480000
## 81                543             2170  3038193.44897959
## 82                118              387             1550500
## 83               3812            18077             1810000
## 84                 19               37              648786
## 85               3145            24919             2720000
## 86               2150             4926              130000
## 87                500              665              124000
## 88                 45               85               11444
## 89                123              226               47200
## 90                485              626             3603000
## 91                106              267              370000
## 92                977             2195            21586000
## 93                704             1151              154400
## 94               1077             4319              250000
## 95                186              632  3038193.44897959
## 96                 89              432              217000
## 97                411              977             3678000
## 98                565             4973                9224
## 99                405             1074  3038193.44897959
## 100                 5                5              804300
## 101               418              251             4521000
## 102               627             2796             8620000
## 103               325             1401             3185900
## 104               184              373               33500
## 105               310              885              269849
## 106               136              380              216000
## 107               675              727              727000
## 108              3439             8533             1260000
## 109               653              846            11783000
## 110                43              308  3038193.44897959
## 111               233              864             4520000
## 112               890             2928  3038193.44897959
## 113               535             1271               48231
## 114               871             3229            10364000
```

```
## 115              378              554           1280000
## 116               52               92 3038193.44897959
## 117              153              569 3038193.44897959
## 118              574             1966           1800000
## 119             1336             5005           1480000
## 120             4752            38363           4240000
## 121                1                1            818000
## 122              454              773           2740000
## 123              149              565            184100
## 124              211              564            759800
## 125              262             1782           2613000
## 126                1                8             25748
## 127               12               52             20700
## 128              332             1176          31030000
## 129               97              113            275873
## 130              253             1237 3038193.44897959
## 131             1265             3430           6619435
## 132              104              378           5563500
## 133              630              456           1174806
## 134              105              289           4690000
## 135               27               43             14586
## 136              213             2753           4734000
## 137                1                0              3849
## 138              155              567            148000
## 139              546              554 3038193.44897959
## 140              148              239            226000
## 141             2233             3479           2731000
## 142              193              882             49424
## 143              794             2046            420000
## 144                0                1              9842
## 145               11               58 3038193.44897959
## 146              261             2104              8204
## 147              445             2099           1899400
## 148                1                9              3086
## 149              336              346          24388000
## 150             1459             6811              5987
## 151              362              230           2814900
## 152              104              380            180100
## 153              815             3403            269000
## 154              166              232           2536000
## 155               56               82            585000
## 156              631             2760            858000
## 157               36               70 3038193.44897959
## 158              649             1333            781200
## 159               39              429 3038193.44897959
## 160               76              189           1810000
## 161               79               67           1818778
## 162                0                1          10280000
## 163               44               77            168700
## 164             1074             5107           6180000
## 165              989             3843          10070000
## 166                8               39          11890000
## 167              262              496            232000
## 168              764               48            250000
```

```
## 169              998             1987             7336000
## 170              649             1842             6605000
## 171             1675             3426             5070000
## 172            13960             9119              946000
## 173             1840             1281              184000
## 174             2210             7559             9737600
## 175              497             1774              768700
## 176              237             1560               55618
## 177             5746               66             4240000
## 178              750             1666              265000
## 179             2581             2955             2014000
## 180               66              250             1198000
## 181             1418             2395             2939000
## 182               13               63             3877901
## 183              984             1767            10988000
## 184              935              892             1618000
## 185             2007             3717             2466000
## 186              858             1579             8392000
## 187              478              755             2284000
## 188              464              871             2347000
## 189             3524             7139              881000
## 190              969             2205                1066
## 191              565             1668             7460000
## 192             1005             3525              776000
## 193              625             1842                2113
## 194              369              584              324925
## 195              270             1105             1655987
## 196              913             1499             4599000
## 197             1111             1293             1630000
## 198             2083             4102             6714000
## 199                3                7              675000
## 200              314              634              788000
## 201              459             1087             4184000
## 202              691             2739             2007000
## 203             1885             4360                5699
## 204              130              269                1887
## 205              955             2787              253499
## 206             3565             8578              209000
## 207                3               28              986572
## 208                9               31             1891977
## 209               32              189              155000
## 210              341              881             1520000
## 211              453             1276             3045000
## 212              340              714             1334000
## 213              302             1298                2208
## 214              689              772                3841
## 215              600             2468             3744000
## 216               28               14              129000
## 217               27               42             1188000
## 218             2672             8359   3038193.44897959
## 219             1383             4435   3038193.44897959
## 220               46              239   3038193.44897959
## 221              500             2300   3038193.44897959
## 222             4245             5262   3038193.44897959
```

```
## 223              786            3481    3038193.44897959
## 224              293             700    3038193.44897959
## 225              480            1712    3038193.44897959
## 226               99             247    3038193.44897959
## 227              641            1859    3038193.44897959
## 228             1128            2290    3038193.44897959
## 229              325             409    3038193.44897959
## 230               67             201    3038193.44897959
## 231              431             606    3038193.44897959
## 232 679.051948051948 1825.7012987013    3038193.44897959
```

```
sum(is.na(new_movie))
```

```
## [1] 0
```

#txt <- "Explore the data set" #banner(txt, centre = TRUE, bandChar = "-") ##———————————————————————- ## Explore the data set – ##———————————————————————————-

#txt <- "Data contents" #banner(txt, centre = TRUE, bandChar = "=") ##============================== ## Data contents == ##==========

```
Hmisc::contents(new_movie)
```

```
##
## Data frame:new_movie 232 observations and 14 variables    Maximum # NAs:0
##
##
##                       Storage
## Movie                 character
## Year                  character
## Sequel                character
## Sentiment             character
## Genre                 character
## Ratings               character
## Gross                 character
## Budget                character
## Screens               character
## Views                 character
## Likes                 character
## Dislikes              character
## Comments              character
## Aggregate_Followers character
```

```
psych::describe(new_movie, skew = TRUE,
                IQR = TRUE)
```

```
##                      vars   n   mean    sd median trimmed   mad min max range
## Movie*                  1 232 116.50 67.12  116.5  116.50 85.99   1 232   231
## Year*                   2 232   1.59  0.91    1.0    1.49  0.00   1   3     2
## Sequel*                 3 232   1.55  1.29    1.0    1.22  0.00   1   8     7
## Sentiment*              4 232  17.65  9.98   12.0   17.23  7.41   1  37    36
## Genre*                  5 232   5.67  4.08    6.0    5.52  7.41   1  12    11
## Ratings*                6 232  25.08  9.86   26.0   25.30 10.38   1  46    45
## Gross*                  7 232 107.39 62.69  106.5  107.18 80.80   1 216   215
## Budget*                 8 232  55.42 29.24   59.5   56.28 31.13   1 105   104
## Screens*                9 232  98.78 58.97   95.5   98.04 79.32   1 201   200
## Views*                 10 232 116.50 67.12  116.5  116.50 85.99   1 232   231
```

```
## Likes*                 11 232 114.40 66.07  114.5  114.49 84.51   1 228   227
## Dislikes*              12 232  99.07 59.41  100.5   98.99 74.13   1 204   203
## Comments*              13 232 104.75 63.62  104.5  104.52 81.54   1 214   213
## Aggregate_Followers*   14 232  96.62 50.89  106.0   96.78 58.56   1 191   190
##                       skew kurtosis   se    IQR
## Movie*                0.00    -1.22 4.41 115.50
## Year*                 0.89    -1.20 0.06   2.00
## Sequel*               2.68     7.47 0.08   0.00
## Sentiment*            0.53    -0.92 0.66  12.25
## Genre*                0.27    -1.45 0.27  10.00
## Ratings*             -0.20    -0.42 0.65  14.00
## Gross*                0.02    -1.22 4.12 108.25
## Budget*              -0.28    -1.11 1.92  47.50
## Screens*              0.08    -1.28 3.87 106.25
## Views*                0.00    -1.22 4.41 115.50
## Likes*               -0.01    -1.21 4.34 113.50
## Dislikes*             0.00    -1.17 3.90  99.50
## Comments*             0.02    -1.22 4.18 109.50
## Aggregate_Followers* -0.06    -0.92 3.34  78.50
```

```
glimpse(new_movie)
```

```
## Rows: 232
## Columns: 14
## $ Movie               <chr> "13 Sins", "22 Jump Street", "3 Days to Kill", "30~
## $ Year                <chr> "2014", "2014", "2014", "2014", "2014", "2014", "2~
## $ Sequel              <chr> "1", "2", "1", "2", "2", "1", "1", "1", "1", "1", ~
## $ Sentiment           <chr> "0", "2", "0", "0", "0", "0", "0", "2", "3", "0", ~
## $ Genre               <chr> "8", "1", "1", "1", "8", "3", "8", "1", "10", "8",~
## $ Ratings             <chr> "6.3", "7.1", "6.2", "6.3", "4.7", "4.6", "6.1", "~
## $ Gross               <chr> "9130", "1.92e+08", "30700000", "1.06e+08", "17300~
## $ Budget              <chr> "4e+06", "5e+07", "2.8e+07", "1.1e+08", "3500000",~
## $ Screens             <chr> "45", "3306", "2872", "3470", "2310", "2209.244343~
## $ Views               <chr> "3280543", "583289", "304861", "452917", "3145573"~
## $ Likes               <chr> "4632", "3465", "328", "2429", "12163", "112", "95~
## $ Dislikes            <chr> "425", "61", "34", "132", "610", "7", "419", "197"~
## $ Comments            <chr> "636", "186", "47", "590", "1082", "1", "1020", "5~
## $ Aggregate_Followers <chr> "1120000", "12350000", "483000", "568000", "192380~
```

```
head(new_movie, 10)
```

```
##                              Movie Year Sequel Sentiment Genre Ratings
## 1                         13 Sins 2014      1         0     8     6.3
## 2                   22 Jump Street 2014      2         2     1     7.1
## 3                   3 Days to Kill 2014      1         0     1     6.2
## 4            300: Rise of an Empire 2014      2         0     1     6.3
## 5                 A Haunted House 2 2014      2         0     8     4.7
## 6                   A Long Way Off 2014      1         0     3     4.6
## 7  A Million Ways to Die in the West 2014      1         0     8     6.1
## 8               A Most Violent Year 2014      1         2     1     7.1
## 9       A Walk Among the Tombstones 2014      1         3    10     6.5
## 10                 About Last Night 2014      1         0     8     6.1
##       Gross   Budget         Screens   Views Likes Dislikes Comments
## 1      9130    4e+06              45 3280543  4632      425      636
## 2  1.92e+08    5e+07            3306  583289  3465       61      186
```

```
## 3  30700000  2.8e+07            2872  304861   328       34       47
## 4  1.06e+08  1.1e+08            3470  452917  2429      132      590
## 5  17300000  3500000            2310 3145573 12163      610     1082
## 6     29000    5e+05 2209.2443438914   91137   112        7        1
## 7  42600000    4e+07            3158 3013011  9595      419     1020
## 8   5750000    2e+07             818 1854103  2207      197      593
## 9   2.6e+07  2.8e+07            2714 2213659  2210      419      382
## 10 48600000 12500000            2253 5218079 11709      532      770
##    Aggregate_Followers
## 1              1120000
## 2             12350000
## 3               483000
## 4               568000
## 5              1923800
## 6               310000
## 7              8153000
## 8               130655
## 9               125646
## 10             21697300
```

```
tail(new_movie)
```

```
##                   Movie             Year           Sequel        Sentiment
## 227            Child 44             2015                1                4
## 228               Aloha             2015                1               13
## 229 Unfinished Business             2015                1                7
## 230            War Room             2015                1               10
## 231         The Gallows             2015                1               -5
## 232                     2014.29437229437 1.35930735930736 2.80952380952381
##                 Genre          Ratings            Gross           Budget
## 227                 4              6.4          1210000            5e+07
## 228                15              5.5          2.1e+07          3.7e+07
## 229                 8              5.4         10200000          3.5e+07
## 230                 1              5.4         12300000            3e+06
## 231                15              4.4         22600000            1e+05
## 232 5.35930735930736 6.44155844155844 68066033.2034632 47921730.0467826
##             Screens            Views            Likes         Dislikes
## 227              66          3701061             9325              641
## 228            2815          7119456            18803             1128
## 229            2777          3450614             6823              325
## 230 2209.2443438914            66872              400               67
## 231            2720           659772             2841              431
## 232 2209.2443438914 3712851.29004329 12732.5367965368 679.051948051948
##            Comments Aggregate_Followers
## 227            1859    3038193.44897959
## 228            2290    3038193.44897959
## 229             409    3038193.44897959
## 230             201    3038193.44897959
## 231             606    3038193.44897959
## 232 1825.7012987013    3038193.44897959
```

```
car::brief(new_movie)
```

```
## 232 x 14 data.frame (227 rows and 10 columns omitted)
##              Movie             Year . . .        Comments Aggregate_Followers
```

```
##                [c]              [c]                    [c]                  [c]
## 1   13 Sins        2014                   636                1120000
## 2   22 Jump Street 2014                   186                12350000
## 3   3 Days to Kill 2014                   47                 483000
## . . .
## 231 The Gallows    2015                   606                3038193.44897959
## 232                2014.29437229437       1825.7012987013    3038193.44897959
```

```
str(new_movie)
```

```
## 'data.frame':    232 obs. of  14 variables:
##  $ Movie              : chr  "13 Sins" "22 Jump Street" "3 Days to Kill" "300: Rise of an Empire" ..
##  $ Year               : chr  "2014" "2014" "2014" "2014" ...
##  $ Sequel             : chr  "1" "2" "1" "2" ...
##  $ Sentiment          : chr  "0" "2" "0" "0" ...
##  $ Genre              : chr  "8" "1" "1" "1" ...
##  $ Ratings            : chr  "6.3" "7.1" "6.2" "6.3" ...
##  $ Gross              : chr  "9130" "1.92e+08" "30700000" "1.06e+08" ...
##  $ Budget             : chr  "4e+06" "5e+07" "2.8e+07" "1.1e+08" ...
##  $ Screens            : chr  "45" "3306" "2872" "3470" ...
##  $ Views              : chr  "3280543" "583289" "304861" "452917" ...
##  $ Likes              : chr  "4632" "3465" "328" "2429" ...
##  $ Dislikes           : chr  "425" "61" "34" "132" ...
##  $ Comments           : chr  "636" "186" "47" "590" ...
##  $ Aggregate_Followers: chr  "1120000" "12350000" "483000" "568000" ...
```

We have 232 obs. of 14 variables

##==
EDA: Exploratory Data Analysis == ##==

```
movie_data <- new_movie[,6:ncol(new_movie)]
```

Check the column names again,

```
colnames(movie_data)
```

```
## [1] "Ratings"             "Gross"               "Budget"
## [4] "Screens"             "Views"               "Likes"
## [7] "Dislikes"            "Comments"            "Aggregate_Followers"
```

#txt <- "Get the summary statistics of the variables" #banner(txt, centre = TRUE, bandChar = "*") ##********** ## Get the summary statistics of the variables ##**********

```
summary(movie_data)
```

```
##    Ratings             Gross              Budget            Screens
##  Length:232         Length:232         Length:232         Length:232
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##     Views              Likes              Dislikes          Comments
##  Length:232         Length:232         Length:232         Length:232
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
```

```
##  Aggregate_Followers
##  Length:232
##  Class :character
##  Mode  :character
```

```
Hmisc::describe(movie_data)
```

```
## movie_data
##
##  9  Variables      232  Observations
## ---------------------------------------------------------------------------
## Ratings
##        n  missing distinct
##      232        0       46
##
## lowest : 3.1 4   4.2 4.3 4.4, highest: 8.1 8.2 8.3 8.6 8.7
## ---------------------------------------------------------------------------
## Gross
##        n  missing distinct
##      232        0      216
##
## lowest : 1.01e+08 1.02e+08 1.05e+08 1.06e+08 1.12e+08
## highest: 9130     91400000 924000   93200000 9840
## ---------------------------------------------------------------------------
## Budget
##        n  missing distinct
##      232        0      105
##
## lowest : 1.03e+08 1.1e+07  1.1e+08  1.25e+08 1.27e+08
## highest: 8e+06    9.5e+07  9500000  9e+06    9e+07
## ---------------------------------------------------------------------------
## Screens
##        n  missing distinct
##      232        0      201
##
## lowest : 103  1044 1061 12   1255, highest: 818  9    90   93   97
## ---------------------------------------------------------------------------
## Views
##        n  missing distinct
##      232        0      232
##
## lowest : 10078326 10164908 10341783 1034480  10366624
## highest: 943306   9511288  9597644  99427    999867
## ---------------------------------------------------------------------------
## Likes
##        n  missing distinct
##      232        0      228
##
## lowest : 1     10062 10073 1023  10521, highest: 9463  9522  9595  963   9783
## ---------------------------------------------------------------------------
## Dislikes
##        n  missing distinct
##      232        0      204
##
## lowest : 0    1    10   1005 104 , highest: 98   984  989  99   998
```

```
## ---------------------------------------------------------------------------
## Comments
##        n  missing distinct
##      232        0      214
##
## lowest : 0    1    1020 1033 1061, highest: 909  9119 92   977  987
## ---------------------------------------------------------------------------
## Aggregate_Followers
##        n  missing distinct
##      232        0      191
##
## lowest : 10070000 10280000 1030000  10364000 1045200
## highest: 9536     9737600  9842     9850000  986572
## ---------------------------------------------------------------------------
```

```
psych::describe(movie_data, skew = TRUE,
                IQR = TRUE)
```

```
##                       vars   n   mean    sd median trimmed   mad min max range
## Ratings*                 1 232  25.08  9.86   26.0   25.30 10.38   1  46    45
## Gross*                   2 232 107.39 62.69  106.5  107.18 80.80   1 216   215
## Budget*                  3 232  55.42 29.24   59.5   56.28 31.13   1 105   104
## Screens*                 4 232  98.78 58.97   95.5   98.04 79.32   1 201   200
## Views*                   5 232 116.50 67.12  116.5  116.50 85.99   1 232   231
## Likes*                   6 232 114.40 66.07  114.5  114.49 84.51   1 228   227
## Dislikes*                7 232  99.07 59.41  100.5   98.99 74.13   1 204   203
## Comments*                8 232 104.75 63.62  104.5  104.52 81.54   1 214   213
## Aggregate_Followers*     9 232  96.62 50.89  106.0   96.78 58.56   1 191   190
##                        skew kurtosis   se    IQR
## Ratings*              -0.20    -0.42 0.65  14.00
## Gross*                 0.02    -1.22 4.12 108.25
## Budget*               -0.28    -1.11 1.92  47.50
## Screens*               0.08    -1.28 3.87 106.25
## Views*                 0.00    -1.22 4.41 115.50
## Likes*                -0.01    -1.21 4.34 113.50
## Dislikes*              0.00    -1.17 3.90  99.50
## Comments*              0.02    -1.22 4.18 109.50
## Aggregate_Followers* -0.06    -0.92 3.34  78.50
```

#txt <- "The Dependent Variables in this study is Ratings" #banner(txt, centre = TRUE, bandChar = ":")

##:: ## The Dependent Variables in this study is Ratings "replace_mean_Ratings" :: ##::

We are going to explore the distribution of this variable

```
movie_replace
```

```
##                                       Movie Year Sequel Sentiment Genre
## 1                                  13 Sins 2014      1         0     8
## 2                            22 Jump Street 2014      2         2     1
## 3                            3 Days to Kill 2014      1         0     1
## 4                     300: Rise of an Empire 2014      2         0     1
## 5                          A Haunted House 2 2014      2         0     8
## 6                             A Long Way Off 2014      1         0     3
```

```
## 7           A Million Ways to Die in the West 2014      1         0     8
## 8                       A Most Violent Year 2014      1         2     1
## 9             A Walk Among the Tombstones 2014      1         3    10
## 10                      About Last Night 2014      1         0     8
## 11                       American Sniper 2014      1         4     1
## 12                        And So It Goes 2014      1         0     8
## 13                             Annabelle 2014      1         0    15
## 14                                 Annie 2014      1         0     8
## 15        Atlas Shrugged: Who Is John Galt? 2014      3         0     3
## 16                              Barefoot 2014      1         2     8
## 17          Better Living Through Chemistry 2014      1         0     8
## 18                    Beyond the Lights 2014      1         0     3
## 19                           Big Hero 6 2014      1        29    12
## 20                        Black or White 2014      1        -1     3
## 21                               Blended 2014      1        -2     8
## 22                               Boyhood 2014      1         9     3
## 23                        Brick Mansions 2014      1         0     1
## 24                                  Cake 2014      1         2     3
## 25                             Camp X-Ray 2014      1         3     3
## 26                             Cantinflas 2014      1         3     9
## 27      Captain America: The Winter Soldier 2014      2         5     1
## 28           Dawn of the Planet of the Apes 2014      2        -4     1
## 29                  Deliver Us from Evil 2014      1         0    10
## 30                          Devil's Due 2014      1         0    15
## 31                            Divergent 2014      1        -4     2
## 32                       Dolphin Tale 2 2014      2        -1     3
## 33                       Dracula Untold 2014      1         0     1
## 34                            Draft Day 2014      1         0     3
## 35                     Dumb and Dumber To 2014      3         0     8
## 36                          Earth to Echo 2014      1         0     2
## 37                       Edge of Tomorrow 2014      1         0     1
## 38                           Endless Love 2014      1         1     3
## 39                          Falcon Rising 2014      1         0     1
## 40                             Foxcatcher 2014      1         6     9
## 41                                   Fury 2014      1         3     1
## 42                       God Help the Girl 2014      1        -4     3
## 43                          God's Not Dead 2014      1         0     3
## 44                            God's Pocket 2014      1         0    10
## 45                                Godzilla 2014      1         2     1
## 46                              Gone Girl 2014      1       -11     3
## 47                  Guardians of the Galaxy 2014      1         0     1
## 48                          Happy Christmas 2014      1         0     8
## 49                       Heaven Is for Real 2014      1        -9     3
## 50                                Hercules 2014      1        -2     1
## 51                         Horrible Bosses 2 2014      2        -1     8
## 52                How to Train Your Dragon 2 2014      2         3    12
## 53                               If I Stay 2014      1        14     3
## 54                In the Name of My Daughter 2014      1         0     3
## 55                             Inherent Vice 2014      1         1     8
## 56                              Interstellar 2014      1         2     2
## 57                             Into the Storm 2014      1         0     1
## 58                             Into the Woods 2014      1        -4     2
## 59                                It Follows 2014      1        -9    15
## 60                 Jack Ryan: Shadow Recruit 2014      5         4     1
```

```
## 61                              Jersey Boys 2014      1        10     9
## 62                                John Wick 2014      1         0     1
## 63                           Kill the Messenger 2014      1         0     9
## 64                 Kingsman: The Secret Service 2014      1         0     1
## 65                                Kung Fu Jungle 2014      1        -2     1
## 66                                   Left Behind 2014      1         0     1
## 67                                Let's Be Cops 2014      1        -5     8
## 68                               Life After Beth 2014      1         0     8
## 69                                     Locker 13 2014      1         0     7
## 70                                          Lucy 2014      1         1     1
## 71                                   Maleficent 2014      1         0     1
## 72                             Maps to the Stars 2014      1         0     8
## 73                           Million Dollar Arm 2014      1        27     9
## 74                              Moms' Night Out 2014      1         0     8
## 75                        Mr. Peabody & Sherman 2014      1        13    12
## 76                          Muppets Most Wanted 2014      3        -1     2
## 77                                  My Old Lady 2014      1         0     8
## 78                               Need for Speed 2014      1         5     1
## 79                                   Neighbors 2014      1         2     8
## 80    Night at the Museum: Secret of the Tomb 2014      3         2     2
## 81                                Nightcrawler 2014      1        -1    10
## 82                                No Good Deed 2014      1         0    10
## 83                                        Noah 2014      1         6     1
## 84                                    Non-Stop 2014      1         0     1
## 85                                    Not Cool 2014      1         0     8
## 86                                       Ouija 2014      1        -4    15
## 87                                   Paddington 2014      1        14     8
## 88       Paranormal Activity: The Marked Ones 2014      1         0    15
## 89                        Penguins of Madagascar 2014      1         8    12
## 90                         Planes: Fire & Rescue 2014      3         0    12
## 91                                    Pompeii 2014      1         0     1
## 92                                  Ride Along 2014      1         0     1
## 93                                       Rio 2 2014      2         4    12
## 94                                    RoboCop 2014      1         7     1
## 95                                  Rosewater 2014      1         1     9
## 96                                  Rudderless 2014      1         0     8
## 97                                    Sabotage 2014      1        17     1
## 98                                       Selma 2014      1        -5     9
## 99                                      Serena 2014      1         0     3
## 100                                Seventh Son 2014      1         0     1
## 101                                   Sex Tape 2014      1         0     8
## 102            Sin City: A Dame to Kill For 2014      2         0    10
## 103                                Son of God 2014      1         2     9
## 104                                   Song One 2014      1         0     3
## 105                                St. Vincent 2014      1        20     8
## 106                                    Taken 3 2014      3         6     1
## 107                                      Tammy 2014      1         0     8
## 108            Teenage Mutant Ninja Turtles 2014      1         0     1
## 109                      That Awkward Moment 2014      1         0     8
## 110                               The Admiral 2014      1         3     2
## 111                The Amazing Spider-Man 2 2014      2         6     1
## 112                               The Babadook 2014      1        -3     3
## 113                             The Best of Me 2014      1         3     3
## 114                           The Book of Life 2014      1         9    12
```

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## 115                            The Boxtrolls 2014      1         5    12
## 116                        The Devil's Hand 2014      1         0     7
## 117                                The Drop 2014      1        -1    10
## 118                           The Equalizer 2014      1         0     1
## 119                       The Expendables 3 2014      3         0     1
## 120                 The Fault in Our Stars 2014      1         7     3
## 121  The Fluffy Movie: Unity Through Laughter 2014      1         0     8
## 122                              The Gambler 2014      1        -2    10
## 123                                The Giver 2014      1         6     3
## 124                             The Good Lie 2014      1        10     3
## 125 The Hobbit: The Battle of the Five Armies 2014      6         3     2
## 126                             The Homesman 2014      1         2     3
## 127                The Hundred-Foot Journey 2014      1        11     8
## 128    The Hunger Games: Mockingjay - Part 1 2014      3         2     2
## 129                             The Identical 2014      1         0     3
## 130                      The Imitation Game 2014      1         9     9
## 131                           The Interview 2014      1         0     1
## 132                               The Judge 2014      1         2    10
## 133                  The Legend of Hercules 2014      1         0     1
## 134                           The Lego Movie 2014      1        -2    12
## 135                                The Loft 2014      1         2     6
## 136                          The Maze Runner 2014      1         2     1
## 137                         The Monuments Men 2014      1         0     3
## 138                         The November Man 2014      1         0     1
## 139                              The Nut Job 2014      1         0    12
## 140                           The One I Love 2014      1         2     8
## 141                         The Other Woman 2014      1        -1     8
## 142                        The Purge: Anarchy 2014      2        -3     1
## 143                              The Pyramid 2014      1         0    15
## 144                                The Rover 2014      1         0    10
## 145                            The Salvation 2014      1         0     3
## 146                The Theory of Everything 2014      1         8     9
## 147                       The Water Diviner 2014      1         7     3
## 148     The Woman in Black 2: Angel of Death 2014      2        -6     3
## 149                     Think Like a Man Too 2014      2         0     8
## 150                            Transcendence 2014      1         0     3
## 151          Transformers: Age of Extinction 2014      4         0     1
## 152                                    Tusk 2014      1         0     8
## 153                                 Unbroken 2014      1         0     9
## 154                            Veronica Mars 2014      1        10    10
## 155                When the Game Stands Tall 2014      1         0     3
## 156                                 Whiplash 2014      1         2     3
## 157                               White God 2014      1        11     3
## 158                                    Wild 2014      1         0     2
## 159                              Wild Tales 2014      1         7     8
## 160                            Winter's Tale 2014      1         0     3
## 161                          Wish I Was Here 2014      1         0     8
## 162               X-Men: Days of Future Past 2014      7         3     1
## 163                       Yves Saint Laurent 2014      1         0     9
## 164                          Jurassic World 2015      4         1     1
## 165                 Avengers: Age of Ultron 2015      2        21     1
## 166                               Furious 7 2015      7       -17     1
## 167                             Inside Out 2015      1         2    12
## 168                                Minions 2015      2        -2     1
```

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## 169                           Pitch Perfect 2 2015      2         1     8
## 170       Mission: Impossible - Rogue Nation 2015      5         3     3
## 171                                    Home 2015      1        -2     8
## 172                     Fifty Shades of Grey 2015      1         9     3
## 173 The SpongeBob Movie: Sponge Out of Water 2015      2         0     8
## 174                              San Andreas 2015      1         3     1
## 175                       Mad Max: Fury Road 2015      4        -4     1
## 176                    Straight Outta Compton 2015      1         5     9
## 177                                Insurgent 2015      2        -6     2
## 178                                      Spy 2015      1         0     1
## 179                               Trainwreck 2015      1         1    12
## 180                             Tomorrowland 2015      1         1    12
## 181                                Get Hard 2015      1         6     8
## 182                           Terminator Genisys 2015      5         1     1
## 183                                    Ted 2 2015      2         5     8
## 184                    Paul Blart: Mall Cop 2 2015      2        15     1
## 185                                  Pixels 2015      1        10     1
## 186                             Magic Mike XXL 2015      2         7     8
## 187                          The Wedding Ringer 2015      1        -8     8
## 188                                  Vacation 2015      5        13     2
## 189                             Fantastic Four 2015      1        20     1
## 190                               Poltergeist 2015      1        -5    15
## 191                            Jupiter Ascending 2015      1         0     1
## 192                          The Age of Adaline 2015      1        11     3
## 193                                       Max 2015      1         0     1
## 194                            The Longest Ride 2015      1        19     3
## 195                                  The Gift 2015      1        11     1
## 196                           The Boy Next Door 2015      1        16     6
## 197                                Hot Pursuit 2015      1         2     1
## 198                                   The DUFF 2015      1         2     8
## 199                              Woman in Gold 2015      1        19    10
## 200                                  Entourage 2015      1         6     3
## 201                                Paper Towns 2015      1         6     3
## 202                          The Lazarus Effect 2015      1         7     8
## 203                                  Sinister 2 2015      2       -38     1
## 204                           Ricki and the Flash 2015      1        25     3
## 205                               Project Almanac 2015      1         7     8
## 206                             Hitman: Agent 47 2015      1        10     8
## 207                                      Dope 2015      1         2     8
## 208                    Hot Tub Time Machine 2 2015      2         9     8
## 209                             American Ultra 2015      1        21     1
## 210                                  The Gunman 2015      1         3     8
## 211                                   Mortdecai 2015      1        -2     8
## 212                                    Blackhat 2015      1         4     3
## 213            Me and Earl and the Dying Girl 2015      1        15     8
## 214                          The Vatican Tapes 2015      1        -2    15
## 215                                    Maggie 2015      1        10     3
## 216                                  Americons 2015      1         0     3
## 217                                  Road Hard 2015      1        14     3
## 218                                    Ant-Man 2015      1        18     1
## 219                                  Southpaw 2015      1         6     1
## 220                                  Ex Machina 2015      1         3     3
## 221                  The Man from U.N.C.L.E. 2015      1         8     6
## 222                                 Cinderella 2015      1         2     8
```

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## 223                                  Chappie 2015      1         8     1
## 224                              Brotherly Love 2015      1         0     8
## 225                               Run All Night 2015      1         3     8
## 226     The Second Best Exotic Marigold Hotel 2015      2        26     1
## 227                                  Child 44 2015      1         4     4
## 228                                     Aloha 2015      1        13    15
## 229                         Unfinished Business 2015      1         7     8
## 230                                  War Room 2015      1        10     1
## 231                                The Gallows 2015      1        -5    15
## 232                                              NA     NA        NA    NA
##     Ratings     Gross    Budget Screens    Views  Likes Dislikes Comments
## 1       6.3      9130   4000000      45  3280543   4632      425      636
## 2       7.1 192000000  50000000    3306   583289   3465       61      186
## 3       6.2  30700000  28000000    2872   304861    328       34       47
## 4       6.3 106000000 110000000    3470   452917   2429      132      590
## 5       4.7  17300000   3500000    2310  3145573  12163      610     1082
## 6       4.6     29000    500000      NA    91137    112        7        1
## 7       6.1  42600000  40000000    3158  3013011   9595      419     1020
## 8       7.1   5750000  20000000     818  1854103   2207      197      593
## 9       6.5  26000000  28000000    2714  2213659   2210      419      382
## 10      6.1  48600000  12500000    2253  5218079  11709      532      770
## 11      7.3 350000000  58800000    3555  3927600  13143      573     3134
## 12      5.7  15200000  30000000    1762   519327    963       94       70
## 13      5.4  84300000   6500000    3185 19032902  38810     4382     4392
## 14      5.2  85900000  65000000    3116   930006   5150      707     1484
## 15      4.4    830000   5000000      65   595194     85       36       39
## 16      6.6     11800   6000000      18  3915978   6983      247      460
## 17      6.3     72300   5000000      25  1391527   2479      146      182
## 18      6.9  14600000   7000000      31  1828235   7633      235      685
## 19      7.9 222000000 165000000    3761  4700023  14163      538     1293
## 20      6.6  21600000   9000000    1823  1348142   4404      307     1033
## 21      6.5  46300000  40000000    3555  7977747  18690     1940     2214
## 22      8.0  25400000   4000000     771  1671367   4572      207      741
## 23      5.7  20300000  28000000    2647  2088644   6633      255     1235
## 24      6.5   1870000   7000000     482  4398243   9202      454     1150
## 25      7.0      9840   1000000      NA     7128      1        0        0
## 26      6.7   6370000   3000000     382  2902492   9522      558     2296
## 27      7.8 260000000 170000000    3938   760262   2918       66      837
## 28      7.7 209000000 170000000    3967  1735700   6772      187      889
## 29      6.2  30500000  30000000      97   465219   1348       72      162
## 30      4.0  15800000   7000000    2544  1844690   3728      581      729
## 31      6.8 151000000  85000000    3936   463866   3400      152      987
## 32      6.4  42000000  36000000    3376   384448   1230      129      228
## 33      6.3  55900000  70000000      NA  9149892  26427     1342     5278
## 34      6.8  28800000  27000000    2781   522630   1248      153      227
## 35      5.8  86200000  35000000    3154  3287020   7698      446     1122
## 36      5.8  38900000  13000000    3230  1488038   2571      553      643
## 37      7.9 100000000 178000000    3490 15568277  29251     1730     6439
## 38      6.3  23400000  20000000    2800 11850723  24226     1343     2577
## 39      5.7      8690   4500000      NA   735551    636       98       92
## 40      7.1   1210000  24000000      66  6685088   8369      467     1580
## 41      7.6  85700000  68000000    3313  2276605   3946      331     1286
## 42      6.4    102000   1850000       8  1034480   6490      181      374
## 43      5.0  60800000   2000000     780   456564   1706      413      890
```

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## 44      6.1    104000   1000000       3    99427     47       10       12
## 45      6.5 201000000 160000000    3952  1156609   2968      112      547
## 46      8.2 168000000  61000000    3014   396010   1390       58      342
## 47      8.1 333000000 170000000    4080  1313548   8567      269     1285
## 48      5.6     30100     70000       9   924347   1406      107      132
## 49      5.8  91400000  12000000    2417   175017    461       34      133
## 50      6.1  72700000 100000000    3595  9324678  15479     1130     3925
## 51      6.3  54400000  42000000      93  1292235   5284      124      362
## 52      7.9 177000000 145000000    4253 11472161  22779      862     2863
## 53      6.8  50500000  11000000    1272  9222933  41728      924     3609
## 54      6.1    275000   8932780       6     8210      6        0        0
## 55      6.7   8090000  20000000     645  1167941   2651       82      797
## 56      8.7 188000000 165000000    3561  5421705  16635      751     4316
## 57      5.8  47600000  50000000    3434  4270410   8886      569     3058
## 58      6.0 128000000  50000000    2440   817242   4391      112      346
## 59      6.9  14700000   2000000       4     4877      6        1        1
## 60      6.2  50500000  60000000    3387  3320754   4322      347     1105
## 61      6.9  47000000  40000000    2905  1438350   4028      133      543
## 62      7.2  43000000  20000000    2589  4846645  14722      405     2732
## 63      7.0   2450000   5000000     374  3650720   6917      234     1119
## 64      7.8 128000000  81000000    3204  2767873  46023      944     6946
## 65      6.5    129000  25000000      28   289922    143       17        9
## 66      3.1  14000000  16000000    1825  5611593  11187     2111     7595
## 67      6.5  82400000  17000000    1534  4450824   7315      546      909
## 68      5.7      8300   2400000      NA  1222921   5553      193      335
## 69      4.8      2470    300000       3    30529     18        4        2
## 70      6.4 127000000  40000000    3173  1142964   2346      167      311
## 71      7.0 241000000 180000000    3948   557012   3528      135      464
## 72      6.3    348000  15000000      66   177465    595       39       71
## 73      7.1  36400000  25000000    3019  1470438   4314      168      511
## 74      5.4  10400000   5000000    1044   667852    469       38       44
## 75      6.9 112000000 145000000    3934   277848    890       45       88
## 76      6.5  51200000  50000000    3194  3037329   6696      564     1061
## 77      6.3   4010000   5000000     255   446576    659       50       45
## 78      6.6  43600000  66000000    3115  1451649   7342      533     2305
## 79      6.4 150000000  18000000    3279  2554307   8722      298      693
## 80      6.3 114000000 127000000      22  3779254  13535      362     1221
## 81      7.9  32300000   8500000    2766  6082510  12522      543     2170
## 82      5.6  52500000  13200000    2130   608230    895      118      387
## 83      5.9 101000000 125000000    3567 13661095  41254     3812    18077
## 84      7.0  91400000  50000000    3090   367551    700       19       37
## 85      5.2     35700    600000      NA  5403836 187162     3145    24919
## 86      4.4  50800000   5000000    2061 11724815  30208     2150     4926
## 87      7.2  76100000  55000000    3303  2028767   3829      500      665
## 88      5.0  32500000   5000000    2867   105480    352       45       85
## 89      6.8  83300000 132000000      32  1223790   2934      123      226
## 90      5.9  59200000  50000000    3826  2117798   2124      485      626
## 91      5.6  23200000 100000000    2658   355563   1568      106      267
## 92      6.1 134000000  25000000    2663  8429023  27484      977     2195
## 93      6.4 132000000 103000000    3948  3849768   9783      704     1151
## 94      6.2  58600000 100000000    3372  3305047  11733     1077     4319
## 95      6.6   3090000   5000000     371   909596   2214      186      632
## 96      7.5     37400   5000000      NA   827239   3221       89      432
## 97      5.7  10500000  35000000    2486  3466458   6096      411      977
```

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## 98      7.5  52100000  20000000    2179  3743181  16782      565     4973
## 99      5.4    176000  30000000      59  3726728   6221      405     1074
## 100     5.5  17200000  95000000    2875    23360     36        5        5
## 101     5.1  38500000  40000000    3062  2757667   3030      418      251
## 102     6.6  13800000  65000000    2894  5223362  18770      627     2796
## 103     5.5  59700000  22000000    3260   943306   3006      325     1401
## 104     5.8     20200   6000000      27  2426078   9230      184      373
## 105     7.3  44100000  13000000      18  4176181   9463      310      885
## 106     6.1  89300000  48000000      21  1544390   2975      136      380
## 107     4.8  84500000  20000000    3465  3429055   7682      675      727
## 108     5.9 191000000 125000000    3845  7908038  27312     3439     8533
## 109     6.1  26000000   8000000    2809  6132551  14539      653      846
## 110     7.1   2590000   9500000    1586   134353    280       43      308
## 111     6.8 203000000 200000000    4324   386857   4996      233      864
## 112     6.9    924000   2000000     147  6501107  14139      890     2928
## 113     6.6  26800000  26000000       8  5546710  15351      535     1271
## 114     7.3  50200000  50000000      12  5165441  17476      871     3229
## 115     6.8  50800000  60000000    3464  2545852   3964      378      554
## 116     4.8      4240   7000000      NA   330363    406       52       92
## 117     7.1  10700000  12600000     809  2897407   5953      153      569
## 118     7.2 102000000  55000000    3236  7075635  15858      574     1966
## 119     6.1  39300000  90000000      90 14453673  33092     1336     5005
## 120     7.9 125000000  12000000    3173 32626778 370552     4752    38363
## 121     7.0   2820000        NA     432    10747      4        1        1
## 122     6.1  33600000  25000000     103  4790221   4740      454      773
## 123     6.5  45100000  25000000     702   523457   2187      149      565
## 124     7.4   2720000  20000000     461  1303646   3306      211      564
## 125     7.5 255000000 250000000    3875  3554189  14152      262     1782
## 126     6.6   2430000  16000000       4    26528     58        1        8
## 127     7.3  54200000  22000000    2023    24809    277       12       52
## 128     6.8 337000000 125000000    4151  3305417  14684      332     1176
## 129     5.0   2820000  12000000      NA   309610    729       97      113
## 130     8.1  91100000  14000000     747  3047849  11748      253     1237
## 131     6.7   6110000  44000000      78  6231191  13331     1265     3430
## 132     7.5  47100000  50000000    3003  1325872   4829      104      378
## 133     4.2  18800000  70000000    2104   797229   1606      630      456
## 134     7.8 258000000  60000000    3775   439159   1847      105      289
## 135     6.3   5980000  14000000    1841   381071    238       27       43
## 136     6.8 102000000  34000000     173  3156436  18124      213     2753
## 137     6.1  78000000  70000000    3083    10649     21        1        0
## 138     6.3  25000000  15000000    2776  1935432   3089      155      567
## 139     5.8  64200000  42000000    3427  2269032   3046      546      554
## 140     7.1    512000    100000      20  1223891   1309      148      239
## 141     6.0  83900000  40000000    3205  8479994  35071     2233     3479
## 142     6.5  71500000   9000000    2805  1142295   3895      193      882
## 143     4.7   2750000   6500000     685  4092871   8781      794     2046
## 144     6.4   1110000  12250000       5      702      1        0        1
## 145     6.8      5000  11712311       2   253631    170       11       58
## 146     7.8  35900000  15000000      15  3226251  18240      261     2104
## 147     7.2   4190000  22500000     320  3281842   4968      445     2099
## 148     4.9  26500000   1000000    2602      698     16        1        9
## 149     5.7  65200000  24000000    2225  2063089   5858      336      346
## 150     6.3  23000000 100000000    3455 14141585  36646     1459     6811
## 151     5.8 245000000 210000000    4233   170909    791      362      230
```

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## 152    5.4   1820000   2800000    449   473100    670    104    380
## 153    7.2 116000000  65000000   3131  6637551  19833    815   3403
## 154    6.8   3320000   6000000    291   476747   2079    166    232
## 155    6.6  30100000  15000000    794   280566    477     56     82
## 156    8.6  13100000   3300000     42  7750223  17541    631   2760
## 157    6.9    280000   2487820      2   166612    571     36     70
## 158    7.2  37900000  15000000   1061  5976092   9343    649   1333
## 159    8.2   3080000   3300000      4   697105   1023     39    429
## 160    6.2     22500  60000000   2965   719976   1312     76    189
## 161    6.7   3590000   6000000     68   865690   1375     79     67
## 162    8.1 234000000 200000000   3996     2285      9      0      1
## 163    6.2    717000  12000000      2   550734    894     44     77
## 164    7.3 643000000 150000000   4274  9143740  34746   1074   5107
## 165    7.8 458000000 250000000   4276 10366624  31552    989   3843
## 166    7.4 350000000 190000000   4004    59056    330      8     39
## 167    8.6 345000000 175000000   3946  1438926   4632    262    496
## 168    6.6 325000000  74000000   4301  1341909   1607    764     48
## 169    6.7 183000000  29000000   3473  9214467  39824    998   1987
## 170    7.8 171000000 150000000   3956  8748596  20352    649   1842
## 171    6.7 177000000 135000000   3708 10341783  24413   1675   3426
## 172    4.2 166000000  40000000   3646 31859569  49900  13960   9119
## 173    6.1 162000000  74000000   3641  5536822  29411   1840   1281
## 174    6.4 154000000 110000000   3777 12632836  36508   2210   7559
## 175    8.3 153000000 150000000   3702  2732371  13030    497   1774
## 176    8.3 135000000  28000000   2757   848970  12607    237   1560
## 177    6.4 130000000 110000000   3875  2834800   5664   5746     66
## 178    7.3 110000000  65000000   3711  6649290  20750    750   1666
## 179    6.7 105000000  35000000   3158  9511288  19903   2581   2955
## 180    6.6  93200000 190000000   3972   999867   4212     66    250
## 181    6.1  90400000  40000000   3175 10078326  26565   1418   2395
## 182    6.8  89400000 155000000   3758    84870    265     13     63
## 183    6.6  81300000  68000000   3442  6711914  29903    984   1767
## 184    4.3  71000000  30000000     90  2389347   8809    935    892
## 185    5.6  71000000  88000000   3723  5340100  26134   2007   3717
## 186    6.2  65900000  14800000   3355  5128288  18475    858   1579
## 187    6.7  64500000  23000000   3003  4826940  10521    478    755
## 188    6.3  54900000  31000000   3411  2554327  10062    464    871
## 189    4.0  52700000 120000000   3995  7560211  24168   3524   7139
## 190    5.0  47400000  35000000   3240  3651828  13998    969   2205
## 191    5.5  47400000 176000000   3181  3920842  10535    565   1668
## 192    7.3  42500000  25000000   2991 11036701  50002   1005   3525
## 193    7.0  41900000  20000000   2855  2947239  19201    625   1842
## 194    7.2  37400000  34000000   3366  2393017  13291    369    584
## 195    7.6  36100000   5000000   1648  2513544   6970    270   1105
## 196    4.6  35400000   4000000   2602  5588384  15144    913   1499
## 197    5.0  34500000  35000000   3003  6964819  26601   1111   1293
## 198    6.6  34000000   8500000   2575 12792898  56001   2083   4102
## 199    7.4  33300000  11000000    258     6495     82      3      7
## 200    7.1  32400000  30000000   3108  1841293   5879    314    634
## 201    6.9  31400000  12000000   3031  2854910  23254    459   1087
## 202    5.2  25800000   3300000   2666  4442147  10605    691   2739
## 203    5.5  19000000  10000000   2766 11037833  36874   1885   4360
## 204    6.1  23500000  18000000   1603   638374   4018    130    269
## 205    6.4  22300000  12000000   2893  6646785  16041    955   2787
```

```
## 206     5.9  16100000  35000000    3261 13154873  46684     3565     8578
## 207     7.5  16800000    700000    2002    50444    238        3       28
## 208     5.1  12300000  14000000    2880    11496    194        9       31
## 209     6.5  10900000  28000000    2778  2996539   1874       32      189
## 210     5.8  10600000  40000000    2816  3098749   4311      341      881
## 211     5.5   7610000  60000000    2648  3850758  13363      453     1276
## 212     5.4   7100000  70000000    2567  2409338   6923      340      714
## 213     8.2   6740000   8000000      34  4032265  18398      302     1298
## 214     4.5   1710000   8495000     420  1364537   3824      689      772
## 215     5.6    131000   4500000      79  5085068  14359      600     2468
## 216     7.3    129000   4000000      14    63724    115       28       14
## 217     6.3    106000   1500000      22    44963    109       27       42
## 218     7.8 169000000 130000000    3856  9597644  32558     2672     8359
## 219     7.7  49500000  30000000    2772 11476882  40496     1383     4435
## 220     7.7  25400000  15000000    1255   419470   2218       46      239
## 221     7.6  34600000  75000000    3638  5216680  20010      500     2300
## 222     7.1 201000000  95000000    3845 10164908  22726     4245     5262
## 223     7.0  31600000  49000000    3201  7384182  23597      786     3481
## 224     6.9    444000   1900000     200   890619   6352      293      700
## 225     6.6  26400000  50000000    3171  5671767  10073      480     1712
## 226     6.6  33100000  10000000    1573   831044   2427       99      247
## 227     6.4   1210000  50000000      66  3701061   9325      641     1859
## 228     5.5  21000000  37000000    2815  7119456  18803     1128     2290
## 229     5.4  10200000  35000000    2777  3450614   6823      325      409
## 230     5.4  12300000   3000000      NA    66872    400       67      201
## 231     4.4  22600000    100000    2720   659772   2841      431      606
## 232      NA        NA        NA      NA       NA     NA       NA       NA
##     Aggregate_Followers replace_mean_Year replace_mean_Sequel
## 1               1120000          2014.000            1.000000
## 2              12350000          2014.000            2.000000
## 3                483000          2014.000            1.000000
## 4                568000          2014.000            2.000000
## 5               1923800          2014.000            2.000000
## 6                310000          2014.000            1.000000
## 7               8153000          2014.000            1.000000
## 8                130655          2014.000            1.000000
## 9                125646          2014.000            1.000000
## 10              21697300          2014.000            1.000000
## 11                 24300          2014.000            1.000000
## 12                386400          2014.000            1.000000
## 13              19420105          2014.000            1.000000
## 14               5130800          2014.000            1.000000
## 15                 15112          2014.000            3.000000
## 16                253000          2014.000            1.000000
## 17               1658900          2014.000            1.000000
## 18                116100          2014.000            1.000000
## 19                199800          2014.000            1.000000
## 20                888000          2014.000            1.000000
## 21               2417000          2014.000            1.000000
## 22                105000          2014.000            1.000000
## 23               3209000          2014.000            1.000000
## 24               4769100          2014.000            1.000000
## 25                  2182          2014.000            1.000000
## 26                    NA          2014.000            1.000000
```

```
## 27              8030000          2014.000          2.000000
## 28               114000          2014.000          2.000000
## 29               744600          2014.000          1.000000
## 30                 9536          2014.000          1.000000
## 31              1030000          2014.000          1.000000
## 32               276750          2014.000          2.000000
## 33               395500          2014.000          1.000000
## 34               147000          2014.000          1.000000
## 35             17064000          2014.000          3.000000
## 36                88586          2014.000          1.000000
## 37              5610000          2014.000          1.000000
## 38                21500          2014.000          1.000000
## 39              1060000          2014.000          1.000000
## 40             13720000          2014.000          1.000000
## 41              1888000          2014.000          1.000000
## 42                66600          2014.000          1.000000
## 43               412000          2014.000          1.000000
## 44                   NA          2014.000          1.000000
## 45              1870000          2014.000          1.000000
## 46             20640000          2014.000          1.000000
## 47              2750000          2014.000          1.000000
## 48              5887700          2014.000          1.000000
## 49                   NA          2014.000          1.000000
## 50              9414000          2014.000          1.000000
## 51              1650000          2014.000          2.000000
## 52               671000          2014.000          2.000000
## 53              1800000          2014.000          1.000000
## 54                58900          2014.000          1.000000
## 55                   NA          2014.000          1.000000
## 56              1865000          2014.000          1.000000
## 57               301000          2014.000          1.000000
## 58              4720000          2014.000          1.000000
## 59                   NA          2014.000          1.000000
## 60               147000          2014.000          5.000000
## 61                27323          2014.000          1.000000
## 62                   NA          2014.000          1.000000
## 63              1045200          2014.000          1.000000
## 64              5407000          2014.000          1.000000
## 65                   NA          2014.000          1.000000
## 66               116800          2014.000          1.000000
## 67              2356000          2014.000          1.000000
## 68              1463000          2014.000          1.000000
## 69                18100          2014.000          1.000000
## 70                   NA          2014.000          1.000000
## 71                 5633          2014.000          1.000000
## 72               644000          2014.000          1.000000
## 73               130000          2014.000          1.000000
## 74               919000          2014.000          1.000000
## 75              8839043          2014.000          1.000000
## 76              9850000          2014.000          3.000000
## 77                   NA          2014.000          1.000000
## 78              2594000          2014.000          1.000000
## 79             14240000          2014.000          1.000000
## 80              6480000          2014.000          3.000000
```

```
## 81                NA         2014.000          1.000000
## 82           1550500         2014.000          1.000000
## 83           1810000         2014.000          1.000000
## 84            648786         2014.000          1.000000
## 85           2720000         2014.000          1.000000
## 86            130000         2014.000          1.000000
## 87            124000         2014.000          1.000000
## 88             11444         2014.000          1.000000
## 89             47200         2014.000          1.000000
## 90           3603000         2014.000          3.000000
## 91            370000         2014.000          1.000000
## 92          21586000         2014.000          1.000000
## 93            154400         2014.000          2.000000
## 94            250000         2014.000          1.000000
## 95                NA         2014.000          1.000000
## 96            217000         2014.000          1.000000
## 97           3678000         2014.000          1.000000
## 98              9224         2014.000          1.000000
## 99                NA         2014.000          1.000000
## 100           804300         2014.000          1.000000
## 101          4521000         2014.000          1.000000
## 102          8620000         2014.000          2.000000
## 103          3185900         2014.000          1.000000
## 104            33500         2014.000          1.000000
## 105           269849         2014.000          1.000000
## 106           216000         2014.000          3.000000
## 107           727000         2014.000          1.000000
## 108          1260000         2014.000          1.000000
## 109         11783000         2014.000          1.000000
## 110               NA         2014.000          1.000000
## 111          4520000         2014.000          2.000000
## 112               NA         2014.000          1.000000
## 113            48231         2014.000          1.000000
## 114         10364000         2014.000          1.000000
## 115          1280000         2014.000          1.000000
## 116               NA         2014.000          1.000000
## 117               NA         2014.000          1.000000
## 118          1800000         2014.000          1.000000
## 119          1480000         2014.000          3.000000
## 120          4240000         2014.000          1.000000
## 121           818000         2014.000          1.000000
## 122          2740000         2014.000          1.000000
## 123           184100         2014.000          1.000000
## 124           759800         2014.000          1.000000
## 125          2613000         2014.000          6.000000
## 126            25748         2014.000          1.000000
## 127            20700         2014.000          1.000000
## 128         31030000         2014.000          3.000000
## 129           275873         2014.000          1.000000
## 130               NA         2014.000          1.000000
## 131          6619435         2014.000          1.000000
## 132          5563500         2014.000          1.000000
## 133          1174806         2014.000          1.000000
## 134          4690000         2014.000          1.000000
```

```
## 135             14586         2014.000          1.000000
## 136           4734000         2014.000          1.000000
## 137              3849         2014.000          1.000000
## 138            148000         2014.000          1.000000
## 139                NA         2014.000          1.000000
## 140            226000         2014.000          1.000000
## 141           2731000         2014.000          1.000000
## 142             49424         2014.000          2.000000
## 143            420000         2014.000          1.000000
## 144              9842         2014.000          1.000000
## 145                NA         2014.000          1.000000
## 146              8204         2014.000          1.000000
## 147           1899400         2014.000          1.000000
## 148              3086         2014.000          2.000000
## 149          24388000         2014.000          2.000000
## 150              5987         2014.000          1.000000
## 151           2814900         2014.000          4.000000
## 152            180100         2014.000          1.000000
## 153            269000         2014.000          1.000000
## 154           2536000         2014.000          1.000000
## 155            585000         2014.000          1.000000
## 156            858000         2014.000          1.000000
## 157                NA         2014.000          1.000000
## 158            781200         2014.000          1.000000
## 159                NA         2014.000          1.000000
## 160           1810000         2014.000          1.000000
## 161           1818778         2014.000          1.000000
## 162          10280000         2014.000          7.000000
## 163            168700         2014.000          1.000000
## 164           6180000         2015.000          4.000000
## 165          10070000         2015.000          2.000000
## 166          11890000         2015.000          7.000000
## 167            232000         2015.000          1.000000
## 168            250000         2015.000          2.000000
## 169           7336000         2015.000          2.000000
## 170           6605000         2015.000          5.000000
## 171           5070000         2015.000          1.000000
## 172            946000         2015.000          1.000000
## 173            184000         2015.000          2.000000
## 174           9737600         2015.000          1.000000
## 175            768700         2015.000          4.000000
## 176             55618         2015.000          1.000000
## 177           4240000         2015.000          2.000000
## 178            265000         2015.000          1.000000
## 179           2014000         2015.000          1.000000
## 180           1198000         2015.000          1.000000
## 181           2939000         2015.000          1.000000
## 182           3877901         2015.000          5.000000
## 183          10988000         2015.000          2.000000
## 184           1618000         2015.000          2.000000
## 185           2466000         2015.000          1.000000
## 186           8392000         2015.000          2.000000
## 187           2284000         2015.000          1.000000
## 188           2347000         2015.000          5.000000
```

```
## 189              881000          2015.000            1.000000
## 190                1066          2015.000            1.000000
## 191             7460000          2015.000            1.000000
## 192              776000          2015.000            1.000000
## 193                2113          2015.000            1.000000
## 194              324925          2015.000            1.000000
## 195             1655987          2015.000            1.000000
## 196             4599000          2015.000            1.000000
## 197             1630000          2015.000            1.000000
## 198             6714000          2015.000            1.000000
## 199              675000          2015.000            1.000000
## 200              788000          2015.000            1.000000
## 201             4184000          2015.000            1.000000
## 202             2007000          2015.000            1.000000
## 203                5699          2015.000            2.000000
## 204                1887          2015.000            1.000000
## 205              253499          2015.000            1.000000
## 206              209000          2015.000            1.000000
## 207              986572          2015.000            1.000000
## 208             1891977          2015.000            2.000000
## 209              155000          2015.000            1.000000
## 210             1520000          2015.000            1.000000
## 211             3045000          2015.000            1.000000
## 212             1334000          2015.000            1.000000
## 213                2208          2015.000            1.000000
## 214                3841          2015.000            1.000000
## 215             3744000          2015.000            1.000000
## 216              129000          2015.000            1.000000
## 217             1188000          2015.000            1.000000
## 218                  NA          2015.000            1.000000
## 219                  NA          2015.000            1.000000
## 220                  NA          2015.000            1.000000
## 221                  NA          2015.000            1.000000
## 222                  NA          2015.000            1.000000
## 223                  NA          2015.000            1.000000
## 224                  NA          2015.000            1.000000
## 225                  NA          2015.000            1.000000
## 226                  NA          2015.000            2.000000
## 227                  NA          2015.000            1.000000
## 228                  NA          2015.000            1.000000
## 229                  NA          2015.000            1.000000
## 230                  NA          2015.000            1.000000
## 231                  NA          2015.000            1.000000
## 232                  NA          2014.294            1.359307
##     replace_mean_Sentiment replace_mean_Genre replace_mean_Ratings
## 1                 0.000000           8.000000             6.300000
## 2                 2.000000           1.000000             7.100000
## 3                 0.000000           1.000000             6.200000
## 4                 0.000000           1.000000             6.300000
## 5                 0.000000           8.000000             4.700000
## 6                 0.000000           3.000000             4.600000
## 7                 0.000000           8.000000             6.100000
## 8                 2.000000           1.000000             7.100000
## 9                 3.000000          10.000000             6.500000
```

```
## 10          0.000000          8.000000          6.100000
## 11          4.000000          1.000000          7.300000
## 12          0.000000          8.000000          5.700000
## 13          0.000000         15.000000          5.400000
## 14          0.000000          8.000000          5.200000
## 15          0.000000          3.000000          4.400000
## 16          2.000000          8.000000          6.600000
## 17          0.000000          8.000000          6.300000
## 18          0.000000          3.000000          6.900000
## 19         29.000000         12.000000          7.900000
## 20         -1.000000          3.000000          6.600000
## 21         -2.000000          8.000000          6.500000
## 22          9.000000          3.000000          8.000000
## 23          0.000000          1.000000          5.700000
## 24          2.000000          3.000000          6.500000
## 25          3.000000          3.000000          7.000000
## 26          3.000000          9.000000          6.700000
## 27          5.000000          1.000000          7.800000
## 28         -4.000000          1.000000          7.700000
## 29          0.000000         10.000000          6.200000
## 30          0.000000         15.000000          4.000000
## 31         -4.000000          2.000000          6.800000
## 32         -1.000000          3.000000          6.400000
## 33          0.000000          1.000000          6.300000
## 34          0.000000          3.000000          6.800000
## 35          0.000000          8.000000          5.800000
## 36          0.000000          2.000000          5.800000
## 37          0.000000          1.000000          7.900000
## 38          1.000000          3.000000          6.300000
## 39          0.000000          1.000000          5.700000
## 40          6.000000          9.000000          7.100000
## 41          3.000000          1.000000          7.600000
## 42         -4.000000          3.000000          6.400000
## 43          0.000000          3.000000          5.000000
## 44          0.000000         10.000000          6.100000
## 45          2.000000          1.000000          6.500000
## 46        -11.000000          3.000000          8.200000
## 47          0.000000          1.000000          8.100000
## 48          0.000000          8.000000          5.600000
## 49         -9.000000          3.000000          5.800000
## 50         -2.000000          1.000000          6.100000
## 51         -1.000000          8.000000          6.300000
## 52          3.000000         12.000000          7.900000
## 53         14.000000          3.000000          6.800000
## 54          0.000000          3.000000          6.100000
## 55          1.000000          8.000000          6.700000
## 56          2.000000          2.000000          8.700000
## 57          0.000000          1.000000          5.800000
## 58         -4.000000          2.000000          6.000000
## 59         -9.000000         15.000000          6.900000
## 60          4.000000          1.000000          6.200000
## 61         10.000000          9.000000          6.900000
## 62          0.000000          1.000000          7.200000
## 63          0.000000          9.000000          7.000000
```

```
## 64            0.000000          1.000000          7.800000
## 65           -2.000000          1.000000          6.500000
## 66            0.000000          1.000000          3.100000
## 67           -5.000000          8.000000          6.500000
## 68            0.000000          8.000000          5.700000
## 69            0.000000          7.000000          4.800000
## 70            1.000000          1.000000          6.400000
## 71            0.000000          1.000000          7.000000
## 72            0.000000          8.000000          6.300000
## 73           27.000000          9.000000          7.100000
## 74            0.000000          8.000000          5.400000
## 75           13.000000         12.000000          6.900000
## 76           -1.000000          2.000000          6.500000
## 77            0.000000          8.000000          6.300000
## 78            5.000000          1.000000          6.600000
## 79            2.000000          8.000000          6.400000
## 80            2.000000          2.000000          6.300000
## 81           -1.000000         10.000000          7.900000
## 82            0.000000         10.000000          5.600000
## 83            6.000000          1.000000          5.900000
## 84            0.000000          1.000000          7.000000
## 85            0.000000          8.000000          5.200000
## 86           -4.000000         15.000000          4.400000
## 87           14.000000          8.000000          7.200000
## 88            0.000000         15.000000          5.000000
## 89            8.000000         12.000000          6.800000
## 90            0.000000         12.000000          5.900000
## 91            0.000000          1.000000          5.600000
## 92            0.000000          1.000000          6.100000
## 93            4.000000         12.000000          6.400000
## 94            7.000000          1.000000          6.200000
## 95            1.000000          9.000000          6.600000
## 96            0.000000          8.000000          7.500000
## 97           17.000000          1.000000          5.700000
## 98           -5.000000          9.000000          7.500000
## 99            0.000000          3.000000          5.400000
## 100           0.000000          1.000000          5.500000
## 101           0.000000          8.000000          5.100000
## 102           0.000000         10.000000          6.600000
## 103           2.000000          9.000000          5.500000
## 104           0.000000          3.000000          5.800000
## 105          20.000000          8.000000          7.300000
## 106           6.000000          1.000000          6.100000
## 107           0.000000          8.000000          4.800000
## 108           0.000000          1.000000          5.900000
## 109           0.000000          8.000000          6.100000
## 110           3.000000          2.000000          7.100000
## 111           6.000000          1.000000          6.800000
## 112          -3.000000          3.000000          6.900000
## 113           3.000000          3.000000          6.600000
## 114           9.000000         12.000000          7.300000
## 115           5.000000         12.000000          6.800000
## 116           0.000000          7.000000          4.800000
## 117          -1.000000         10.000000          7.100000
```

```
## 118              0.000000          1.000000          7.200000
## 119              0.000000          1.000000          6.100000
## 120              7.000000          3.000000          7.900000
## 121              0.000000          8.000000          7.000000
## 122             -2.000000         10.000000          6.100000
## 123              6.000000          3.000000          6.500000
## 124             10.000000          3.000000          7.400000
## 125              3.000000          2.000000          7.500000
## 126              2.000000          3.000000          6.600000
## 127             11.000000          8.000000          7.300000
## 128              2.000000          2.000000          6.800000
## 129              0.000000          3.000000          5.000000
## 130              9.000000          9.000000          8.100000
## 131              0.000000          1.000000          6.700000
## 132              2.000000         10.000000          7.500000
## 133              0.000000          1.000000          4.200000
## 134             -2.000000         12.000000          7.800000
## 135              2.000000          6.000000          6.300000
## 136              2.000000          1.000000          6.800000
## 137              0.000000          3.000000          6.100000
## 138              0.000000          1.000000          6.300000
## 139              0.000000         12.000000          5.800000
## 140              2.000000          8.000000          7.100000
## 141             -1.000000          8.000000          6.000000
## 142             -3.000000          1.000000          6.500000
## 143              0.000000         15.000000          4.700000
## 144              0.000000         10.000000          6.400000
## 145              0.000000          3.000000          6.800000
## 146              8.000000          9.000000          7.800000
## 147              7.000000          3.000000          7.200000
## 148             -6.000000          3.000000          4.900000
## 149              0.000000          8.000000          5.700000
## 150              0.000000          3.000000          6.300000
## 151              0.000000          1.000000          5.800000
## 152              0.000000          8.000000          5.400000
## 153              0.000000          9.000000          7.200000
## 154             10.000000         10.000000          6.800000
## 155              0.000000          3.000000          6.600000
## 156              2.000000          3.000000          8.600000
## 157             11.000000          3.000000          6.900000
## 158              0.000000          2.000000          7.200000
## 159              7.000000          8.000000          8.200000
## 160              0.000000          3.000000          6.200000
## 161              0.000000          8.000000          6.700000
## 162              3.000000          1.000000          8.100000
## 163              0.000000          9.000000          6.200000
## 164              1.000000          1.000000          7.300000
## 165             21.000000          1.000000          7.800000
## 166            -17.000000          1.000000          7.400000
## 167              2.000000         12.000000          8.600000
## 168             -2.000000          1.000000          6.600000
## 169              1.000000          8.000000          6.700000
## 170              3.000000          3.000000          7.800000
## 171             -2.000000          8.000000          6.700000
```

```
## 172              9.000000          3.000000          4.200000
## 173              0.000000          8.000000          6.100000
## 174              3.000000          1.000000          6.400000
## 175             -4.000000          1.000000          8.300000
## 176              5.000000          9.000000          8.300000
## 177             -6.000000          2.000000          6.400000
## 178              0.000000          1.000000          7.300000
## 179              1.000000         12.000000          6.700000
## 180              1.000000         12.000000          6.600000
## 181              6.000000          8.000000          6.100000
## 182              1.000000          1.000000          6.800000
## 183              5.000000          8.000000          6.600000
## 184             15.000000          1.000000          4.300000
## 185             10.000000          1.000000          5.600000
## 186              7.000000          8.000000          6.200000
## 187             -8.000000          8.000000          6.700000
## 188             13.000000          2.000000          6.300000
## 189             20.000000          1.000000          4.000000
## 190             -5.000000         15.000000          5.000000
## 191              0.000000          1.000000          5.500000
## 192             11.000000          3.000000          7.300000
## 193              0.000000          1.000000          7.000000
## 194             19.000000          3.000000          7.200000
## 195             11.000000          1.000000          7.600000
## 196             16.000000          6.000000          4.600000
## 197              2.000000          1.000000          5.000000
## 198              2.000000          8.000000          6.600000
## 199             19.000000         10.000000          7.400000
## 200              6.000000          3.000000          7.100000
## 201              6.000000          3.000000          6.900000
## 202              7.000000          8.000000          5.200000
## 203            -38.000000          1.000000          5.500000
## 204             25.000000          3.000000          6.100000
## 205              7.000000          8.000000          6.400000
## 206             10.000000          8.000000          5.900000
## 207              2.000000          8.000000          7.500000
## 208              9.000000          8.000000          5.100000
## 209             21.000000          1.000000          6.500000
## 210              3.000000          8.000000          5.800000
## 211             -2.000000          8.000000          5.500000
## 212              4.000000          3.000000          5.400000
## 213             15.000000          8.000000          8.200000
## 214             -2.000000         15.000000          4.500000
## 215             10.000000          3.000000          5.600000
## 216              0.000000          3.000000          7.300000
## 217             14.000000          3.000000          6.300000
## 218             18.000000          1.000000          7.800000
## 219              6.000000          1.000000          7.700000
## 220              3.000000          3.000000          7.700000
## 221              8.000000          6.000000          7.600000
## 222              2.000000          8.000000          7.100000
## 223              8.000000          1.000000          7.000000
## 224              0.000000          8.000000          6.900000
## 225              3.000000          8.000000          6.600000
```

```
## 226              26.000000           1.000000             6.600000
## 227               4.000000           4.000000             6.400000
## 228              13.000000          15.000000             5.500000
## 229               7.000000           8.000000             5.400000
## 230              10.000000           1.000000             5.400000
## 231              -5.000000          15.000000             4.400000
## 232               2.809524           5.359307             6.441558
##     replace_mean_Gross replace_mean_Budget replace_mean_Screens
## 1                 9130             4000000                45.000
## 2            192000000            50000000              3306.000
## 3             30700000            28000000              2872.000
## 4            106000000           110000000              3470.000
## 5             17300000             3500000              2310.000
## 6                29000              500000              2209.244
## 7             42600000            40000000              3158.000
## 8              5750000            20000000               818.000
## 9             26000000            28000000              2714.000
## 10            48600000            12500000              2253.000
## 11           350000000            58800000              3555.000
## 12            15200000            30000000              1762.000
## 13            84300000             6500000              3185.000
## 14            85900000            65000000              3116.000
## 15              830000             5000000                65.000
## 16               11800             6000000                18.000
## 17               72300             5000000                25.000
## 18            14600000             7000000                31.000
## 19           222000000           165000000              3761.000
## 20            21600000             9000000              1823.000
## 21            46300000            40000000              3555.000
## 22            25400000             4000000               771.000
## 23            20300000            28000000              2647.000
## 24             1870000             7000000               482.000
## 25                9840             1000000              2209.244
## 26             6370000             3000000               382.000
## 27           260000000           170000000              3938.000
## 28           209000000           170000000              3967.000
## 29            30500000            30000000                97.000
## 30            15800000             7000000              2544.000
## 31           151000000            85000000              3936.000
## 32            42000000            36000000              3376.000
## 33            55900000            70000000              2209.244
## 34            28800000            27000000              2781.000
## 35            86200000            35000000              3154.000
## 36            38900000            13000000              3230.000
## 37           100000000           178000000              3490.000
## 38            23400000            20000000              2800.000
## 39                8690             4500000              2209.244
## 40             1210000            24000000                66.000
## 41            85700000            68000000              3313.000
## 42              102000             1850000                 8.000
## 43            60800000             2000000               780.000
## 44              104000             1000000                 3.000
## 45           201000000           160000000              3952.000
## 46           168000000            61000000              3014.000
```

```
## 47          333000000          170000000          4080.000
## 48              30100              70000             9.000
## 49           91400000           12000000          2417.000
## 50           72700000          100000000          3595.000
## 51           54400000           42000000            93.000
## 52          177000000          145000000          4253.000
## 53           50500000           11000000          1272.000
## 54             275000            8932780             6.000
## 55            8090000           20000000           645.000
## 56          188000000          165000000          3561.000
## 57           47600000           50000000          3434.000
## 58          128000000           50000000          2440.000
## 59           14700000            2000000             4.000
## 60           50500000           60000000          3387.000
## 61           47000000           40000000          2905.000
## 62           43000000           20000000          2589.000
## 63            2450000            5000000           374.000
## 64          128000000           81000000          3204.000
## 65             129000           25000000            28.000
## 66           14000000           16000000          1825.000
## 67           82400000           17000000          1534.000
## 68               8300            2400000          2209.244
## 69               2470             300000             3.000
## 70          127000000           40000000          3173.000
## 71          241000000          180000000          3948.000
## 72             348000           15000000            66.000
## 73           36400000           25000000          3019.000
## 74           10400000            5000000          1044.000
## 75          112000000          145000000          3934.000
## 76           51200000           50000000          3194.000
## 77            4010000            5000000           255.000
## 78           43600000           66000000          3115.000
## 79          150000000           18000000          3279.000
## 80          114000000          127000000            22.000
## 81           32300000            8500000          2766.000
## 82           52500000           13200000          2130.000
## 83          101000000          125000000          3567.000
## 84           91400000           50000000          3090.000
## 85              35700             600000          2209.244
## 86           50800000            5000000          2061.000
## 87           76100000           55000000          3303.000
## 88           32500000            5000000          2867.000
## 89           83300000          132000000            32.000
## 90           59200000           50000000          3826.000
## 91           23200000          100000000          2658.000
## 92          134000000           25000000          2663.000
## 93          132000000          103000000          3948.000
## 94           58600000          100000000          3372.000
## 95            3090000            5000000           371.000
## 96              37400            5000000          2209.244
## 97           10500000           35000000          2486.000
## 98           52100000           20000000          2179.000
## 99             176000           30000000            59.000
## 100          17200000           95000000          2875.000
```

```
## 101      38500000     40000000     3062.000
## 102      13800000     65000000     2894.000
## 103      59700000     22000000     3260.000
## 104         20200      6000000       27.000
## 105      44100000     13000000       18.000
## 106      89300000     48000000       21.000
## 107      84500000     20000000     3465.000
## 108     191000000    125000000     3845.000
## 109      26000000      8000000     2809.000
## 110       2590000      9500000     1586.000
## 111     203000000    200000000     4324.000
## 112        924000      2000000      147.000
## 113      26800000     26000000        8.000
## 114      50200000     50000000       12.000
## 115      50800000     60000000     3464.000
## 116          4240      7000000     2209.244
## 117      10700000     12600000      809.000
## 118     102000000     55000000     3236.000
## 119      39300000     90000000       90.000
## 120     125000000     12000000     3173.000
## 121       2820000     47921730      432.000
## 122      33600000     25000000      103.000
## 123      45100000     25000000      702.000
## 124       2720000     20000000      461.000
## 125     255000000    250000000     3875.000
## 126       2430000     16000000        4.000
## 127      54200000     22000000     2023.000
## 128     337000000    125000000     4151.000
## 129       2820000     12000000     2209.244
## 130      91100000     14000000      747.000
## 131       6110000     44000000       78.000
## 132      47100000     50000000     3003.000
## 133      18800000     70000000     2104.000
## 134     258000000     60000000     3775.000
## 135       5980000     14000000     1841.000
## 136     102000000     34000000      173.000
## 137      78000000     70000000     3083.000
## 138      25000000     15000000     2776.000
## 139      64200000     42000000     3427.000
## 140        512000       100000       20.000
## 141      83900000     40000000     3205.000
## 142      71500000      9000000     2805.000
## 143       2750000      6500000      685.000
## 144       1110000     12250000        5.000
## 145          5000     11712311        2.000
## 146      35900000     15000000       15.000
## 147       4190000     22500000      320.000
## 148      26500000      1000000     2602.000
## 149      65200000     24000000     2225.000
## 150      23000000    100000000     3455.000
## 151     245000000    210000000     4233.000
## 152       1820000      2800000      449.000
## 153     116000000     65000000     3131.000
## 154       3320000      6000000      291.000
```

```
## 155          30100000          15000000           794.000
## 156          13100000           3300000            42.000
## 157            280000           2487820             2.000
## 158          37900000          15000000          1061.000
## 159           3080000           3300000             4.000
## 160             22500          60000000          2965.000
## 161           3590000           6000000            68.000
## 162         234000000         200000000          3996.000
## 163            717000          12000000             2.000
## 164         643000000         150000000          4274.000
## 165         458000000         250000000          4276.000
## 166         350000000         190000000          4004.000
## 167         345000000         175000000          3946.000
## 168         325000000          74000000          4301.000
## 169         183000000          29000000          3473.000
## 170         171000000         150000000          3956.000
## 171         177000000         135000000          3708.000
## 172         166000000          40000000          3646.000
## 173         162000000          74000000          3641.000
## 174         154000000         110000000          3777.000
## 175         153000000         150000000          3702.000
## 176         135000000          28000000          2757.000
## 177         130000000         110000000          3875.000
## 178         110000000          65000000          3711.000
## 179         105000000          35000000          3158.000
## 180          93200000         190000000          3972.000
## 181          90400000          40000000          3175.000
## 182          89400000         155000000          3758.000
## 183          81300000          68000000          3442.000
## 184          71000000          30000000            90.000
## 185          71000000          88000000          3723.000
## 186          65900000          14800000          3355.000
## 187          64500000          23000000          3003.000
## 188          54900000          31000000          3411.000
## 189          52700000         120000000          3995.000
## 190          47400000          35000000          3240.000
## 191          47400000         176000000          3181.000
## 192          42500000          25000000          2991.000
## 193          41900000          20000000          2855.000
## 194          37400000          34000000          3366.000
## 195          36100000           5000000          1648.000
## 196          35400000           4000000          2602.000
## 197          34500000          35000000          3003.000
## 198          34000000           8500000          2575.000
## 199          33300000          11000000           258.000
## 200          32400000          30000000          3108.000
## 201          31400000          12000000          3031.000
## 202          25800000           3300000          2666.000
## 203          19000000          10000000          2766.000
## 204          23500000          18000000          1603.000
## 205          22300000          12000000          2893.000
## 206          16100000          35000000          3261.000
## 207          16800000            700000          2002.000
## 208          12300000          14000000          2880.000
```

```
## 209           10900000            28000000             2778.000
## 210           10600000            40000000             2816.000
## 211            7610000            60000000             2648.000
## 212            7100000            70000000             2567.000
## 213            6740000             8000000               34.000
## 214            1710000             8495000              420.000
## 215             131000             4500000               79.000
## 216             129000             4000000               14.000
## 217             106000             1500000               22.000
## 218          169000000           130000000             3856.000
## 219           49500000            30000000             2772.000
## 220           25400000            15000000             1255.000
## 221           34600000            75000000             3638.000
## 222          201000000            95000000             3845.000
## 223           31600000            49000000             3201.000
## 224             444000             1900000              200.000
## 225           26400000            50000000             3171.000
## 226           33100000            10000000             1573.000
## 227            1210000            50000000               66.000
## 228           21000000            37000000             2815.000
## 229           10200000            35000000             2777.000
## 230           12300000             3000000             2209.244
## 231           22600000              100000             2720.000
## 232           68066033            47921730             2209.244
##     replace_mean_Views replace_mean_Likes replace_mean_Dislikes
## 1              3280543            4632.00              425.0000
## 2               583289            3465.00               61.0000
## 3               304861             328.00               34.0000
## 4               452917            2429.00              132.0000
## 5              3145573           12163.00              610.0000
## 6                91137             112.00                7.0000
## 7              3013011            9595.00              419.0000
## 8              1854103            2207.00              197.0000
## 9              2213659            2210.00              419.0000
## 10             5218079           11709.00              532.0000
## 11             3927600           13143.00              573.0000
## 12              519327             963.00               94.0000
## 13            19032902           38810.00             4382.0000
## 14              930006            5150.00              707.0000
## 15              595194              85.00               36.0000
## 16             3915978            6983.00              247.0000
## 17             1391527            2479.00              146.0000
## 18             1828235            7633.00              235.0000
## 19             4700023           14163.00              538.0000
## 20             1348142            4404.00              307.0000
## 21             7977747           18690.00             1940.0000
## 22             1671367            4572.00              207.0000
## 23             2088644            6633.00              255.0000
## 24             4398243            9202.00              454.0000
## 25                7128               1.00                0.0000
## 26             2902492            9522.00              558.0000
## 27              760262            2918.00               66.0000
## 28             1735700            6772.00              187.0000
## 29              465219            1348.00               72.0000
```

```
## 30          1844690          3728.00          581.0000
## 31           463866          3400.00          152.0000
## 32           384448          1230.00          129.0000
## 33          9149892         26427.00         1342.0000
## 34           522630          1248.00          153.0000
## 35          3287020          7698.00          446.0000
## 36          1488038          2571.00          553.0000
## 37         15568277         29251.00         1730.0000
## 38         11850723         24226.00         1343.0000
## 39           735551           636.00           98.0000
## 40          6685088          8369.00          467.0000
## 41          2276605          3946.00          331.0000
## 42          1034480          6490.00          181.0000
## 43           456564          1706.00          413.0000
## 44            99427            47.00           10.0000
## 45          1156609          2968.00          112.0000
## 46           396010          1390.00           58.0000
## 47          1313548          8567.00          269.0000
## 48           924347          1406.00          107.0000
## 49           175017           461.00           34.0000
## 50          9324678         15479.00         1130.0000
## 51          1292235          5284.00          124.0000
## 52         11472161         22779.00          862.0000
## 53          9222933         41728.00          924.0000
## 54             8210             6.00            0.0000
## 55          1167941          2651.00           82.0000
## 56          5421705         16635.00          751.0000
## 57          4270410          8886.00          569.0000
## 58           817242          4391.00          112.0000
## 59             4877             6.00            1.0000
## 60          3320754          4322.00          347.0000
## 61          1438350          4028.00          133.0000
## 62          4846645         14722.00          405.0000
## 63          3650720          6917.00          234.0000
## 64          2767873         46023.00          944.0000
## 65           289922           143.00           17.0000
## 66          5611593         11187.00         2111.0000
## 67          4450824          7315.00          546.0000
## 68          1222921          5553.00          193.0000
## 69            30529            18.00            4.0000
## 70          1142964          2346.00          167.0000
## 71           557012          3528.00          135.0000
## 72           177465           595.00           39.0000
## 73          1470438          4314.00          168.0000
## 74           667852           469.00           38.0000
## 75           277848           890.00           45.0000
## 76          3037329          6696.00          564.0000
## 77           446576           659.00           50.0000
## 78          1451649          7342.00          533.0000
## 79          2554307          8722.00          298.0000
## 80          3779254         13535.00          362.0000
## 81          6082510         12522.00          543.0000
## 82           608230           895.00          118.0000
## 83         13661095         41254.00         3812.0000
```

```
## 84              367551            700.00             19.0000
## 85             5403836         187162.00           3145.0000
## 86            11724815          30208.00           2150.0000
## 87             2028767           3829.00            500.0000
## 88              105480            352.00             45.0000
## 89             1223790           2934.00            123.0000
## 90             2117798           2124.00            485.0000
## 91              355563           1568.00            106.0000
## 92             8429023          27484.00            977.0000
## 93             3849768           9783.00            704.0000
## 94             3305047          11733.00           1077.0000
## 95              909596           2214.00            186.0000
## 96              827239           3221.00             89.0000
## 97             3466458           6096.00            411.0000
## 98             3743181          16782.00            565.0000
## 99             3726728           6221.00            405.0000
## 100              23360             36.00              5.0000
## 101            2757667           3030.00            418.0000
## 102            5223362          18770.00            627.0000
## 103             943306           3006.00            325.0000
## 104            2426078           9230.00            184.0000
## 105            4176181           9463.00            310.0000
## 106            1544390           2975.00            136.0000
## 107            3429055           7682.00            675.0000
## 108            7908038          27312.00           3439.0000
## 109            6132551          14539.00            653.0000
## 110             134353            280.00             43.0000
## 111             386857           4996.00            233.0000
## 112            6501107          14139.00            890.0000
## 113            5546710          15351.00            535.0000
## 114            5165441          17476.00            871.0000
## 115            2545852           3964.00            378.0000
## 116             330363            406.00             52.0000
## 117            2897407           5953.00            153.0000
## 118            7075635          15858.00            574.0000
## 119           14453673          33092.00           1336.0000
## 120           32626778         370552.00           4752.0000
## 121              10747              4.00              1.0000
## 122            4790221           4740.00            454.0000
## 123             523457           2187.00            149.0000
## 124            1303646           3306.00            211.0000
## 125            3554189          14152.00            262.0000
## 126              26528             58.00              1.0000
## 127              24809            277.00             12.0000
## 128            3305417          14684.00            332.0000
## 129             309610            729.00             97.0000
## 130            3047849          11748.00            253.0000
## 131            6231191          13331.00           1265.0000
## 132            1325872           4829.00            104.0000
## 133             797229           1606.00            630.0000
## 134             439159           1847.00            105.0000
## 135             381071            238.00             27.0000
## 136            3156436          18124.00            213.0000
## 137              10649             21.00              1.0000
```

```
## 138          1935432          3089.00           155.0000
## 139          2269032          3046.00           546.0000
## 140          1223891          1309.00           148.0000
## 141          8479994         35071.00          2233.0000
## 142          1142295          3895.00           193.0000
## 143          4092871          8781.00           794.0000
## 144              702             1.00             0.0000
## 145           253631           170.00            11.0000
## 146          3226251         18240.00           261.0000
## 147          3281842          4968.00           445.0000
## 148              698            16.00             1.0000
## 149          2063089          5858.00           336.0000
## 150         14141585         36646.00          1459.0000
## 151           170909           791.00           362.0000
## 152           473100           670.00           104.0000
## 153          6637551         19833.00           815.0000
## 154           476747          2079.00           166.0000
## 155           280566           477.00            56.0000
## 156          7750223         17541.00           631.0000
## 157           166612           571.00            36.0000
## 158          5976092          9343.00           649.0000
## 159           697105          1023.00            39.0000
## 160           719976          1312.00            76.0000
## 161           865690          1375.00            79.0000
## 162             2285             9.00             0.0000
## 163           550734           894.00            44.0000
## 164          9143740         34746.00          1074.0000
## 165         10366624         31552.00           989.0000
## 166            59056           330.00             8.0000
## 167          1438926          4632.00           262.0000
## 168          1341909          1607.00           764.0000
## 169          9214467         39824.00           998.0000
## 170          8748596         20352.00           649.0000
## 171         10341783         24413.00          1675.0000
## 172         31859569         49900.00         13960.0000
## 173          5536822         29411.00          1840.0000
## 174         12632836         36508.00          2210.0000
## 175          2732371         13030.00           497.0000
## 176           848970         12607.00           237.0000
## 177          2834800          5664.00          5746.0000
## 178          6649290         20750.00           750.0000
## 179          9511288         19903.00          2581.0000
## 180           999867          4212.00            66.0000
## 181         10078326         26565.00          1418.0000
## 182            84870           265.00            13.0000
## 183          6711914         29903.00           984.0000
## 184          2389347          8809.00           935.0000
## 185          5340100         26134.00          2007.0000
## 186          5128288         18475.00           858.0000
## 187          4826940         10521.00           478.0000
## 188          2554327         10062.00           464.0000
## 189          7560211         24168.00          3524.0000
## 190          3651828         13998.00           969.0000
## 191          3920842         10535.00           565.0000
```

```
## 192           11036701           50002.00             1005.0000
## 193            2947239           19201.00              625.0000
## 194            2393017           13291.00              369.0000
## 195            2513544            6970.00              270.0000
## 196            5588384           15144.00              913.0000
## 197            6964819           26601.00             1111.0000
## 198           12792898           56001.00             2083.0000
## 199               6495              82.00                3.0000
## 200            1841293            5879.00              314.0000
## 201            2854910           23254.00              459.0000
## 202            4442147           10605.00              691.0000
## 203           11037833           36874.00             1885.0000
## 204             638374            4018.00              130.0000
## 205            6646785           16041.00              955.0000
## 206           13154873           46684.00             3565.0000
## 207              50444             238.00                3.0000
## 208              11496             194.00                9.0000
## 209            2996539            1874.00               32.0000
## 210            3098749            4311.00              341.0000
## 211            3850758           13363.00              453.0000
## 212            2409338            6923.00              340.0000
## 213            4032265           18398.00              302.0000
## 214            1364537            3824.00              689.0000
## 215            5085068           14359.00              600.0000
## 216              63724             115.00               28.0000
## 217              44963             109.00               27.0000
## 218            9597644           32558.00             2672.0000
## 219           11476882           40496.00             1383.0000
## 220             419470            2218.00               46.0000
## 221            5216680           20010.00              500.0000
## 222           10164908           22726.00             4245.0000
## 223            7384182           23597.00              786.0000
## 224             890619            6352.00              293.0000
## 225            5671767           10073.00              480.0000
## 226             831044            2427.00               99.0000
## 227            3701061            9325.00              641.0000
## 228            7119456           18803.00             1128.0000
## 229            3450614            6823.00              325.0000
## 230              66872             400.00               67.0000
## 231             659772            2841.00              431.0000
## 232            3712851           12732.54              679.0519
##     replace_mean_Comments replace_mean_Aggregate_Followers
## 1                 636.000                          1120000
## 2                 186.000                         12350000
## 3                  47.000                           483000
## 4                 590.000                           568000
## 5                1082.000                          1923800
## 6                   1.000                           310000
## 7                1020.000                          8153000
## 8                 593.000                           130655
## 9                 382.000                           125646
## 10                770.000                         21697300
## 11               3134.000                            24300
## 12                 70.000                           386400
```

```
## 13          4392.000          19420105
## 14          1484.000           5130800
## 15            39.000             15112
## 16           460.000            253000
## 17           182.000           1658900
## 18           685.000            116100
## 19          1293.000            199800
## 20          1033.000            888000
## 21          2214.000           2417000
## 22           741.000            105000
## 23          1235.000           3209000
## 24          1150.000           4769100
## 25             0.000              2182
## 26          2296.000           3038193
## 27           837.000           8030000
## 28           889.000            114000
## 29           162.000            744600
## 30           729.000              9536
## 31           987.000           1030000
## 32           228.000            276750
## 33          5278.000            395500
## 34           227.000            147000
## 35          1122.000          17064000
## 36           643.000             88586
## 37          6439.000           5610000
## 38          2577.000             21500
## 39            92.000           1060000
## 40          1580.000          13720000
## 41          1286.000           1888000
## 42           374.000             66600
## 43           890.000            412000
## 44            12.000           3038193
## 45           547.000           1870000
## 46           342.000          20640000
## 47          1285.000           2750000
## 48           132.000           5887700
## 49           133.000           3038193
## 50          3925.000           9414000
## 51           362.000           1650000
## 52          2863.000            671000
## 53          3609.000           1800000
## 54             0.000             58900
## 55           797.000           3038193
## 56          4316.000           1865000
## 57          3058.000            301000
## 58           346.000           4720000
## 59             1.000           3038193
## 60          1105.000            147000
## 61           543.000             27323
## 62          2732.000           3038193
## 63          1119.000           1045200
## 64          6946.000           5407000
## 65             9.000           3038193
## 66          7595.000            116800
```

```
## 67              909.000                2356000
## 68              335.000                1463000
## 69                2.000                  18100
## 70              311.000                3038193
## 71              464.000                   5633
## 72               71.000                 644000
## 73              511.000                 130000
## 74               44.000                 919000
## 75               88.000                8839043
## 76             1061.000                9850000
## 77               45.000                3038193
## 78             2305.000                2594000
## 79              693.000               14240000
## 80             1221.000                6480000
## 81             2170.000                3038193
## 82              387.000                1550500
## 83            18077.000                1810000
## 84               37.000                 648786
## 85            24919.000                2720000
## 86             4926.000                 130000
## 87              665.000                 124000
## 88               85.000                  11444
## 89              226.000                  47200
## 90              626.000                3603000
## 91              267.000                 370000
## 92             2195.000               21586000
## 93             1151.000                 154400
## 94             4319.000                 250000
## 95              632.000                3038193
## 96              432.000                 217000
## 97              977.000                3678000
## 98             4973.000                   9224
## 99             1074.000                3038193
## 100               5.000                 804300
## 101             251.000                4521000
## 102            2796.000                8620000
## 103            1401.000                3185900
## 104             373.000                  33500
## 105             885.000                 269849
## 106             380.000                 216000
## 107             727.000                 727000
## 108            8533.000                1260000
## 109             846.000               11783000
## 110             308.000                3038193
## 111             864.000                4520000
## 112            2928.000                3038193
## 113            1271.000                  48231
## 114            3229.000               10364000
## 115             554.000                1280000
## 116              92.000                3038193
## 117             569.000                3038193
## 118            1966.000                1800000
## 119            5005.000                1480000
## 120           38363.000                4240000
```

```
## 121              1.000                818000
## 122            773.000               2740000
## 123            565.000                184100
## 124            564.000                759800
## 125           1782.000               2613000
## 126              8.000                 25748
## 127             52.000                 20700
## 128           1176.000               31030000
## 129            113.000                275873
## 130           1237.000               3038193
## 131           3430.000               6619435
## 132            378.000               5563500
## 133            456.000               1174806
## 134            289.000               4690000
## 135             43.000                 14586
## 136           2753.000               4734000
## 137              0.000                  3849
## 138            567.000                148000
## 139            554.000               3038193
## 140            239.000                226000
## 141           3479.000               2731000
## 142            882.000                 49424
## 143           2046.000                420000
## 144              1.000                  9842
## 145             58.000               3038193
## 146           2104.000                  8204
## 147           2099.000               1899400
## 148              9.000                  3086
## 149            346.000               24388000
## 150           6811.000                  5987
## 151            230.000               2814900
## 152            380.000                180100
## 153           3403.000                269000
## 154            232.000               2536000
## 155             82.000                585000
## 156           2760.000                858000
## 157             70.000               3038193
## 158           1333.000                781200
## 159            429.000               3038193
## 160            189.000               1810000
## 161             67.000               1818778
## 162              1.000               10280000
## 163             77.000                168700
## 164           5107.000               6180000
## 165           3843.000               10070000
## 166             39.000               11890000
## 167            496.000                232000
## 168             48.000                250000
## 169           1987.000               7336000
## 170           1842.000               6605000
## 171           3426.000               5070000
## 172           9119.000                946000
## 173           1281.000                184000
## 174           7559.000               9737600
```

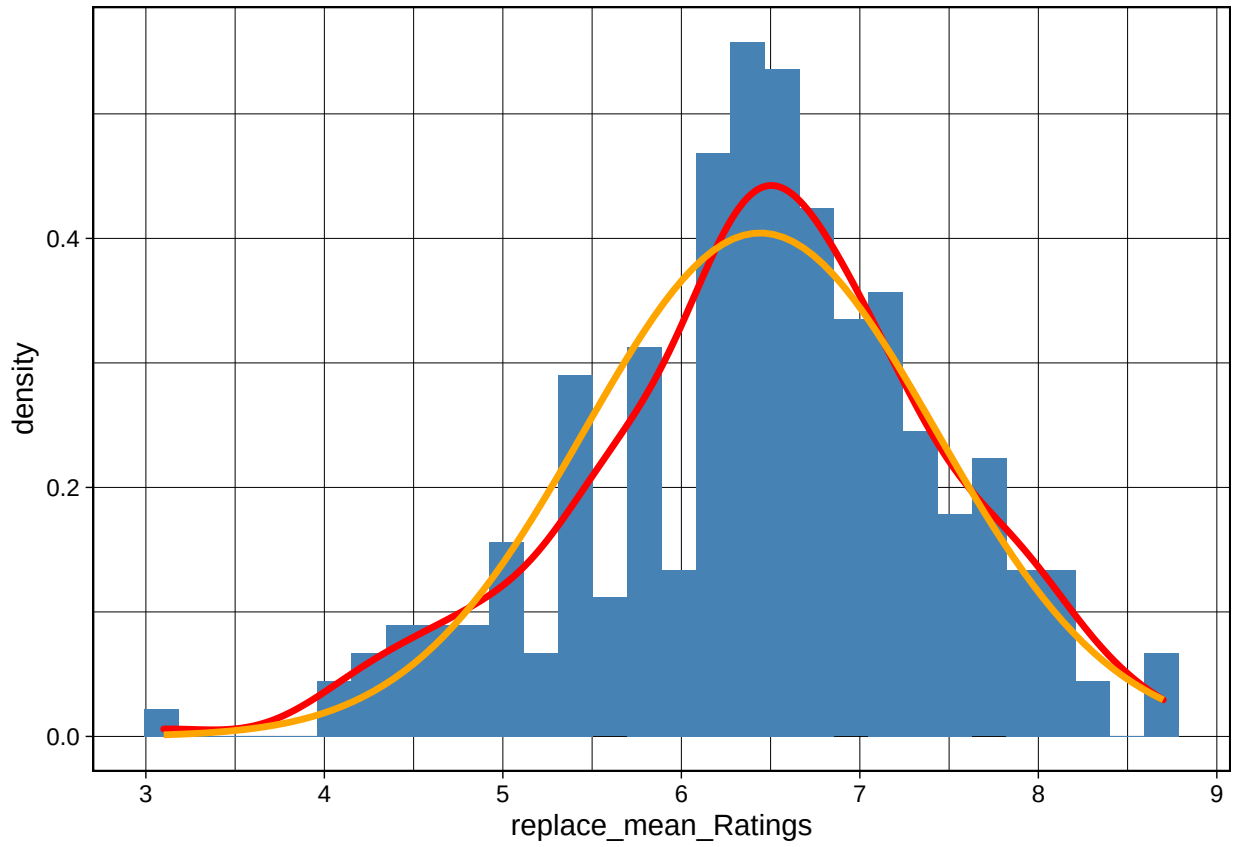
```
## 175  1774.000  768700
## 176  1560.000   55618
## 177    66.000 4240000
## 178  1666.000  265000
## 179  2955.000 2014000
## 180   250.000 1198000
## 181  2395.000 2939000
## 182    63.000 3877901
## 183  1767.000 10988000
## 184   892.000 1618000
## 185  3717.000 2466000
## 186  1579.000 8392000
## 187   755.000 2284000
## 188   871.000 2347000
## 189  7139.000  881000
## 190  2205.000    1066
## 191  1668.000 7460000
## 192  3525.000  776000
## 193  1842.000    2113
## 194   584.000  324925
## 195  1105.000 1655987
## 196  1499.000 4599000
## 197  1293.000 1630000
## 198  4102.000 6714000
## 199     7.000  675000
## 200   634.000  788000
## 201  1087.000 4184000
## 202  2739.000 2007000
## 203  4360.000    5699
## 204   269.000    1887
## 205  2787.000  253499
## 206  8578.000  209000
## 207    28.000  986572
## 208    31.000 1891977
## 209   189.000  155000
## 210   881.000 1520000
## 211  1276.000 3045000
## 212   714.000 1334000
## 213  1298.000    2208
## 214   772.000    3841
## 215  2468.000 3744000
## 216    14.000  129000
## 217    42.000 1188000
## 218  8359.000 3038193
## 219  4435.000 3038193
## 220   239.000 3038193
## 221  2300.000 3038193
## 222  5262.000 3038193
## 223  3481.000 3038193
## 224   700.000 3038193
## 225  1712.000 3038193
## 226   247.000 3038193
## 227  1859.000 3038193
## 228  2290.000 3038193
```

```
## 229                409.000                          3038193
## 230                201.000                          3038193
## 231                606.000                          3038193
## 232               1825.701                          3038193
```

```
View(movie_replace)
movie_data <- movie_replace[,19:ncol(movie_replace)]
View(movie_data)
colnames(movie_data)
```

```
## [1] "replace_mean_Ratings"              "replace_mean_Gross"
## [3] "replace_mean_Budget"               "replace_mean_Screens"
## [5] "replace_mean_Views"                "replace_mean_Likes"
## [7] "replace_mean_Dislikes"             "replace_mean_Comments"
## [9] "replace_mean_Aggregate_Followers"
```

```
ggplot(movie_data, aes(x = replace_mean_Ratings)) +
  geom_histogram(aes(y = ..density..),
                 fill = "steelblue") +
  geom_density(color = "red", lwd = 1.2) +
  stat_function(fun = dnorm, args = list(mean = mean(movie_data$replace_mean_Ratings),
                                         sd = sd(movie_data$replace_mean_Ratings)),
                color = "orange", lwd = 1.2) +
  theme_linedraw()
```

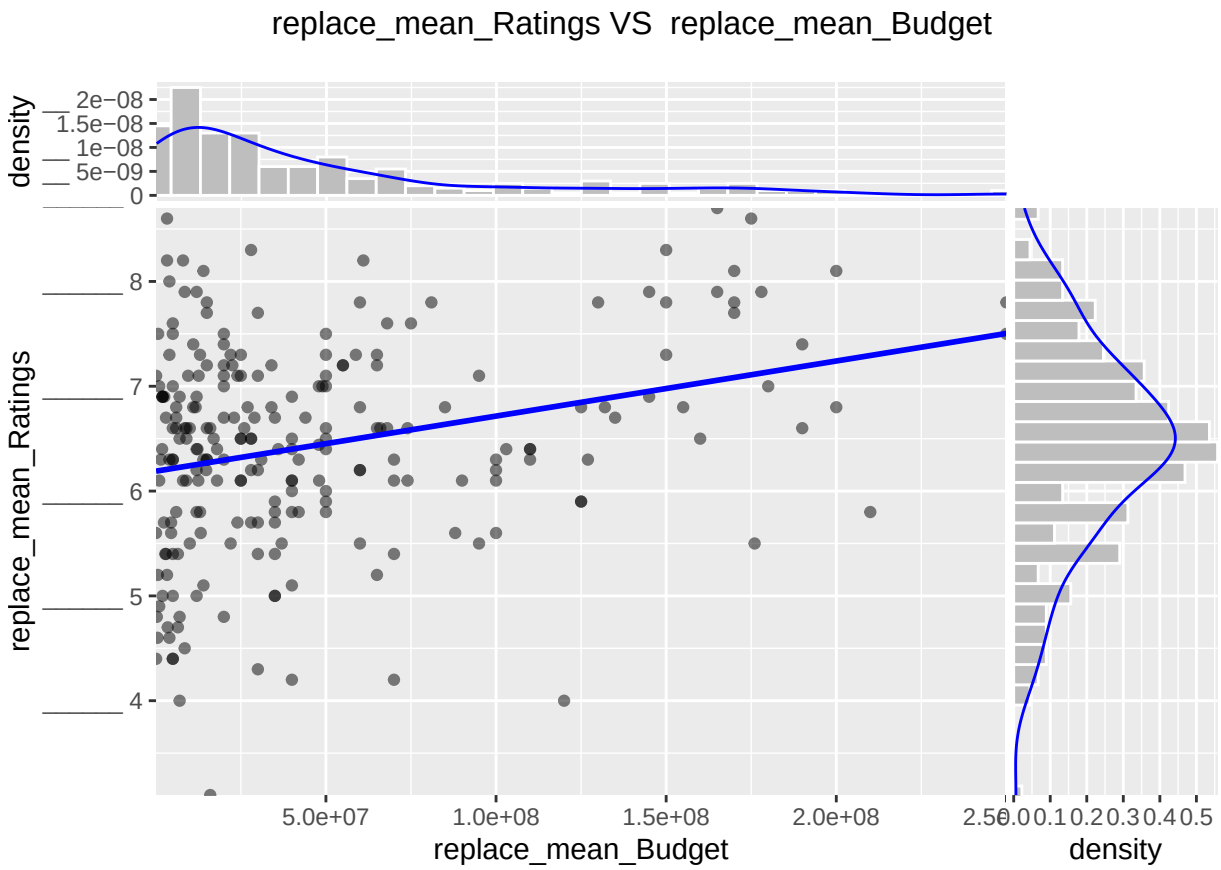


Joint Graphs

```
library(WVPlots)
```

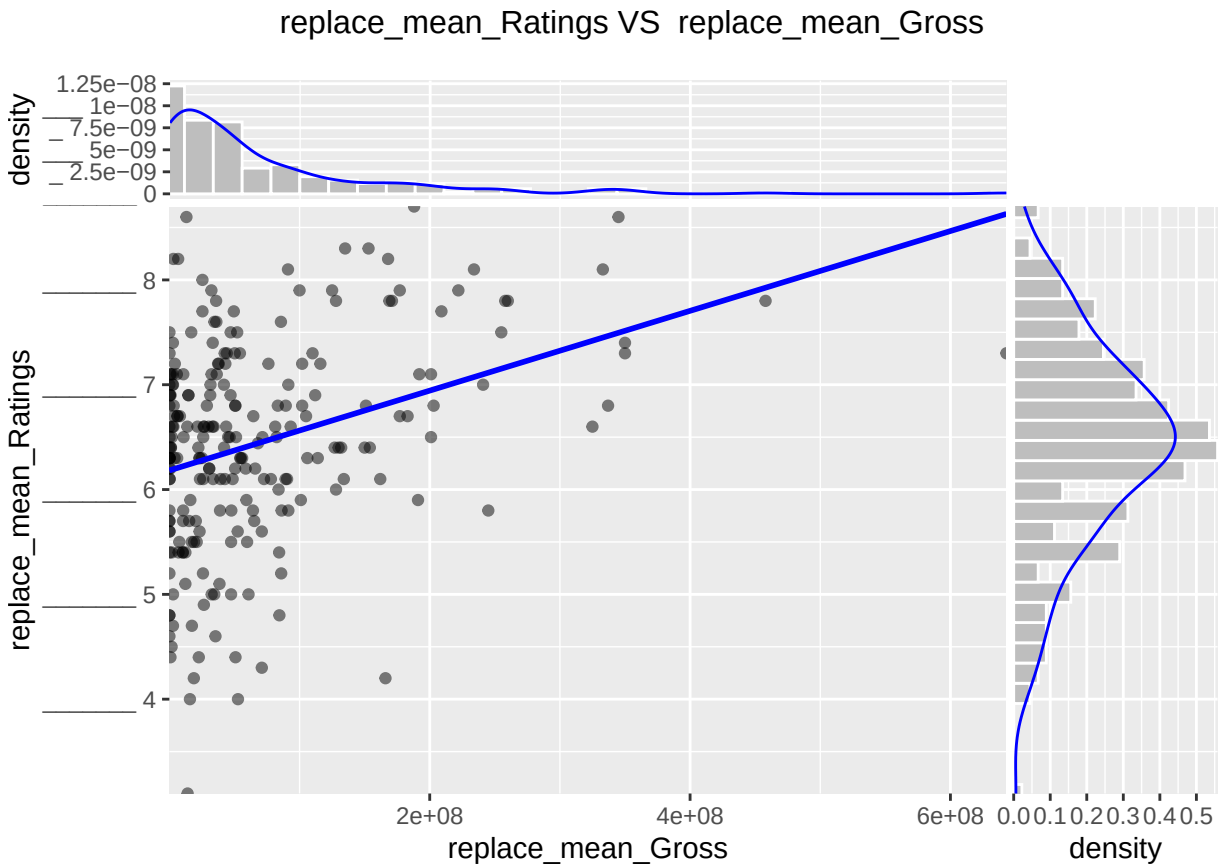
#replace_mean_Ratings VS replace_mean_Budget

```
ScatterHist(movie_data, title = "replace_mean_Ratings VS  replace_mean_Budget",
            xvar = "replace_mean_Budget", yvar = "replace_mean_Ratings",
            smoothmethod = "lm")
```



There is a positive linear relationshipbetween the variables(replace_mean_Ratings & replace_mean_Budget) #replace_mean_Ratings VS replace_mean_Gross

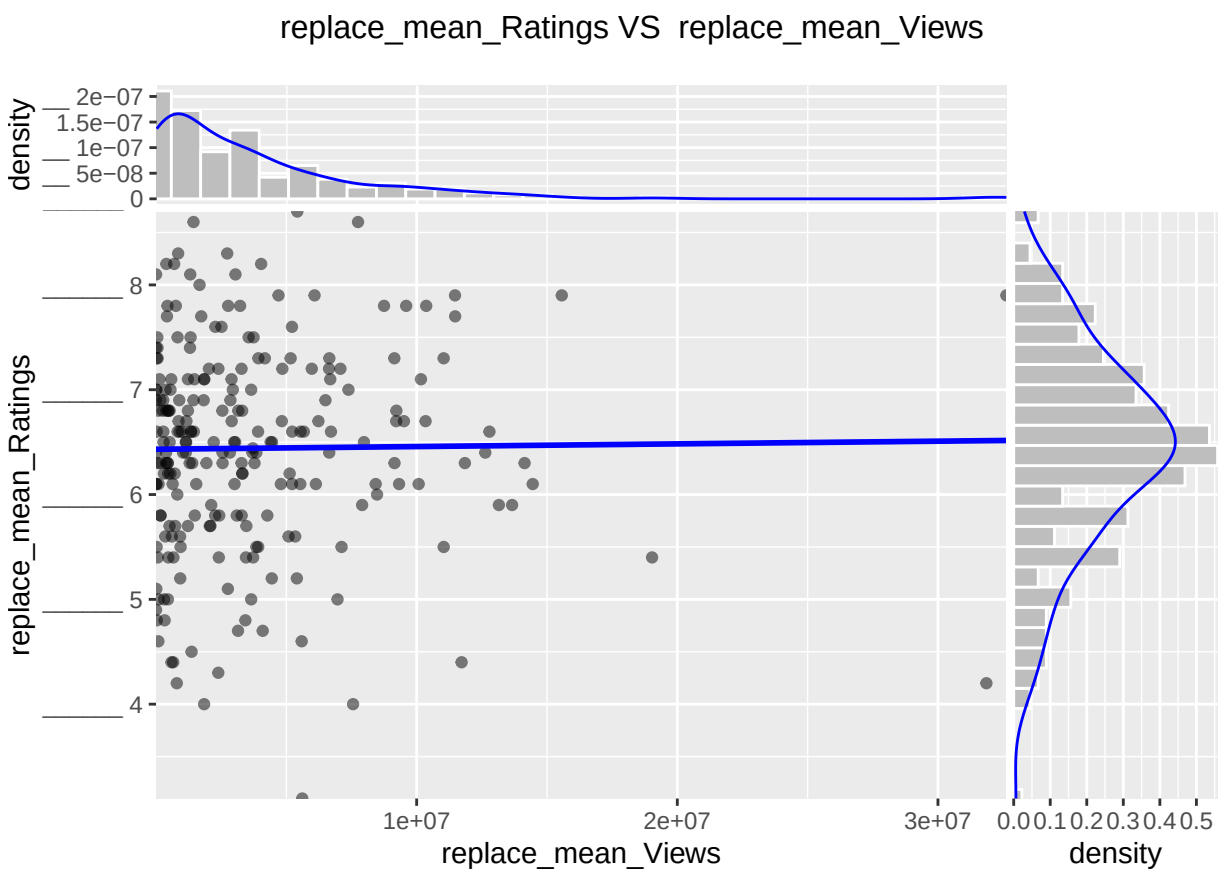
```
ScatterHist(movie_data, title = "replace_mean_Ratings VS  replace_mean_Gross",
            xvar = "replace_mean_Gross", yvar = "replace_mean_Ratings",
            smoothmethod = "lm")
```



There is a positive linear relationshipbetween the variables(replace_mean_Ratings & replace_mean_Gross)

replace_mean_Ratings VS replace_mean_Views

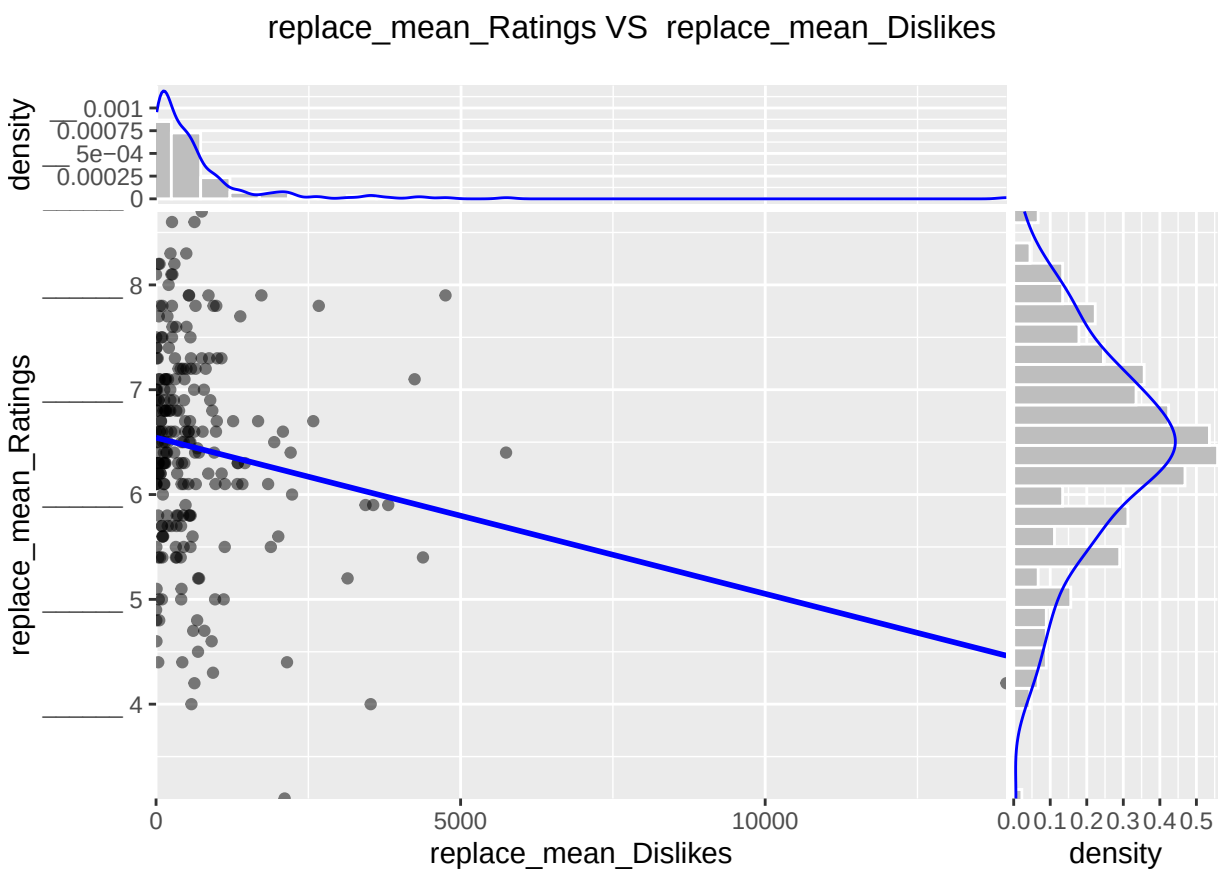
```
ScatterHist(movie_data, title = "replace_mean_Ratings VS  replace_mean_Views",
            xvar = "replace_mean_Views", yvar = "replace_mean_Ratings",
            smoothmethod = "lm")
```



There is a very weak relationship between the variables(replace_mean_Ratings & replace_mean_Views)

replace_mean_Ratings VS replace_mean_Dislikes

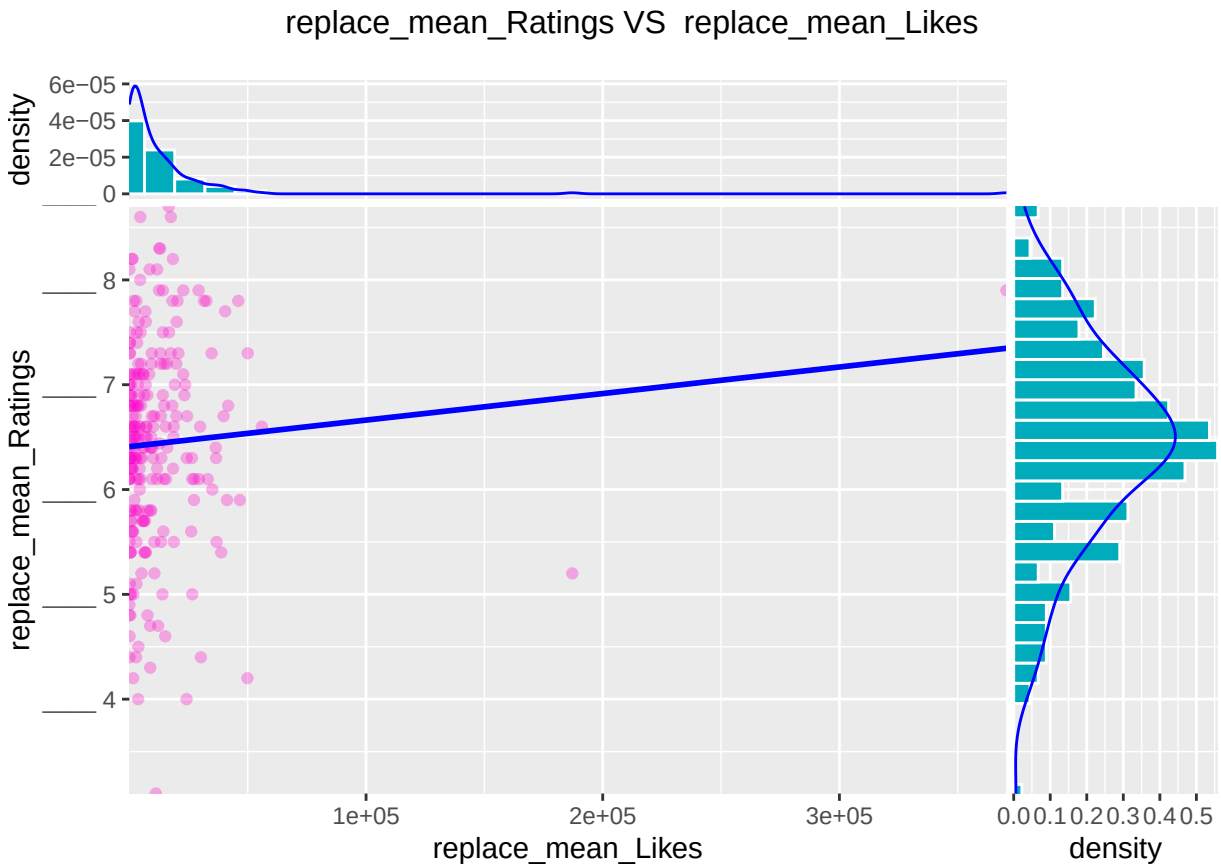
```
ScatterHist(movie_data, title = "replace_mean_Ratings VS  replace_mean_Dislikes",
            xvar = "replace_mean_Dislikes", yvar = "replace_mean_Ratings",
            smoothmethod = "lm")
```



There is a negative linear relationship between the variables(replace_mean_Ratings & replace_mean_Dislikes)

replace_mean_Ratings VS replace_mean_Likes

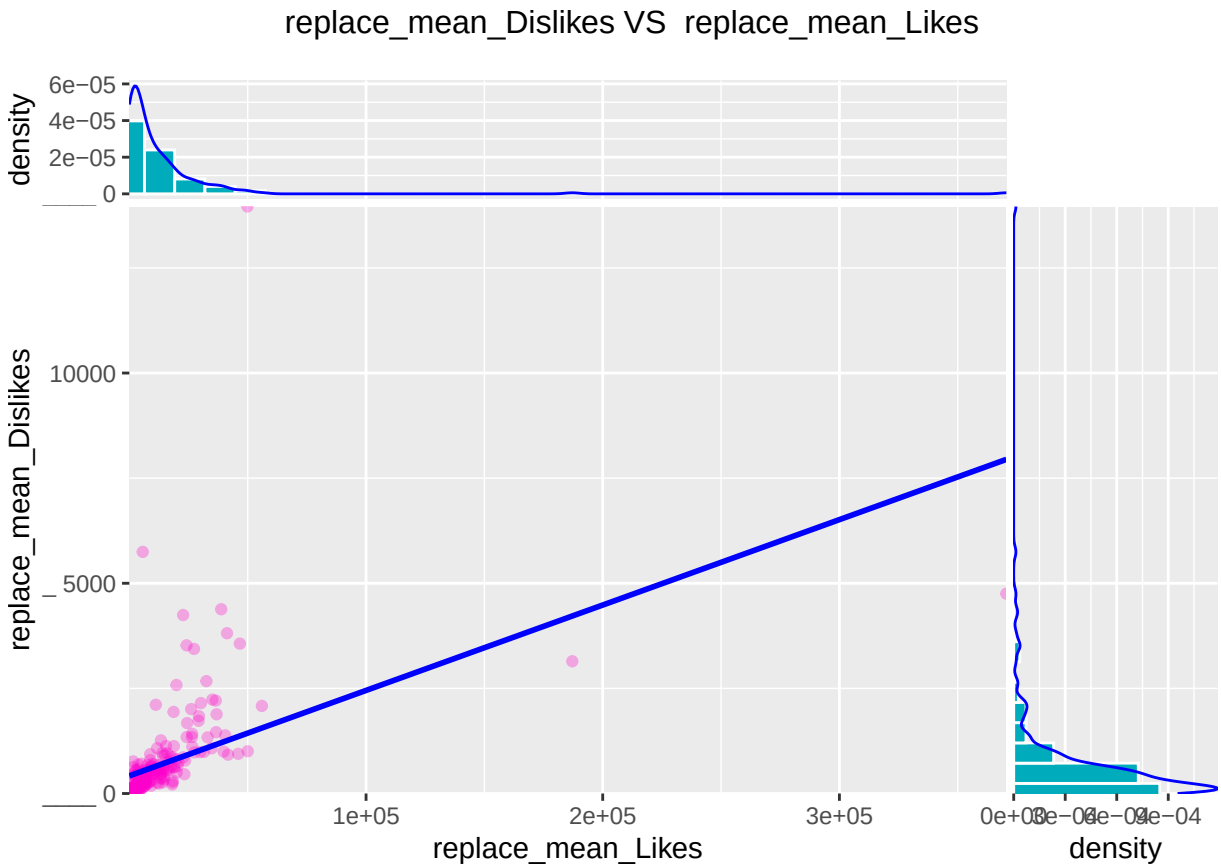
```
ScatterHist(movie_data, title = "replace_mean_Ratings VS  replace_mean_Likes",
            xvar = "replace_mean_Likes", yvar = "replace_mean_Ratings",
            smoothmethod = "lm", hist_color = "#00ACBB",
            point_alpha = 0.3,
            point_color = "#FF00CC")
```



There is a positive linear relationship between the variables (replace_mean_Ratings & replace_mean_Likes)

replace_mean_Dislikes VS replace_mean_Likes

```
ScatterHist(movie_data, title = "replace_mean_Dislikes VS  replace_mean_Likes",
            xvar = "replace_mean_Likes", yvar = "replace_mean_Dislikes",
            smoothmethod = "lm", hist_color = "#00ACBB",
            point_alpha = 0.3,
            point_color = "#FF00CC")
```



There is a positive linear relationship between the variables (replace_mean_Dislikes & replace_mean_Likes)

********** ## Study the correlation ##**********

```
psych::lowerCor(x = movie_data)
```

```
##                                rp__R rp__G rp__B rp__S rp__V rp__L rp__D
## replace_mean_Ratings            1.00
## replace_mean_Gross              0.34  1.00
## replace_mean_Budget             0.29  0.72  1.00
## replace_mean_Screens            0.06  0.58  0.59  1.00
## replace_mean_Views              0.01  0.18  0.11  0.25  1.00
## replace_mean_Likes              0.07  0.11  0.01  0.16  0.68  1.00
## replace_mean_Dislikes          -0.19  0.16  0.10  0.26  0.78  0.47  1.00
## replace_mean_Comments           0.02  0.13  0.09  0.19  0.71  0.92  0.58
## replace_mean_Aggregate_Followers 0.07  0.29  0.16  0.19  0.15  0.08  0.05
##                                rp__C r__A_
## replace_mean_Ratings
## replace_mean_Gross
## replace_mean_Budget
## replace_mean_Screens
## replace_mean_Views
## replace_mean_Likes
```

```
## replace_mean_Dislikes
## replace_mean_Comments             1.00
## replace_mean_Aggregate_Followers  0.03  1.00
```

```
psych::corr.test(movie_data)$p
```

```
##                                 replace_mean_Ratings replace_mean_Gross
## replace_mean_Ratings                    0.000000e+00       2.422017e-06
## replace_mean_Gross                      8.970434e-08       0.000000e+00
## replace_mean_Budget                     8.307646e-06       3.321590e-38
## replace_mean_Screens                    3.970636e-01       3.158471e-22
## replace_mean_Views                      8.591898e-01       7.083120e-03
## replace_mean_Likes                      2.627507e-01       9.332830e-02
## replace_mean_Dislikes                   4.173496e-03       1.376441e-02
## replace_mean_Comments                   8.122354e-01       5.538454e-02
## replace_mean_Aggregate_Followers        2.672329e-01       6.782357e-06
##                                 replace_mean_Budget replace_mean_Screens
## replace_mean_Ratings                   2.076912e-04         1.000000e+00
## replace_mean_Gross                     1.129341e-36         9.159566e-21
## replace_mean_Budget                    0.000000e+00         2.920777e-21
## replace_mean_Screens                   9.421861e-23         0.000000e+00
## replace_mean_Views                     8.169808e-02         9.645549e-05
## replace_mean_Likes                     8.593522e-01         1.572106e-02
## replace_mean_Dislikes                  1.414848e-01         4.480573e-05
## replace_mean_Comments                  1.694576e-01         3.445917e-03
## replace_mean_Aggregate_Followers       1.323881e-02         3.296656e-03
##                                 replace_mean_Views replace_mean_Likes
## replace_mean_Ratings                 1.000000e+00       1.000000e+00
## replace_mean_Gross                   1.345793e-01       1.000000e+00
## replace_mean_Budget                  1.000000e+00       1.000000e+00
## replace_mean_Screens                 2.218476e-03       2.515370e-01
## replace_mean_Views                   0.000000e+00       5.631184e-31
## replace_mean_Likes                   1.759745e-32       0.000000e+00
## replace_mean_Dislikes                5.934931e-48       3.434477e-14
## replace_mean_Comments                5.821249e-37       4.665160e-94
## replace_mean_Aggregate_Followers     2.356921e-02       2.384126e-01
##                                 replace_mean_Dislikes replace_mean_Comments
## replace_mean_Ratings                     8.346991e-02          1.000000e+00
## replace_mean_Gross                       2.382985e-01          7.753836e-01
## replace_mean_Budget                      1.000000e+00          1.000000e+00
## replace_mean_Screens                     1.075337e-03          7.252643e-02
## replace_mean_Views                       2.077226e-46          1.921012e-35
## replace_mean_Likes                       9.616535e-13          1.679457e-92
## replace_mean_Dislikes                    0.000000e+00          8.971585e-21
## replace_mean_Comments                    2.990528e-22          0.000000e+00
## replace_mean_Aggregate_Followers         4.395099e-01          6.103311e-01
##                                 replace_mean_Aggregate_Followers
## replace_mean_Ratings                              1.0000000000
## replace_mean_Gross                                0.0001763413
## replace_mean_Budget                               0.2382985034
## replace_mean_Screens                              0.0725264331
## replace_mean_Views                                0.3535381264
## replace_mean_Likes                                1.0000000000
## replace_mean_Dislikes                             1.0000000000
## replace_mean_Comments                             1.0000000000
```

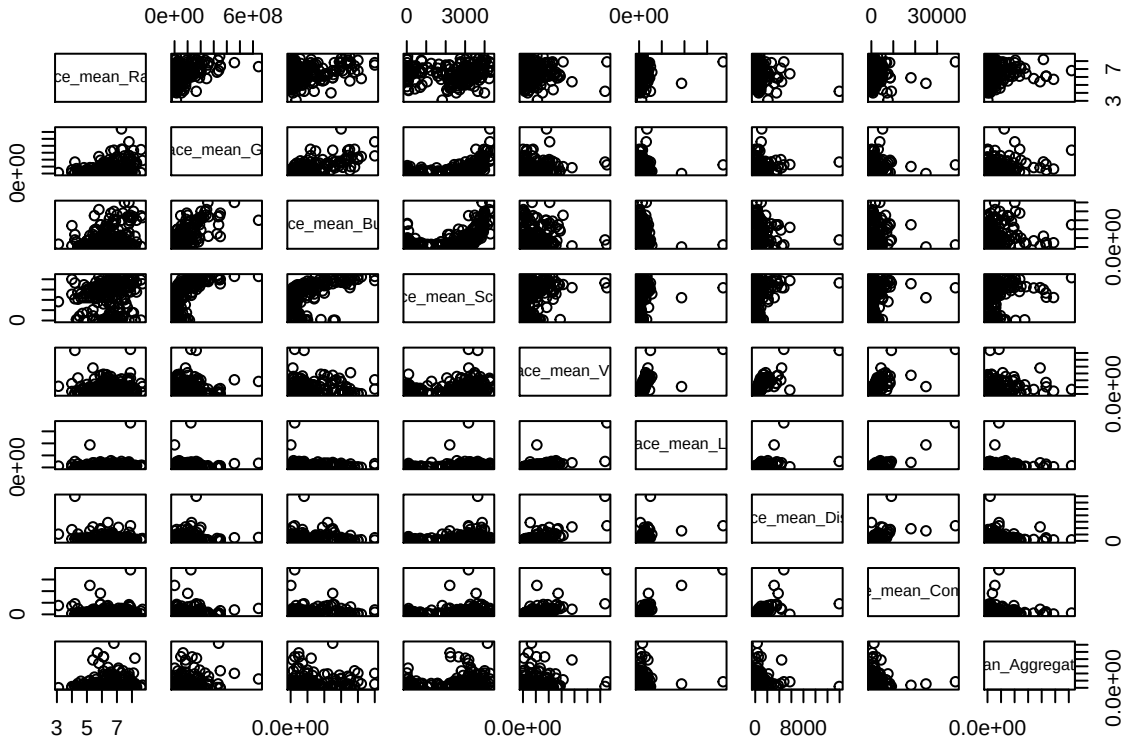
```
## replace_mean_Aggregate_Followers                    0.0000000000
```

Plotting the ScatterPlotMatrix

First look at the help, and the arguments

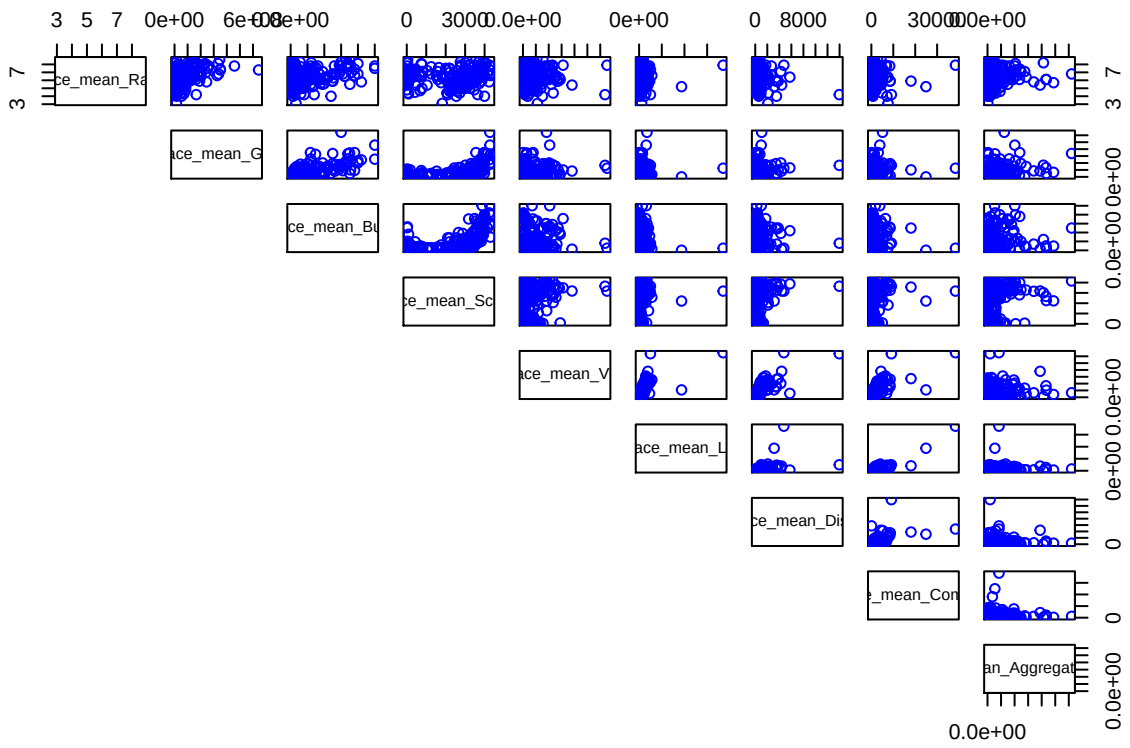
I am going to tweak the knobs a little

```
pairs(movie_data)
```



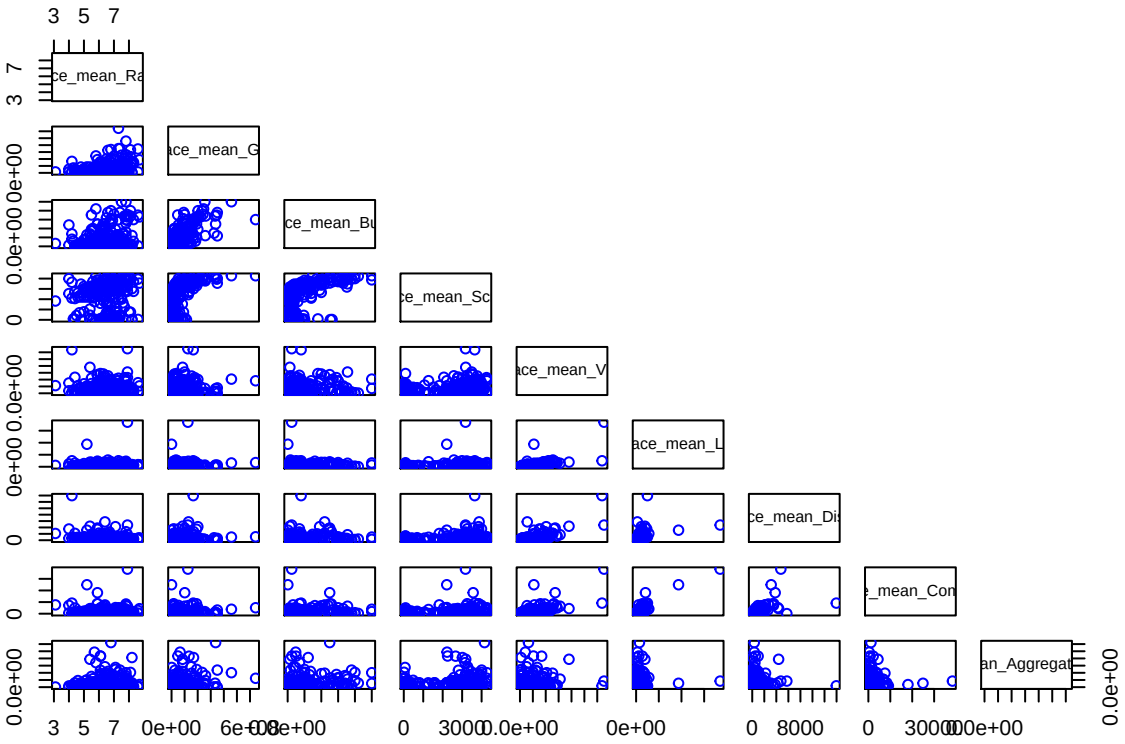
#change the color and get halp matrix

```
pairs(movie_data, lower.panel = NULL, col= "blue")
```



Or if you want only the lower part matrix

```
pairs(movie_data, upper.panel = NULL, col= "blue")
```

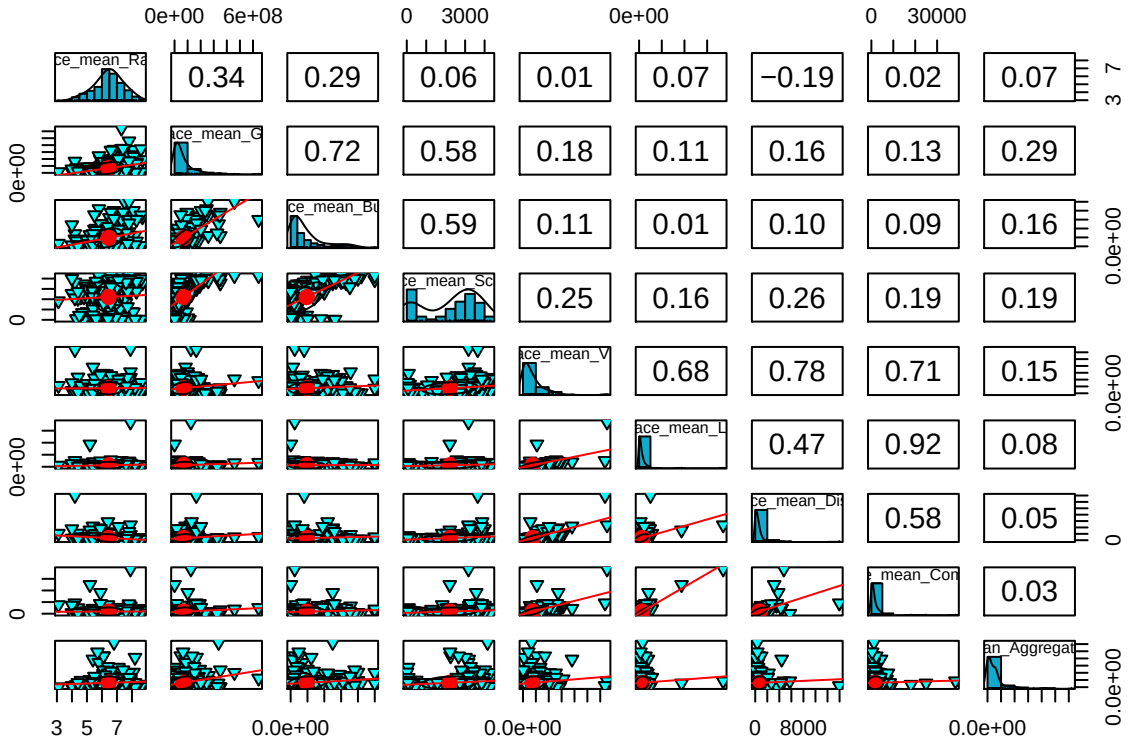


Check the documentation for more information

```
?pairs
```

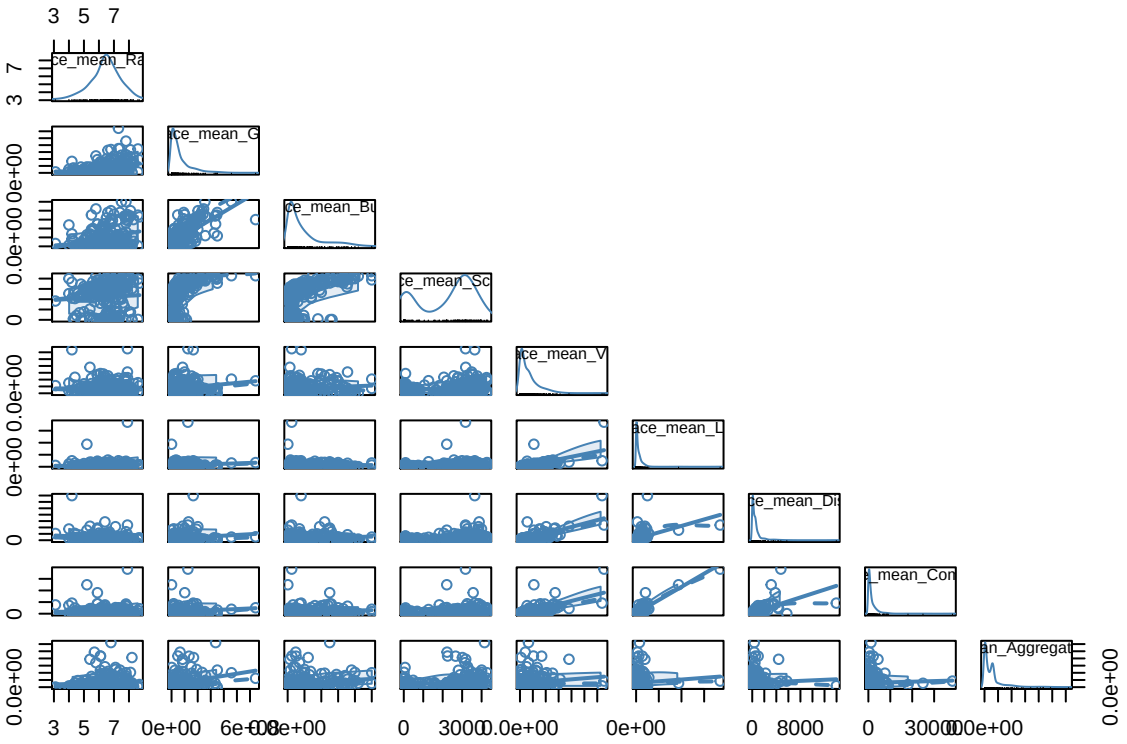
Scatter Matrix with psych package

```
library(psych)
pairs.panels(movie_data,
             method = "pearson", # Correlation method
             hist.col = "#11AACC",
             density = TRUE,
             cex.cor = 1.3,
             col = "red",
             lm = TRUE,
             pch = 25,     # point character
             bg = "cyan") # background
```



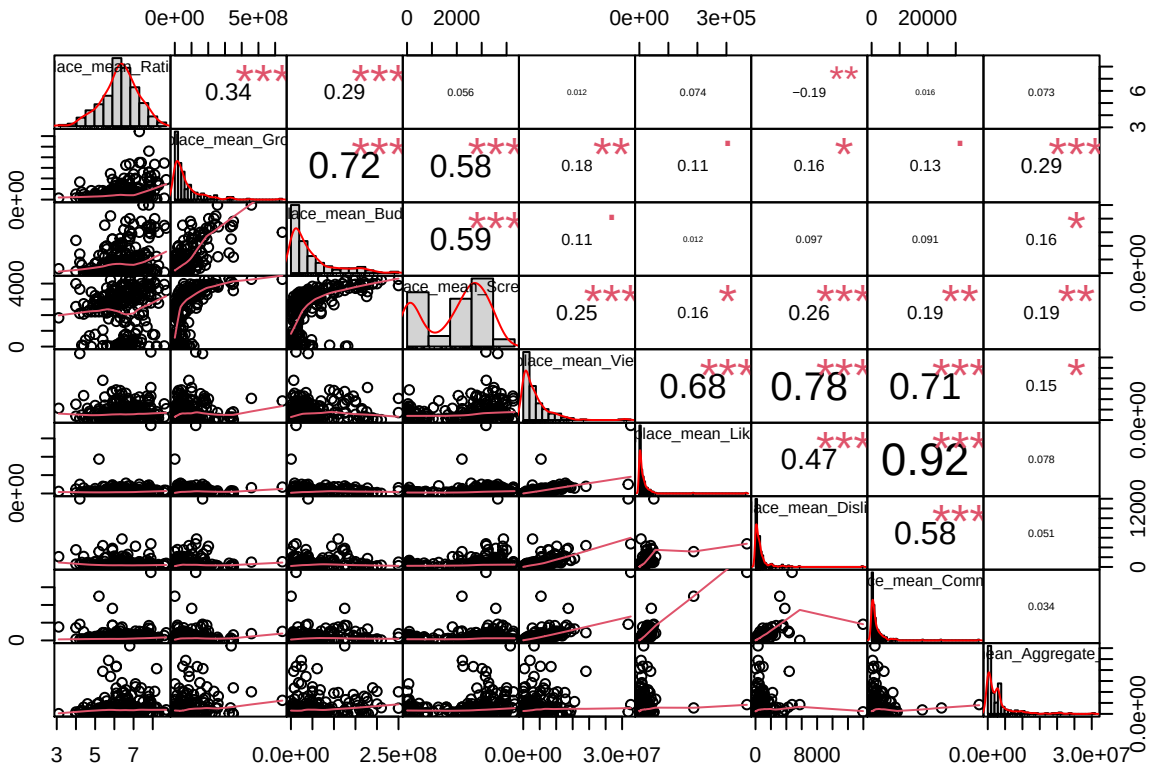
Scatter Matrix with car package

```
car::scatterplotMatrix(movie_data,
                       col = "steelblue",
                       pch = 21,
                       upper.panel = NULL)
```



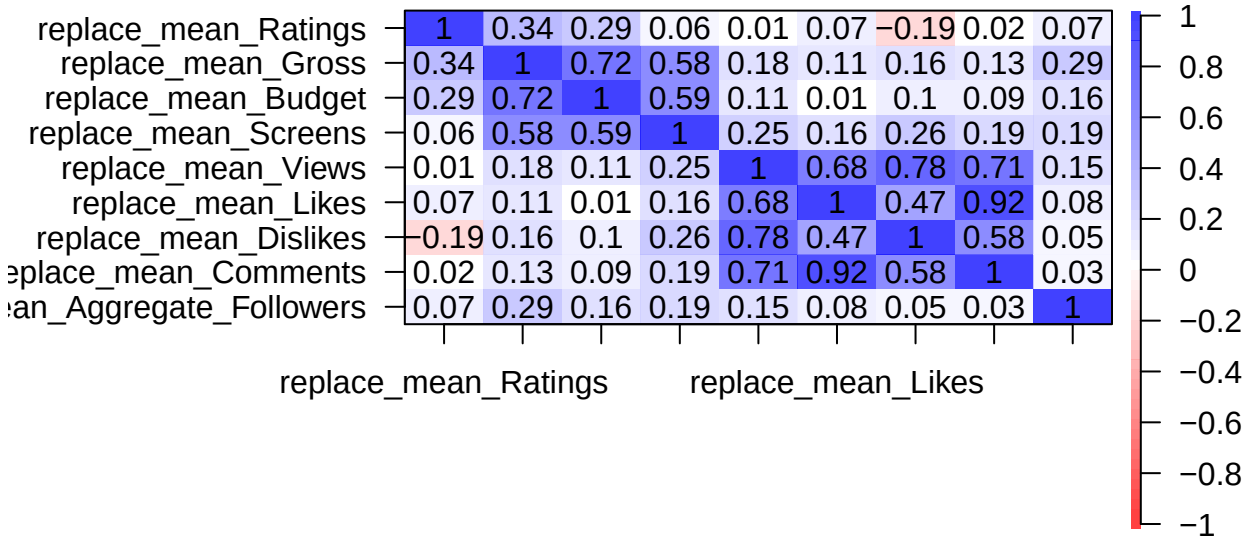
Lastly

```
library(PerformanceAnalytics)
chart.Correlation(movie_data,
                  histogram=TRUE,
                  pch=19,
                  col = "blue")
```

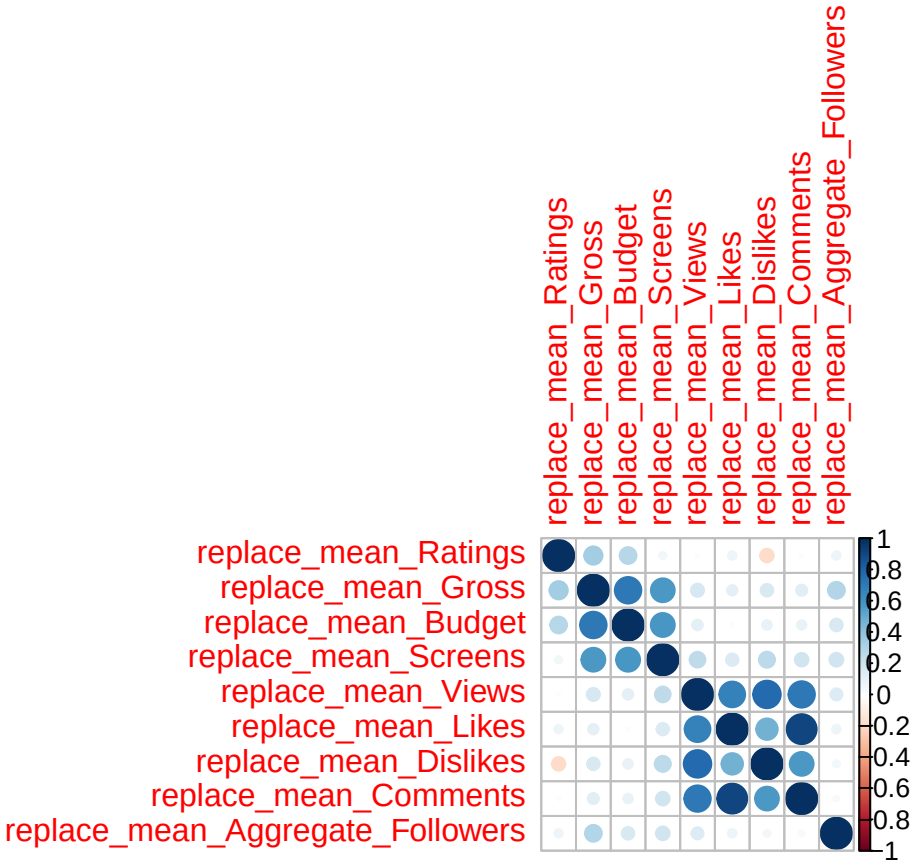


correlation plot matrices

```
correl <- cor(movie_data)

psych::cor.plot(correl)
```

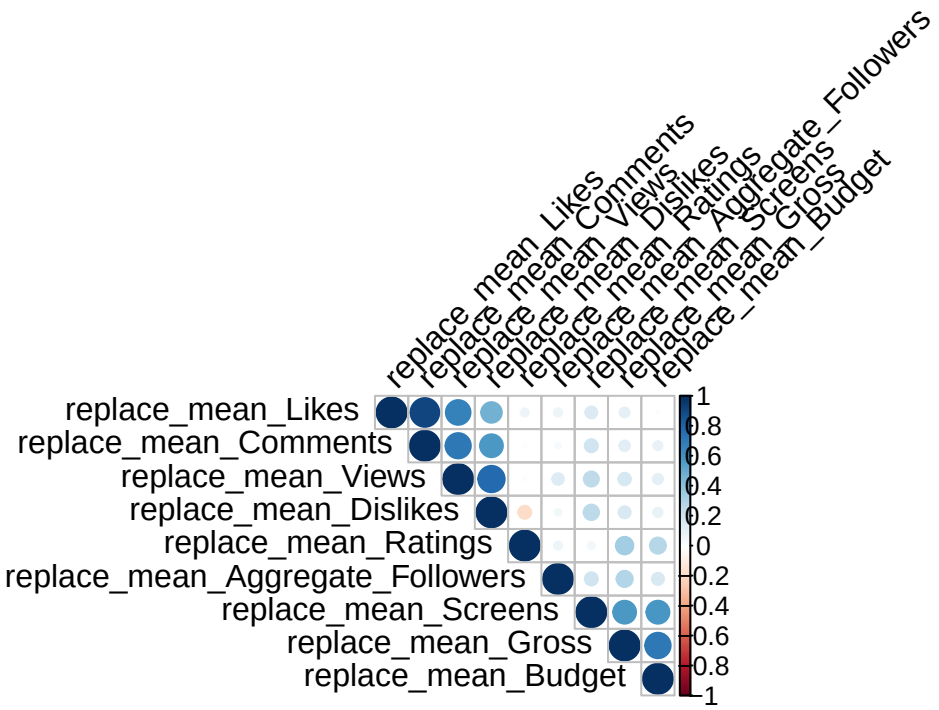



```
corrplot::corrplot(correl)
```



Tweak the knobs

```
corrplot(correl, type = "upper",
         order = "hclust",
         tl.col = "black",
         tl.srt = 45)
```

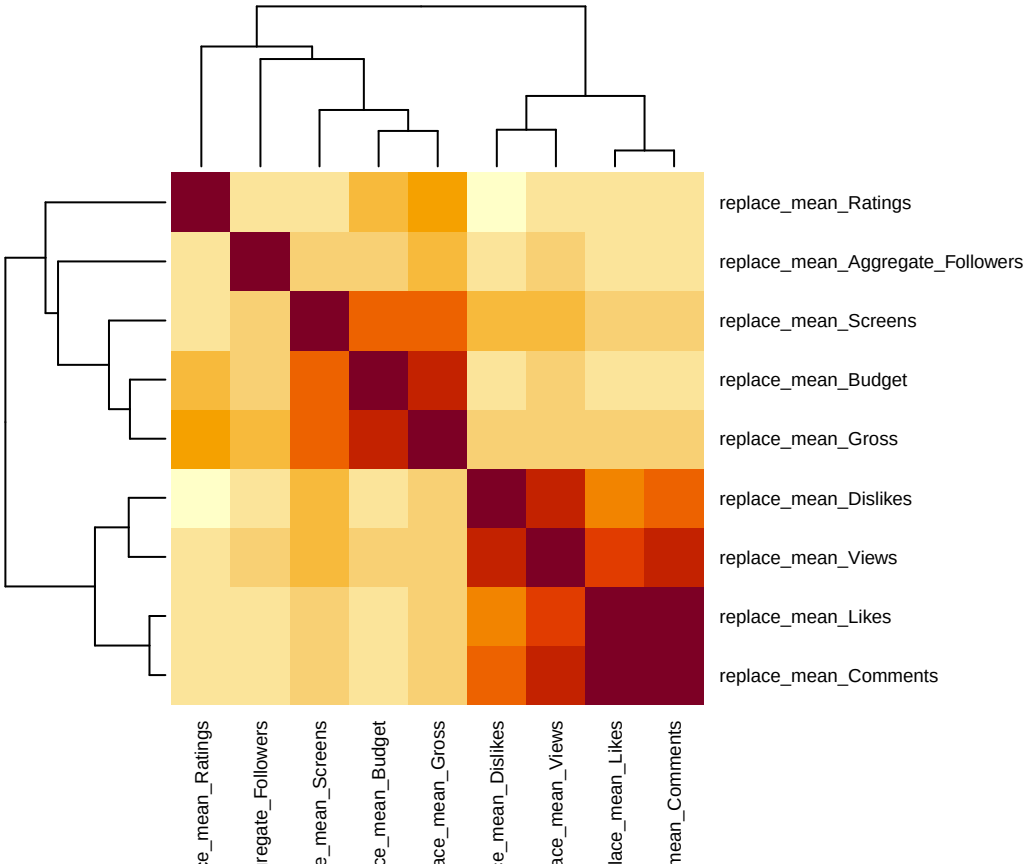


check

```
?corrplot
```

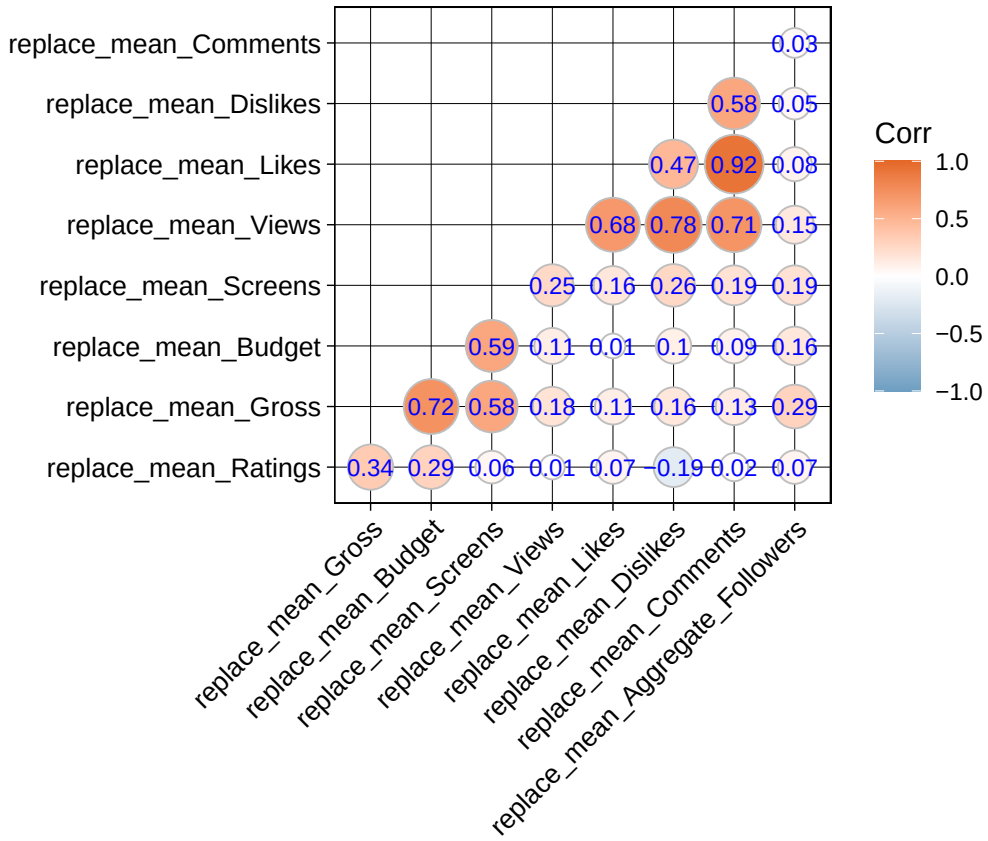
Heatmap

```
heatmap(correl, symm = TRUE,
        cexRow = 0.7,
        cexCol = 0.7)
```

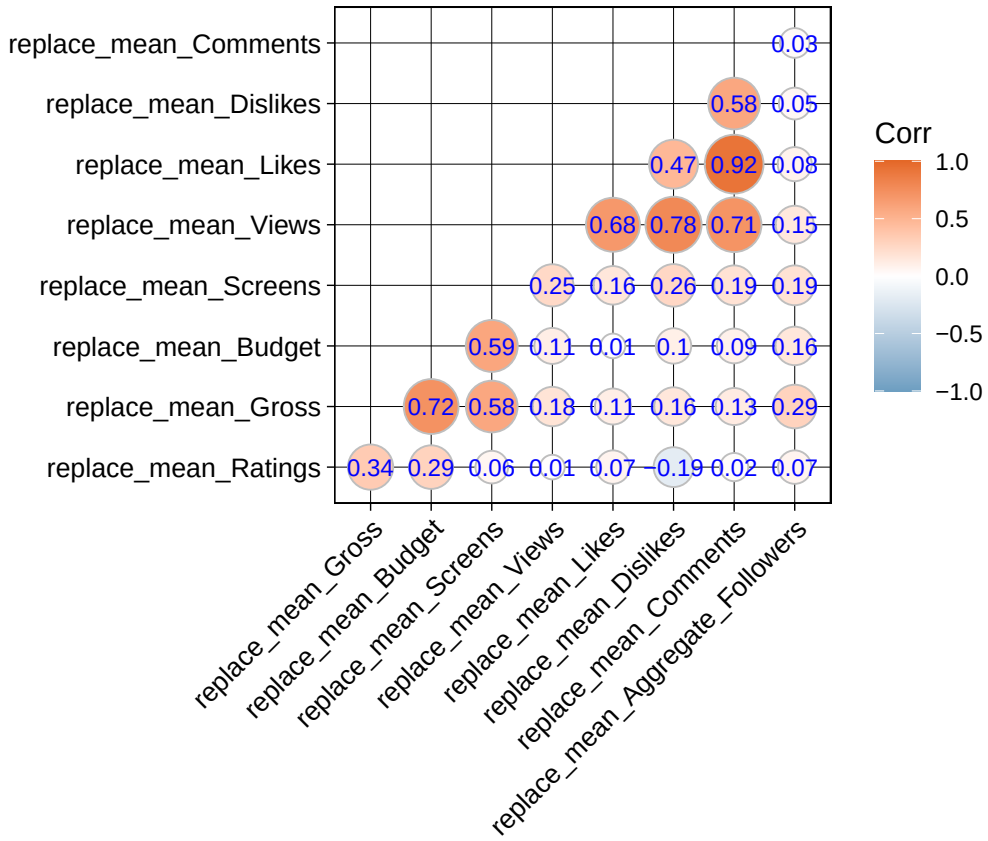


ggcorrplot

```
p <- ggcorrplot::ggcorrplot(correl,
                            method = "circle",
                            type = "lower",
                            ggtheme = ggplot2::theme_linedraw,
                            lab_col = "blue",
                            lab_size = 3,
                            tl.cex = 10,
                            lab = TRUE,
                            pch.cex = 10,
                            colors = c("#6D9EC1", "white", "#E46726"))
p
```




```
p + guides(scale = "none")
```

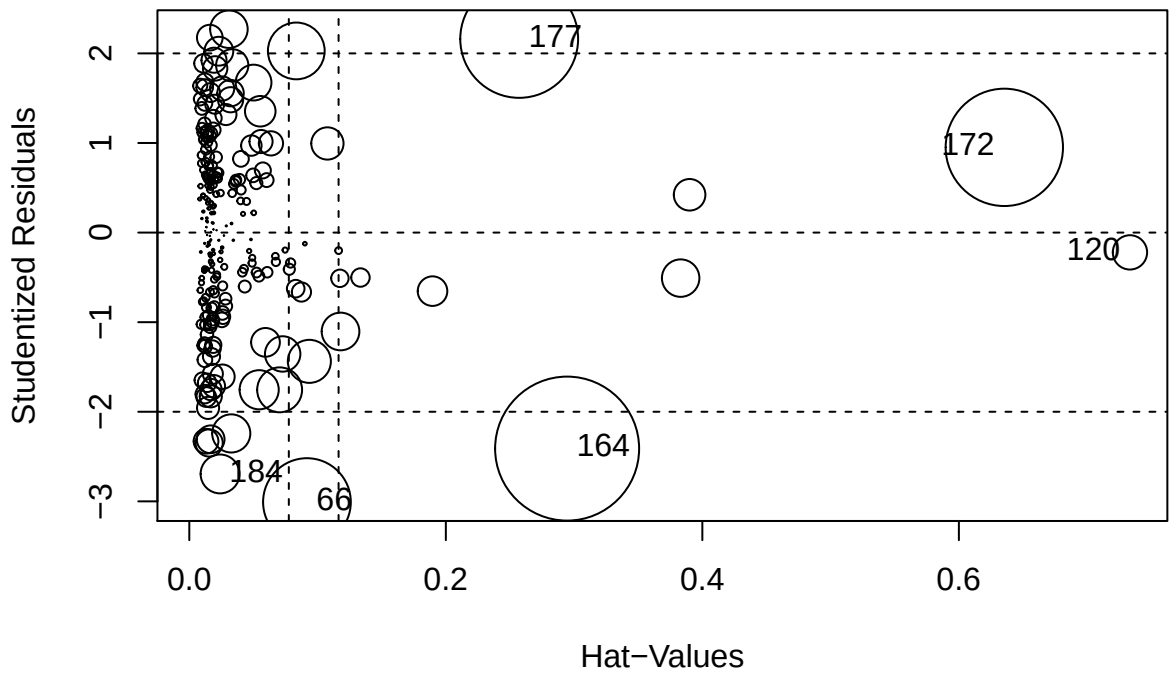


Fitting Multiple Regression –

```
model <- lm(replace_mean_Ratings ~ replace_mean_Gross+ replace_mean_Budget+replace_mean_Screens+
            replace_mean_Views+  replace_mean_Likes+replace_mean_Dislikes+replace_mean_Comments+
              replace_mean_Aggregate_Followers, data = movie_data)
model
```

```
##
## Call:
## lm(formula = replace_mean_Ratings ~ replace_mean_Gross + replace_mean_Budget +
##     replace_mean_Screens + replace_mean_Views + replace_mean_Likes +
##     replace_mean_Dislikes + replace_mean_Comments + replace_mean_Aggregate_Followers,
##     data = movie_data)
##
## Coefficients:
##                         (Intercept)                   replace_mean_Gross
##                           6.352e+00                            4.102e-09
##                 replace_mean_Budget                  replace_mean_Screens
##                           3.275e-09                           -1.476e-04
##                  replace_mean_Views                   replace_mean_Likes
##                           6.565e-08                            8.255e-06
##                replace_mean_Dislikes                replace_mean_Comments
##                          -3.554e-04                           -4.943e-05
## replace_mean_Aggregate_Followers
##                          -1.243e-08
```

```
influencePlot(model)
```




```
##        StudRes        Hat      CookD
## 66  -3.0078772 0.09171501 0.09797153
## 120 -0.2211173 0.73339231 0.01500800
## 164 -2.4113009 0.29456210 0.26405971
## 172  0.9512353 0.63542922 0.17530894
## 177  2.1615251 0.25718316 0.17682573
## 184 -2.6939684 0.02397499 0.01926732
```

Checking lm objects

Show the components of lm object

```
str(model)
```

```
## List of 12
##  $ coefficients : Named num [1:9] 6.35 4.10e-09 3.27e-09 -1.48e-04 6.57e-08 ...
##   ..- attr(*, "names")= chr [1:9] "(Intercept)" "replace_mean_Gross" "replace_mean_Budget" "replace_
##  $ residuals    : Named num [1:232] -0.1156 0.4021 0.0519 -0.3016 -1.4062 ...
##   ..- attr(*, "names")= chr [1:232] "1" "2" "3" "4" ...
##  $ effects      : Named num [1:232] -98.115 -5.131 0.904 3.03 -0.113 ...
##   ..- attr(*, "names")= chr [1:232] "(Intercept)" "replace_mean_Gross" "replace_mean_Budget" "replace
##  $ rank         : int 9
##  $ fitted.values: Named num [1:232] 6.42 6.7 6.15 6.6 6.11 ...
##   ..- attr(*, "names")= chr [1:232] "1" "2" "3" "4" ...
##  $ assign       : int [1:9] 0 1 2 3 4 5 6 7 8
##  $ qr           :List of 5
```

```
##   ..$ qr   : num [1:232, 1:9] -15.2315 0.0657 0.0657 0.0657 0.0657 ...
##   .. ..- attr(*, "dimnames")=List of 2
##   .. .. ..$ : chr [1:232] "1" "2" "3" "4" ...
##   .. .. ..$ : chr [1:9] "(Intercept)" "replace_mean_Gross" "replace_mean_Budget" "replace_mean_Screen
##   .. ..- attr(*, "assign")= int [1:9] 0 1 2 3 4 5 6 7 8
##   ..$ qraux: num [1:9] 1.07 1.1 1.01 1.04 1.01 ...
##   ..$ pivot: int [1:9] 1 2 3 4 5 6 7 8 9
##   ..$ tol  : num 1e-07
##   ..$ rank : int 9
##   ..- attr(*, "class")= chr "qr"
##  $ df.residual  : int 223
##  $ xlevels      : Named list()
##  $ call         : language lm(formula = replace_mean_Ratings ~ replace_mean_Gross + replace_mean_Budg
##  $ terms        :Classes 'terms', 'formula'  language replace_mean_Ratings ~ replace_mean_Gross + rep
##   .. ..- attr(*, "variables")= language list(replace_mean_Ratings, replace_mean_Gross, replace_mean_
##   .. ..- attr(*, "factors")= int [1:9, 1:8] 0 1 0 0 0 0 0 0 0 0 ...
##   .. .. ..- attr(*, "dimnames")=List of 2
##   .. .. .. ..$ : chr [1:9] "replace_mean_Ratings" "replace_mean_Gross" "replace_mean_Budget" "replace
##   .. .. .. ..$ : chr [1:8] "replace_mean_Gross" "replace_mean_Budget" "replace_mean_Screens" "replace
##   .. ..- attr(*, "term.labels")= chr [1:8] "replace_mean_Gross" "replace_mean_Budget" "replace_mean_S
##   .. ..- attr(*, "order")= int [1:8] 1 1 1 1 1 1 1 1
##   .. ..- attr(*, "intercept")= int 1
##   .. ..- attr(*, "response")= int 1
##   .. ..- attr(*, ".Environment")=<environment: R_GlobalEnv>
##   .. ..- attr(*, "predvars")= language list(replace_mean_Ratings, replace_mean_Gross, replace_mean_Bu
##   .. ..- attr(*, "dataClasses")= Named chr [1:9] "numeric" "numeric" "numeric" "numeric" ...
##   .. .. ..- attr(*, "names")= chr [1:9] "replace_mean_Ratings" "replace_mean_Gross" "replace_mean_Bud
##  $ model        :'data.frame':   232 obs. of  9 variables:
##   ..$ replace_mean_Ratings            : num [1:232] 6.3 7.1 6.2 6.3 4.7 4.6 6.1 7.1 6.5 6.1 ...
##   ..$ replace_mean_Gross              : num [1:232] 9.13e+03 1.92e+08 3.07e+07 1.06e+08 1.73e+07 2.90
##   ..$ replace_mean_Budget             : num [1:232] 4.00e+06 5.00e+07 2.80e+07 1.10e+08 3.50e+06 5.00
##   ..$ replace_mean_Screens            : num [1:232] 45 3306 2872 3470 2310 ...
##   ..$ replace_mean_Views              : num [1:232] 3280543 583289 304861 452917 3145573 ...
##   ..$ replace_mean_Likes              : num [1:232] 4632 3465 328 2429 12163 ...
##   ..$ replace_mean_Dislikes           : num [1:232] 425 61 34 132 610 7 419 197 419 532 ...
##   ..$ replace_mean_Comments           : num [1:232] 636 186 47 590 1082 ...
##   ..$ replace_mean_Aggregate_Followers: num [1:232] 1120000 12350000 483000 568000 1923800 ...
##   ..- attr(*, "terms")=Classes 'terms', 'formula'  language replace_mean_Ratings ~ replace_mean_Gross
##   .. .. ..- attr(*, "variables")= language list(replace_mean_Ratings, replace_mean_Gross, replace_mea
##   .. .. ..- attr(*, "factors")= int [1:9, 1:8] 0 1 0 0 0 0 0 0 0 0 ...
##   .. .. .. ..- attr(*, "dimnames")=List of 2
##   .. .. .. .. ..$ : chr [1:9] "replace_mean_Ratings" "replace_mean_Gross" "replace_mean_Budget" "repl
##   .. .. .. .. ..$ : chr [1:8] "replace_mean_Gross" "replace_mean_Budget" "replace_mean_Screens" "repl
##   .. .. ..- attr(*, "term.labels")= chr [1:8] "replace_mean_Gross" "replace_mean_Budget" "replace_mea
##   .. .. ..- attr(*, "order")= int [1:8] 1 1 1 1 1 1 1 1
##   .. .. ..- attr(*, "intercept")= int 1
##   .. .. ..- attr(*, "response")= int 1
##   .. .. ..- attr(*, ".Environment")=<environment: R_GlobalEnv>
##   .. .. ..- attr(*, "predvars")= language list(replace_mean_Ratings, replace_mean_Gross, replace_mean
##   .. .. ..- attr(*, "dataClasses")= Named chr [1:9] "numeric" "numeric" "numeric" "numeric" ...
##   .. .. .. ..- attr(*, "names")= chr [1:9] "replace_mean_Ratings" "replace_mean_Gross" "replace_mean_
##  - attr(*, "class")= chr "lm"
```

```r
class(model)
```

```
## [1] "lm"
```

```r
typeof(model)
```

```
## [1] "list"
```

```r
length(model)
```

```
## [1] 12
```

```r
names(model)
```

```
##  [1] "coefficients"  "residuals"     "effects"       "rank"
##  [5] "fitted.values" "assign"        "qr"            "df.residual"
##  [9] "xlevels"       "call"          "terms"         "model"
```

Summary Function

```r
summary(model)
```

```
##
## Call:
## lm(formula = replace_mean_Ratings ~ replace_mean_Gross + replace_mean_Budget +
##     replace_mean_Screens + replace_mean_Views + replace_mean_Likes +
##     replace_mean_Dislikes + replace_mean_Comments + replace_mean_Aggregate_Followers,
##     data = movie_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.42601 -0.50733  0.00213  0.53345  1.90750
##
## Coefficients:
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      6.352e+00  1.117e-01  56.858  < 2e-16 ***
## replace_mean_Gross               4.102e-09  9.972e-10   4.113 5.49e-05 ***
## replace_mean_Budget              3.275e-09  1.654e-09   1.980  0.04888 *
## replace_mean_Screens            -1.476e-04  5.265e-05  -2.803  0.00551 **
## replace_mean_Views               6.565e-08  2.456e-08   2.674  0.00806 **
## replace_mean_Likes               8.255e-06  5.471e-06   1.509  0.13277
## replace_mean_Dislikes           -3.554e-04  7.817e-05  -4.547 8.94e-06 ***
## replace_mean_Comments           -4.943e-05  4.576e-05  -1.080  0.28116
## replace_mean_Aggregate_Followers -1.243e-08  1.351e-08  -0.920  0.35851
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8614 on 223 degrees of freedom
## Multiple R-squared:  0.2641, Adjusted R-squared:  0.2377
## F-statistic:    10 on 8 and 223 DF,  p-value: 6.858e-12
```

Coefficients Function

```r
model$coefficients
```

```
##                       (Intercept)                 replace_mean_Gross
##                         6.351917e+00                       4.101794e-09
##                 replace_mean_Budget                replace_mean_Screens
##                         3.274910e-09                      -1.475589e-04
##                  replace_mean_Views                  replace_mean_Likes
##                         6.565145e-08                       8.254940e-06
##                replace_mean_Dislikes               replace_mean_Comments
##                        -3.554223e-04                      -4.943290e-05
## replace_mean_Aggregate_Followers
##                        -1.242762e-08
```

Fitted function

```
model$fitted
```

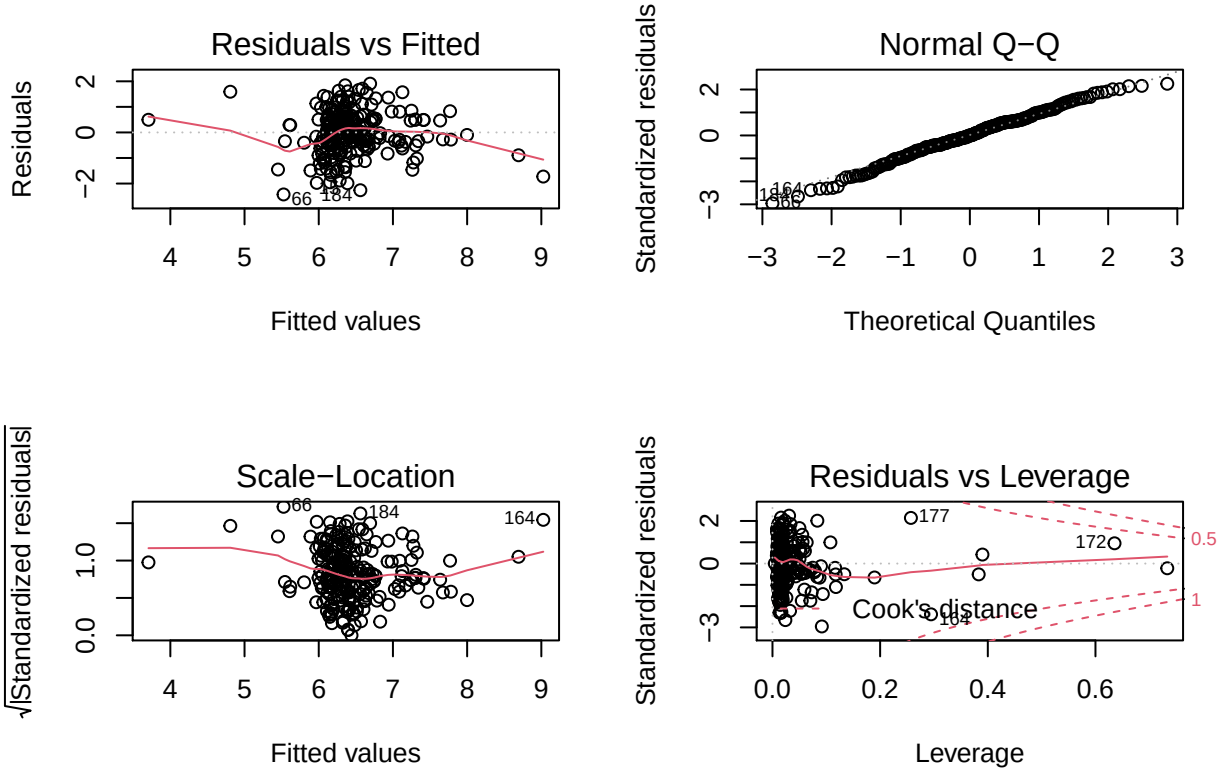
```
##        1        2        3        4        5        6        7        8
## 6.415610 6.697918 6.148062 6.601564 6.106193 6.028198 6.168008 6.359285
##        9       10       11       12       13       14       15       16
## 6.143993 6.202188 7.463003 6.252885 5.803006 6.172500 6.386971 6.570020
##       17       18       19       20       21       22       23       24
## 6.395214 6.494361 7.415767 6.154638 5.997289 6.391396 6.136607 6.398623
##       25       26       27       28       29       30       31       32
## 6.029688 6.251078 7.303404 7.238588 6.559774 5.973485 6.611769 6.118764
##       33       34       35       36       37       38       39       40
## 6.560516 6.125296 6.208010 5.966916 7.090697 6.473246 6.041684 6.519117
##       41       42       43       44       45       46       47       48
## 6.414630 6.395056 6.340912 6.320186 7.127557 6.539492 7.636159 6.305507
##       49       50       51       52       53       54       55       56
## 6.368349 6.474446 6.744861 7.410192 6.828164 6.381270 6.347684 7.127769
##       57       58       59       60       61       62       63       64
## 6.200761 6.654979 6.380380 6.329679 6.300267 6.334727 6.468455 6.484992
##       65       66       67       68       69       70       71       72
## 6.406157 5.526012 6.603536 6.056605 6.352874 6.517553 7.342074 6.383917
##       73       74       75       76       77       78       79       80
## 6.183176 6.277514 6.601079 6.133733 6.324117 6.107544 6.464840 7.322481
##       81       82       83       84       85       86       87       88
## 6.268766 6.263169 5.615677 6.447873 5.544391 6.282380 6.309471 6.068041
##       89       90       91       92       93       94       95       96
## 7.170251 6.102397 6.363173 6.646722 6.672575 6.136643 6.269107 6.067665
##       97       98       99      100      101      102      103      104
## 6.180593 6.247109 6.503405 6.299163 6.177905 6.224032 6.050183 6.518881
##      105      106      107      108      109      110      111      112
## 6.767730 6.928448 6.256379 6.062226 6.172554 6.102490 7.086462 6.385266
##      113      114      115      116      117      118      119      120
## 6.783104 6.605192 6.267857 6.013118 6.436791 6.744785 7.276007 7.998561
##      121      122      123      124      125      126      127      128
## 6.446846 6.676400 6.484438 6.361108 7.781289 6.414842 6.344593 7.307527
##      129      130      131      132      133      134      135      136
## 6.059643 6.769459 6.327271 6.267855 6.152350 6.983827 6.165718 6.942330
##      137      138      139      140      141      142      143      144
## 6.446646 6.161567 6.162020 6.375324 6.200786 6.255102 6.236031 6.395732
##      145      146      147      148      149      150      151      152
## 6.363519 6.711586 6.366511 6.079280 6.113825 6.639536 7.262706 6.280902
```

```
##      153      154      155      156      157      158      159      160
## 6.716840 6.288721 6.398473 6.692504 6.322557 6.563132 6.356152 6.110241
##      161      162      163      164      165      166      167      168
## 6.390449 7.249492 6.415857 9.026086 8.692719 7.673017 7.770060 7.117034
##      169      170      171      172      173      174      175      176
## 7.074630 7.299371 7.025682 3.705130 6.608188 6.637077 6.937519 6.588301
##      177      178      179      180      181      182      183      184
## 4.808252 6.724003 6.131516 6.820041 6.607260 6.623534 6.514045 6.561171
##      185      186      187      188      189      190      191      192
## 6.020573 6.177524 6.416834 6.188921 5.451059 6.084756 6.621738 6.763012
##      193      194      195      196      197      198      199      200
## 6.206773 6.222751 6.324577 6.162415 6.362724 6.414850 6.477763 6.141128
##      201      202      203      204      205      206      207      208
## 6.183281 6.048400 6.197925 6.286273 6.144238 5.606685 6.118272 5.997360
##      209      210      211      212      213      214      215      216
## 6.267960 6.166252 6.290084 6.274108 6.645815 6.162831 6.426126 6.356366
##      217      218      219      220      221      222      223      224
## 6.331433 6.400079 6.583394 6.299967 6.381138 5.968432 6.360047 6.264855
##      225      226      227      228      229      230      231      232
## 6.318563 6.277765 6.473365 6.214593 6.207979 6.022385 5.889451 6.441558
```

```
extract_eq(model,use_cof=TRUE)
```

$$\text{replace\_mean\_Ratings} = \alpha+\beta_1(\text{replace\_mean\_Gross})+\beta_2(\text{replace\_mean\_Budget})+\beta_3(\text{replace\_mean\_Screens})+\beta_4(\text{replac}$$

```
par(mfrow = c(2, 2))
plot(model)
```



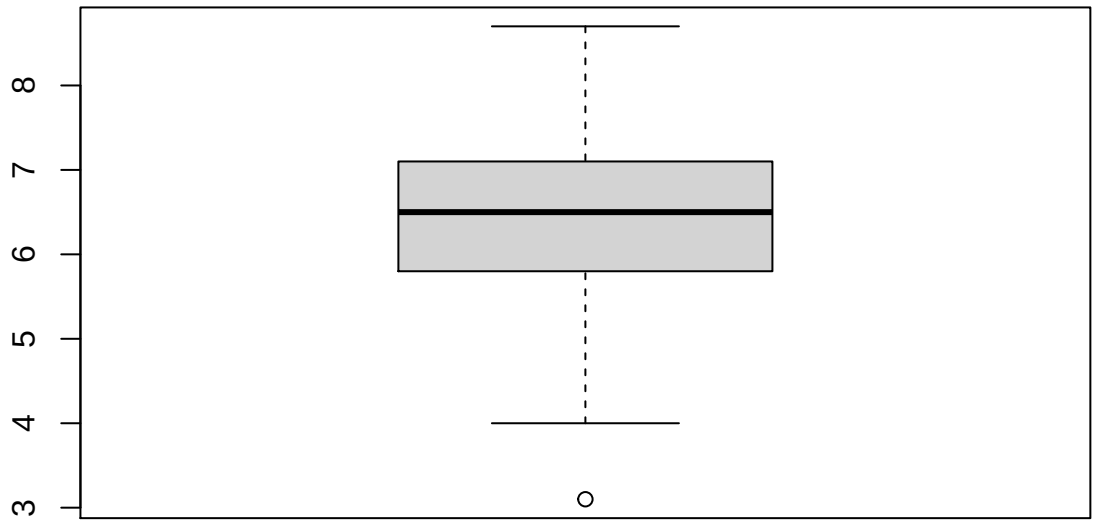

```
vif(model)
```

```
##               replace_mean_Gross               replace_mean_Budget
##                         2.435939                          2.487005
##             replace_mean_Screens                replace_mean_Views
##                         1.760608                          3.803236
##               replace_mean_Likes             replace_mean_Dislikes
##                         7.709133                          2.930766
##            replace_mean_Comments replace_mean_Aggregate_Followers
##                         8.275607                          1.144607
```

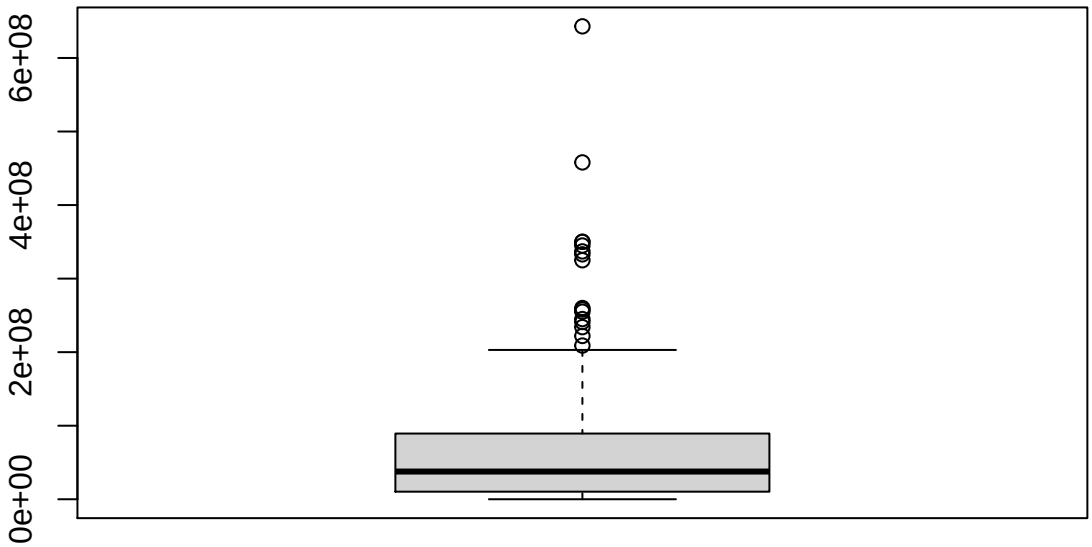
We will improve our result by removing the outlier

##create a boxplot to identify outliers

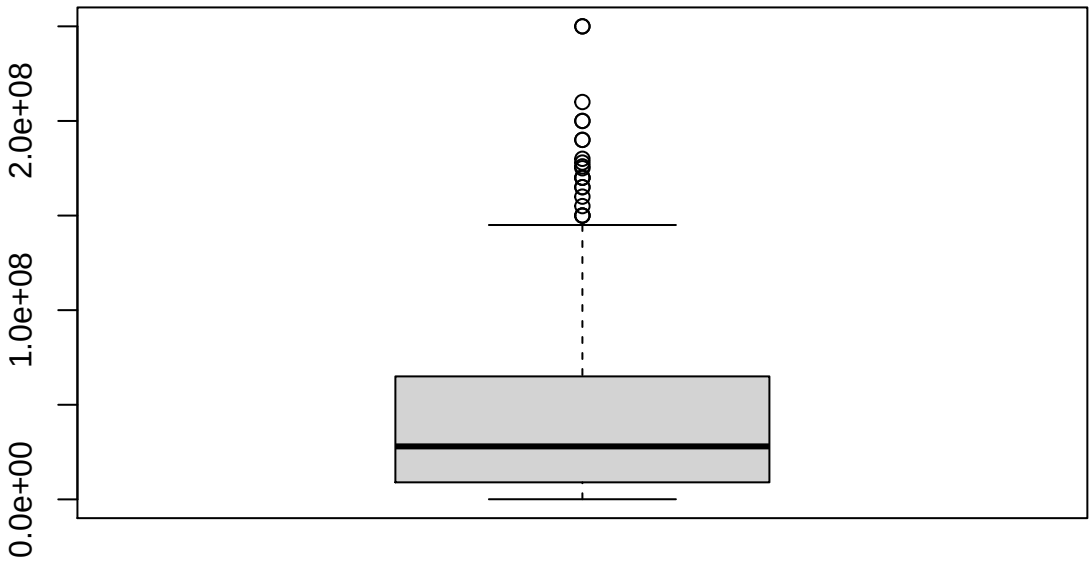
```
boxplot(movie_data$replace_mean_Ratings)
```



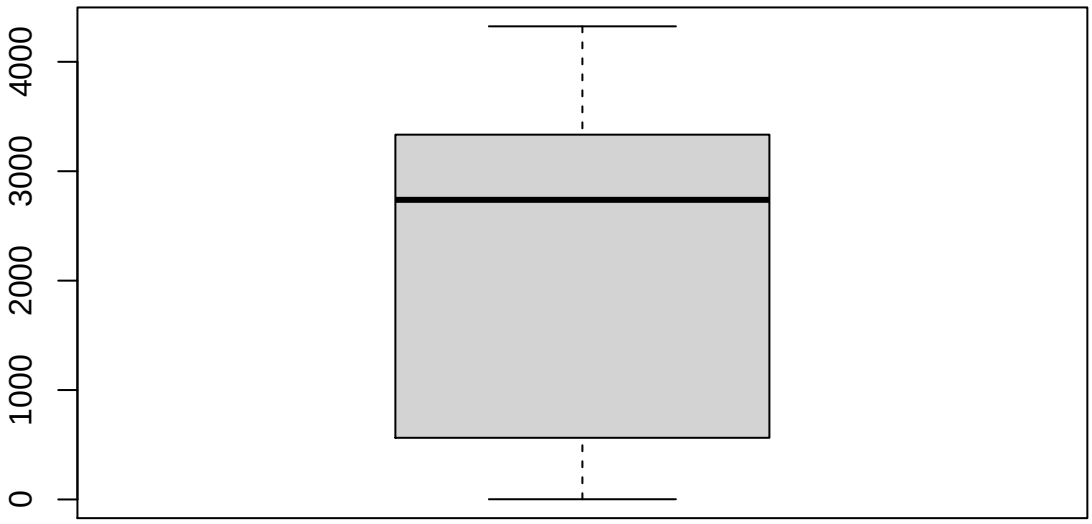

```
boxplot(movie_data$replace_mean_Gross)
```



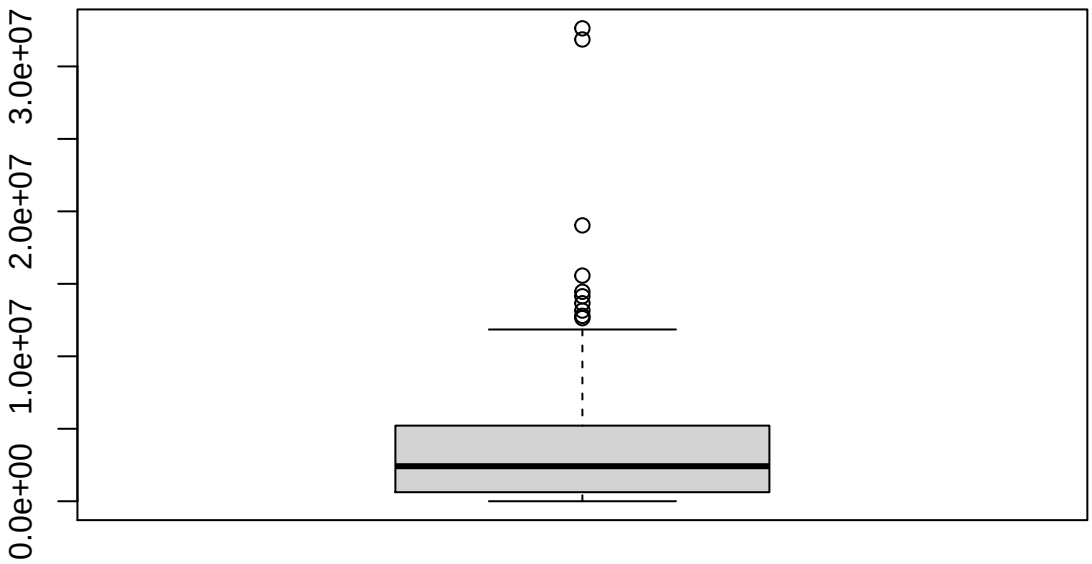

```
boxplot(movie_data$replace_mean_Budget)
```



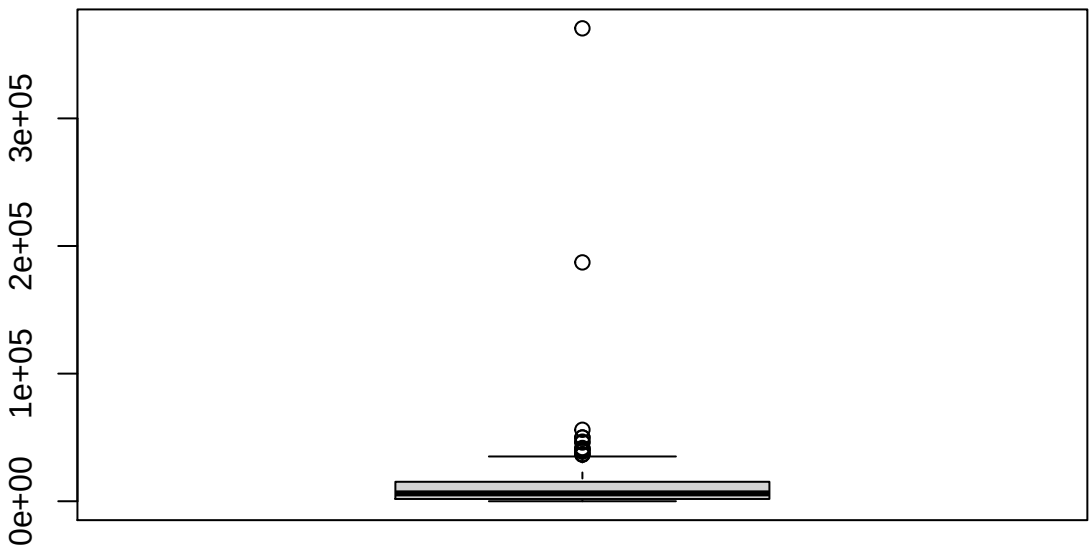

```
boxplot(movie_data$replace_mean_Screens)
```



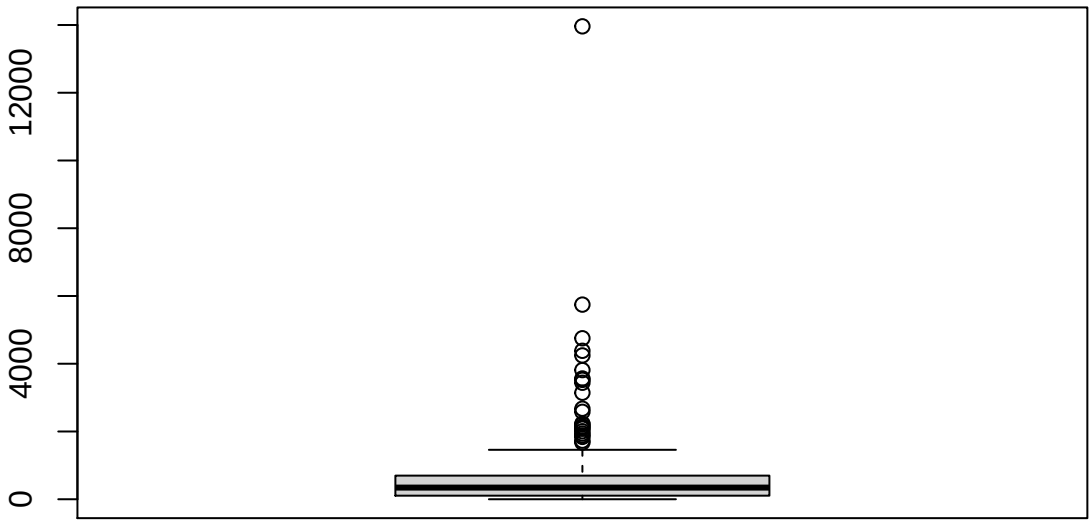

```
boxplot(movie_data$replace_mean_Views)
```



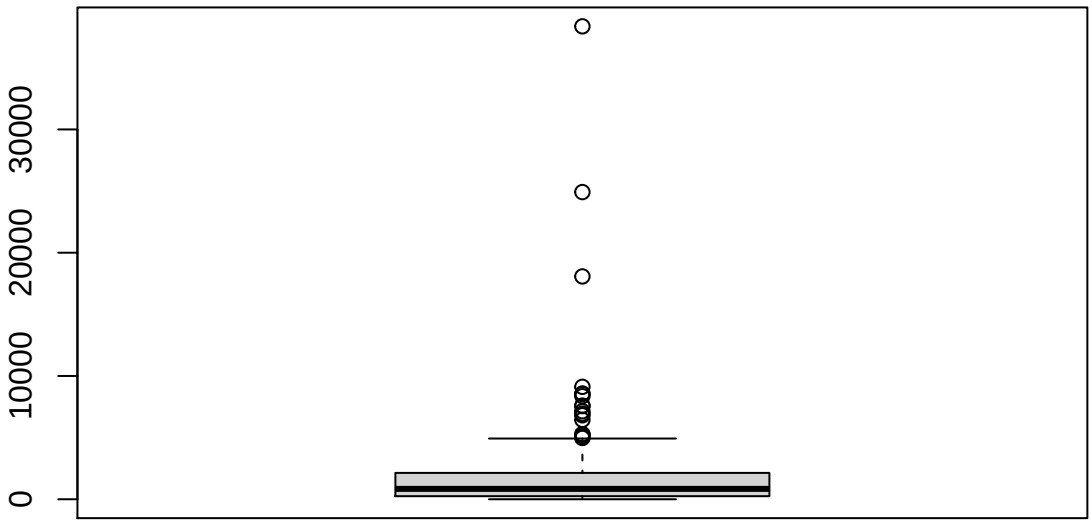

```
boxplot(movie_data$replace_mean_Likes)
```



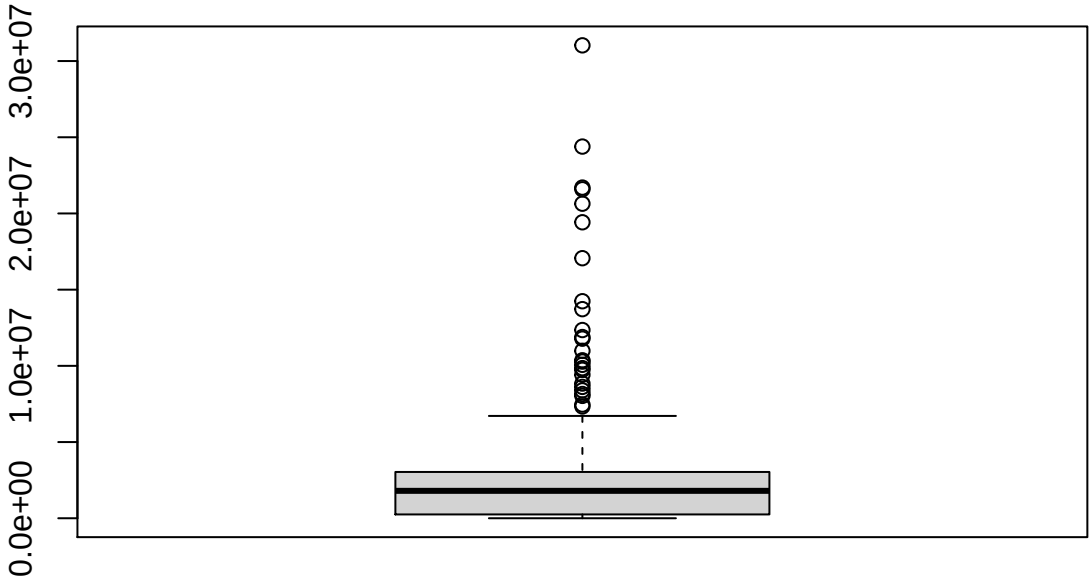

```
boxplot(movie_data$replace_mean_Dislikes)
```



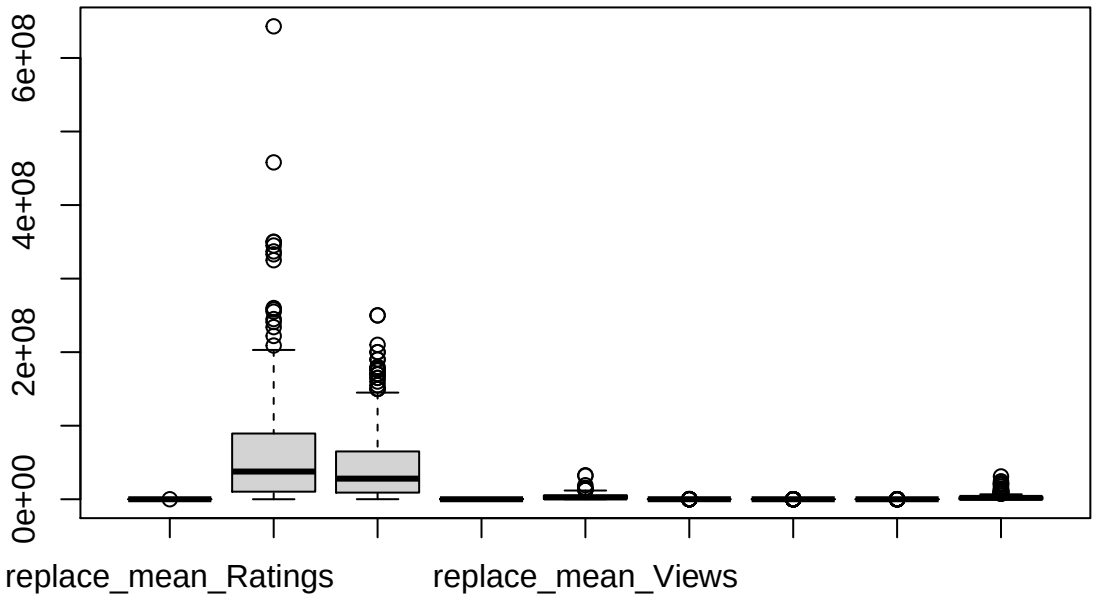

```
boxplot(movie_data$replace_mean_Comments)
```




```
boxplot(movie_data$replace_mean_Aggregate_Followers)
```




```
boxplot(movie_data)
boxplot(movie_data)$out
```

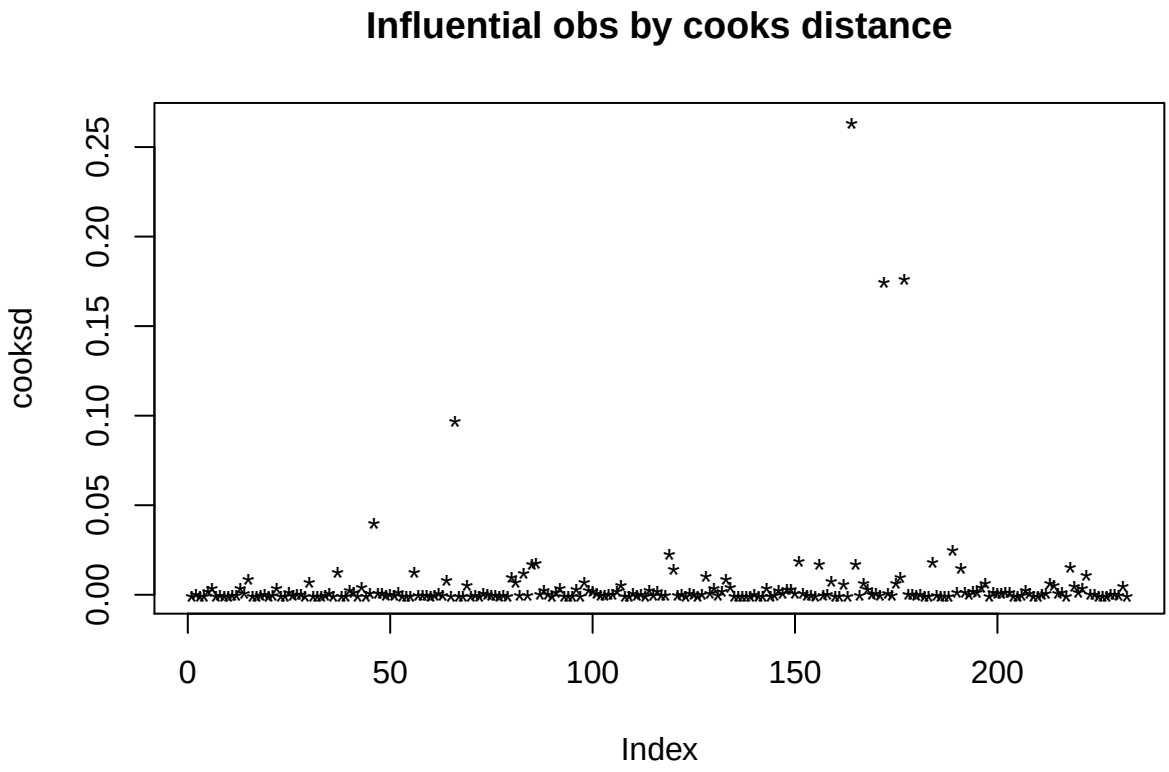



```
##   [1]         3.1 350000000.0 222000000.0 260000000.0 209000000.0 333000000.0
##   [7] 241000000.0 255000000.0 337000000.0 258000000.0 245000000.0 234000000.0
##  [13] 643000000.0 458000000.0 350000000.0 345000000.0 325000000.0 165000000.0
##  [19] 170000000.0 170000000.0 178000000.0 160000000.0 170000000.0 165000000.0
##  [25] 180000000.0 200000000.0 250000000.0 210000000.0 200000000.0 150000000.0
##  [31] 250000000.0 190000000.0 175000000.0 150000000.0 150000000.0 190000000.0
##  [37] 155000000.0 176000000.0  19032902.0  15568277.0  13661095.0  14453673.0
##  [43]  32626778.0  14141585.0  31859569.0  12632836.0  12792898.0  13154873.0
##  [49]     38810.0     41728.0     46023.0     41254.0    187162.0    370552.0
##  [55]     36646.0     39824.0     49900.0     36508.0     50002.0     56001.0
##  [61]     36874.0     46684.0     40496.0      4382.0      1940.0      1730.0
##  [67]      2111.0      3812.0      3145.0      2150.0      3439.0      4752.0
##  [73]      2233.0      1675.0     13960.0      1840.0      2210.0      5746.0
##  [79]      2581.0      2007.0      3524.0      2083.0      1885.0      3565.0
##  [85]      2672.0      4245.0      5278.0      6439.0      6946.0      7595.0
##  [91]     18077.0     24919.0      4973.0      8533.0      5005.0     38363.0
##  [97]      6811.0      5107.0      9119.0      7559.0      7139.0      8578.0
## [103]      8359.0      5262.0  12350000.0   8153000.0  21697300.0  19420105.0
## [109]   8030000.0  17064000.0  13720000.0  20640000.0   9414000.0   8839043.0
## [115]   9850000.0  14240000.0  21586000.0   8620000.0  11783000.0  10364000.0
## [121]  31030000.0  24388000.0  10280000.0  10070000.0  11890000.0   7336000.0
## [127]   9737600.0  10988000.0   8392000.0   7460000.0
```

###How to Remove Outliers from Multiple Columns in R

```
cooksd<-cooks.distance((model))
```

```
plot(cooksd,pch="*",cex=1,main="Influential obs by cooks distance")
```




```
cooksd
```

```
##            1            2            3            4            5            6
## 3.199881e-05 1.061405e-03 5.559492e-06 2.510955e-04 3.063783e-03 4.357536e-03
##            7            8            9           10           11           12
## 1.210919e-05 8.086688e-04 2.080758e-04 1.702180e-04 5.932023e-04 3.979801e-04
##           13           14           15           16           17           18
## 4.321734e-03 2.003389e-03 9.430120e-03 2.641235e-06 2.080530e-05 4.138818e-04
##           19           20           21           22           23           24
## 1.362723e-03 2.663981e-04 7.652797e-04 4.382884e-03 2.828426e-04 2.232967e-05
##           25           26           27           28           29           30
## 2.059391e-03 4.604448e-04 1.445641e-03 1.188209e-03 3.484621e-04 7.802453e-03
##           31           32           33           34           35           36
## 1.052228e-04 2.100214e-04 2.565811e-04 8.923383e-04 1.512163e-03 8.043333e-05
##           37           38           39           40           41           42
## 1.326012e-02 2.307838e-04 2.109440e-04 3.260227e-03 2.089443e-03 6.373026e-08
##           43           44           45           46           47           48
## 5.125479e-03 1.246199e-04 1.763317e-03 4.098960e-02 1.874689e-03 1.506946e-03
##           49           50           51           52           53           54
## 8.047916e-04 9.452611e-04 6.028368e-04 2.452272e-03 3.396126e-06 2.059163e-04
##           55           56           57           58           59           60
## 2.049725e-04 1.325300e-02 5.403106e-04 7.295958e-04 7.198905e-04 3.662672e-05
##           61           62           63           64           65           66
## 6.079021e-04 1.562084e-03 5.945978e-04 8.886200e-03 2.459761e-05 9.797153e-02
```

```
##           67           68           69           70           71           72
## 1.981886e-05 2.271515e-04 6.248938e-03 3.239033e-05 8.145974e-04 1.759739e-05
##           73           74           75           76           77           78
## 1.793060e-03 1.088856e-03 5.805818e-04 4.410799e-04 1.244508e-06 5.632846e-04
##           79           80           81           82           83           84
## 3.344251e-05 1.050861e-02 7.975237e-03 6.946140e-04 1.269043e-02 5.818775e-04
##           85           86           87           88           89           90
## 1.787468e-02 1.854010e-02 1.405631e-03 3.318075e-03 1.413009e-03 1.018163e-04
##           91           92           93           94           95           96
## 2.376351e-03 4.697717e-03 1.927801e-04 1.839860e-05 2.171721e-04 3.834666e-03
##           97           98           99          100          101          102
## 3.354370e-04 8.072584e-03 3.429251e-03 2.648879e-03 1.977100e-03 5.415673e-04
##          103          104          105          106          107          108
## 8.784224e-04 1.409200e-03 9.533434e-04 2.748543e-03 6.330677e-03 3.438133e-04
##          109          110          111          112          113          114
## 2.904724e-05 1.504729e-03 6.651857e-04 9.196852e-04 1.307158e-04 3.158387e-03
##          115          116          117          118          119          120
## 5.694482e-04 2.738409e-03 6.379014e-04 6.044638e-04 2.358869e-02 1.500800e-02
##          121          122          123          124          125          126
## 8.890892e-04 1.016521e-03 4.625472e-07 1.966664e-03 1.102509e-03 9.199738e-05
##          127          128          129          130          131          132
## 1.474201e-03 1.113599e-02 2.032217e-03 4.553796e-03 7.450113e-04 2.814528e-03
##          133          134          135          136          137          138
## 9.815489e-03 5.327287e-03 2.715033e-05 8.188774e-05 2.419848e-04 4.036642e-05
##          139          140          141          142          143          144
## 2.380219e-04 1.255565e-03 1.184534e-04 1.731816e-04 4.369847e-03 4.812187e-08
##          145          146          147          148          149          150
## 4.918238e-04 3.463467e-03 1.804750e-03 3.727347e-03 3.864774e-03 1.582902e-03
##          151          152          153          154          155          156
## 1.951475e-02 1.515652e-03 5.767143e-04 5.560868e-04 6.820157e-05 1.790988e-02
##          157          158          159          160          161          162
## 8.581471e-04 9.556858e-04 8.392391e-03 2.325468e-05 2.180515e-04 6.794319e-03
##          163          164          165          166          167          168
## 1.178358e-04 2.640597e-01 1.808081e-02 8.665188e-04 7.486733e-03 3.948200e-03
##          169          170          171          172          173          174
## 1.227517e-03 1.590776e-03 4.580027e-04 1.753089e-01 1.826302e-03 4.569832e-04
##          175          176          177          178          179          180
## 7.486957e-03 1.058590e-02 1.768257e-01 1.131626e-03 1.158710e-03 5.589147e-04
##          181          182          183          184          185          186
## 1.056423e-03 2.127828e-04 3.898227e-05 1.926732e-02 5.933617e-04 1.681899e-06
##          187          188          189          190          191          192
## 1.782805e-04 2.608060e-05 2.568686e-02 2.271504e-03 1.595054e-02 2.377370e-03
##          193          194          195          196          197          198
## 1.263146e-03 2.762880e-03 2.120557e-03 4.967029e-03 7.576990e-03 2.859548e-04
##          199          200          201          202          203          204
## 2.058958e-03 1.844200e-03 1.682653e-03 2.051455e-03 2.183725e-03 4.747076e-05
##          205          206          207          208          209          210
## 1.963914e-04 6.302017e-04 3.515945e-03 2.026057e-03 1.281909e-04 2.402708e-04
##          211          212          213          214          215          216
## 1.405737e-03 1.918368e-03 7.580368e-03 6.233217e-03 1.941239e-03 2.283365e-03
##          217          218          219          220          221          222
## 2.453915e-06 1.628784e-02 5.651963e-03 2.539792e-03 4.582412e-03 1.188407e-02
##          223          224          225          226          227          228
## 1.133999e-03 9.379196e-04 2.061179e-04 1.291130e-04 1.948335e-05 1.049369e-03
```

```
##          229          230          231          232
## 1.258997e-03 7.626064e-04 5.807478e-03 9.438684e-35
```

```
influential<-cooksd[(cooksd>(3*mean(cooksd,na.rm=TRUE)))]

names_of_influential<-names(influential)
names_of_influential
```

```
##  [1] "46"  "66"  "86"  "119" "151" "164" "172" "177" "184" "189"
```

```
outliers <- movie_data[names_of_influential,]
movie_data_without_outliers <-movie_data %>% anti_join(outliers)
movie_data_without_outliers
```

```
##     replace_mean_Ratings replace_mean_Gross replace_mean_Budget
## 1               6.300000               9130             4000000
## 2               7.100000          192000000            50000000
## 3               6.200000           30700000            28000000
## 4               6.300000          106000000           110000000
## 5               4.700000           17300000             3500000
## 6               4.600000              29000              500000
## 7               6.100000           42600000            40000000
## 8               7.100000            5750000            20000000
## 9               6.500000           26000000            28000000
## 10              6.100000           48600000            12500000
## 11              7.300000          350000000            58800000
## 12              5.700000           15200000            30000000
## 13              5.400000           84300000             6500000
## 14              5.200000           85900000            65000000
## 15              4.400000             830000             5000000
## 16              6.600000              11800             6000000
## 17              6.300000              72300             5000000
## 18              6.900000           14600000             7000000
## 19              7.900000          222000000           165000000
## 20              6.600000           21600000             9000000
## 21              6.500000           46300000            40000000
## 22              8.000000           25400000             4000000
## 23              5.700000           20300000            28000000
## 24              6.500000            1870000             7000000
## 25              7.000000               9840             1000000
## 26              6.700000            6370000             3000000
## 27              7.800000          260000000           170000000
## 28              7.700000          209000000           170000000
## 29              6.200000           30500000            30000000
## 30              4.000000           15800000             7000000
## 31              6.800000          151000000            85000000
## 32              6.400000           42000000            36000000
## 33              6.300000           55900000            70000000
## 34              6.800000           28800000            27000000
## 35              5.800000           86200000            35000000
## 36              5.800000           38900000            13000000
## 37              7.900000          100000000           178000000
## 38              6.300000           23400000            20000000
## 39              5.700000               8690             4500000
## 40              7.100000            1210000            24000000
```

```
## 41          7.600000          85700000          68000000
## 42          6.400000            102000           1850000
## 43          5.000000          60800000           2000000
## 44          6.100000            104000           1000000
## 45          6.500000         201000000         160000000
## 46          8.100000         333000000         170000000
## 47          5.600000             30100             70000
## 48          5.800000          91400000          12000000
## 49          6.100000          72700000         100000000
## 50          6.300000          54400000          42000000
## 51          7.900000         177000000         145000000
## 52          6.800000          50500000          11000000
## 53          6.100000            275000           8932780
## 54          6.700000           8090000          20000000
## 55          8.700000         188000000         165000000
## 56          5.800000          47600000          50000000
## 57          6.000000         128000000          50000000
## 58          6.900000          14700000           2000000
## 59          6.200000          50500000          60000000
## 60          6.900000          47000000          40000000
## 61          7.200000          43000000          20000000
## 62          7.000000           2450000           5000000
## 63          7.800000         128000000          81000000
## 64          6.500000            129000          25000000
## 65          6.500000          82400000          17000000
## 66          5.700000              8300           2400000
## 67          4.800000              2470            300000
## 68          6.400000         127000000          40000000
## 69          7.000000         241000000         180000000
## 70          6.300000            348000          15000000
## 71          7.100000          36400000          25000000
## 72          5.400000          10400000           5000000
## 73          6.900000         112000000         145000000
## 74          6.500000          51200000          50000000
## 75          6.300000           4010000           5000000
## 76          6.600000          43600000          66000000
## 77          6.400000         150000000          18000000
## 78          6.300000         114000000         127000000
## 79          7.900000          32300000           8500000
## 80          5.600000          52500000          13200000
## 81          5.900000         101000000         125000000
## 82          7.000000          91400000          50000000
## 83          5.200000             35700            600000
## 84          7.200000          76100000          55000000
## 85          5.000000          32500000           5000000
## 86          6.800000          83300000         132000000
## 87          5.900000          59200000          50000000
## 88          5.600000          23200000         100000000
## 89          6.100000         134000000          25000000
## 90          6.400000         132000000         103000000
## 91          6.200000          58600000         100000000
## 92          6.600000           3090000           5000000
## 93          7.500000             37400           5000000
## 94          5.700000          10500000          35000000
```

```
## 95          7.500000          52100000          20000000
## 96          5.400000            176000          30000000
## 97          5.500000          17200000          95000000
## 98          5.100000          38500000          40000000
## 99          6.600000          13800000          65000000
## 100         5.500000          59700000          22000000
## 101         5.800000             20200           6000000
## 102         7.300000          44100000          13000000
## 103         6.100000          89300000          48000000
## 104         4.800000          84500000          20000000
## 105         5.900000         191000000         125000000
## 106         6.100000          26000000           8000000
## 107         7.100000           2590000           9500000
## 108         6.800000         203000000         200000000
## 109         6.900000            924000           2000000
## 110         6.600000          26800000          26000000
## 111         7.300000          50200000          50000000
## 112         6.800000          50800000          60000000
## 113         4.800000              4240           7000000
## 114         7.100000          10700000          12600000
## 115         7.200000         102000000          55000000
## 116         7.900000         125000000          12000000
## 117         7.000000           2820000          47921730
## 118         6.100000          33600000          25000000
## 119         6.500000          45100000          25000000
## 120         7.400000           2720000          20000000
## 121         7.500000         255000000         250000000
## 122         6.600000           2430000          16000000
## 123         7.300000          54200000          22000000
## 124         6.800000         337000000         125000000
## 125         5.000000           2820000          12000000
## 126         8.100000          91100000          14000000
## 127         6.700000           6110000          44000000
## 128         7.500000          47100000          50000000
## 129         4.200000          18800000          70000000
## 130         7.800000         258000000          60000000
## 131         6.300000           5980000          14000000
## 132         6.800000         102000000          34000000
## 133         6.100000          78000000          70000000
## 134         6.300000          25000000          15000000
## 135         5.800000          64200000          42000000
## 136         7.100000            512000            100000
## 137         6.000000          83900000          40000000
## 138         6.500000          71500000           9000000
## 139         4.700000           2750000           6500000
## 140         6.400000           1110000          12250000
## 141         6.800000              5000          11712311
## 142         7.800000          35900000          15000000
## 143         7.200000           4190000          22500000
## 144         4.900000          26500000           1000000
## 145         5.700000          65200000          24000000
## 146         6.300000          23000000         100000000
## 147         5.400000           1820000           2800000
## 148         7.200000         116000000          65000000
```

```
## 149          6.800000          3320000          6000000
## 150          6.600000         30100000         15000000
## 151          8.600000         13100000          3300000
## 152          6.900000           280000          2487820
## 153          7.200000         37900000         15000000
## 154          8.200000          3080000          3300000
## 155          6.200000            22500         60000000
## 156          6.700000          3590000          6000000
## 157          8.100000        234000000        200000000
## 158          6.200000           717000         12000000
## 159          7.800000        458000000        250000000
## 160          7.400000        350000000        190000000
## 161          8.600000        345000000        175000000
## 162          6.600000        325000000         74000000
## 163          6.700000        183000000         29000000
## 164          7.800000        171000000        150000000
## 165          6.700000        177000000        135000000
## 166          6.100000        162000000         74000000
## 167          6.400000        154000000        110000000
## 168          8.300000        153000000        150000000
## 169          8.300000        135000000         28000000
## 170          7.300000        110000000         65000000
## 171          6.700000        105000000         35000000
## 172          6.600000         93200000        190000000
## 173          6.100000         90400000         40000000
## 174          6.800000         89400000        155000000
## 175          6.600000         81300000         68000000
## 176          5.600000         71000000         88000000
## 177          6.200000         65900000         14800000
## 178          6.700000         64500000         23000000
## 179          6.300000         54900000         31000000
## 180          5.000000         47400000         35000000
## 181          5.500000         47400000        176000000
## 182          7.300000         42500000         25000000
## 183          7.000000         41900000         20000000
## 184          7.200000         37400000         34000000
## 185          7.600000         36100000          5000000
## 186          4.600000         35400000          4000000
## 187          5.000000         34500000         35000000
## 188          6.600000         34000000          8500000
## 189          7.400000         33300000         11000000
## 190          7.100000         32400000         30000000
## 191          6.900000         31400000         12000000
## 192          5.200000         25800000          3300000
## 193          5.500000         19000000         10000000
## 194          6.100000         23500000         18000000
## 195          6.400000         22300000         12000000
## 196          5.900000         16100000         35000000
## 197          7.500000         16800000           700000
## 198          5.100000         12300000         14000000
## 199          6.500000         10900000         28000000
## 200          5.800000         10600000         40000000
## 201          5.500000          7610000         60000000
## 202          5.400000          7100000         70000000
```

```
## 203             8.200000            6740000             8000000
## 204             4.500000            1710000             8495000
## 205             5.600000             131000             4500000
## 206             7.300000             129000             4000000
## 207             6.300000             106000             1500000
## 208             7.800000          169000000           130000000
## 209             7.700000           49500000            30000000
## 210             7.700000           25400000            15000000
## 211             7.600000           34600000            75000000
## 212             7.100000          201000000            95000000
## 213             7.000000           31600000            49000000
## 214             6.900000             444000             1900000
## 215             6.600000           26400000            50000000
## 216             6.600000           33100000            10000000
## 217             6.400000            1210000            50000000
## 218             5.500000           21000000            37000000
## 219             5.400000           10200000            35000000
## 220             5.400000           12300000             3000000
## 221             4.400000           22600000              100000
## 222             6.441558           68066033            47921730
##     replace_mean_Screens replace_mean_Views replace_mean_Likes
## 1                 45.000            3280543            4632.00
## 2               3306.000             583289            3465.00
## 3               2872.000             304861             328.00
## 4               3470.000             452917            2429.00
## 5               2310.000            3145573           12163.00
## 6               2209.244              91137             112.00
## 7               3158.000            3013011            9595.00
## 8                818.000            1854103            2207.00
## 9               2714.000            2213659            2210.00
## 10              2253.000            5218079           11709.00
## 11              3555.000            3927600           13143.00
## 12              1762.000             519327             963.00
## 13              3185.000           19032902           38810.00
## 14              3116.000             930006            5150.00
## 15                65.000             595194              85.00
## 16                18.000            3915978            6983.00
## 17                25.000            1391527            2479.00
## 18                31.000            1828235            7633.00
## 19              3761.000            4700023           14163.00
## 20              1823.000            1348142            4404.00
## 21              3555.000            7977747           18690.00
## 22               771.000            1671367            4572.00
## 23              2647.000            2088644            6633.00
## 24               482.000            4398243            9202.00
## 25              2209.244               7128               1.00
## 26               382.000            2902492            9522.00
## 27              3938.000             760262            2918.00
## 28              3967.000            1735700            6772.00
## 29                97.000             465219            1348.00
## 30              2544.000            1844690            3728.00
## 31              3936.000             463866            3400.00
## 32              3376.000             384448            1230.00
## 33              2209.244            9149892           26427.00
```

```
## 34            2781.000          522630          1248.00
## 35            3154.000         3287020          7698.00
## 36            3230.000         1488038          2571.00
## 37            3490.000        15568277         29251.00
## 38            2800.000        11850723         24226.00
## 39            2209.244          735551           636.00
## 40              66.000         6685088          8369.00
## 41            3313.000         2276605          3946.00
## 42               8.000         1034480          6490.00
## 43             780.000          456564          1706.00
## 44               3.000           99427            47.00
## 45            3952.000         1156609          2968.00
## 46            4080.000         1313548          8567.00
## 47               9.000          924347          1406.00
## 48            2417.000          175017           461.00
## 49            3595.000         9324678         15479.00
## 50              93.000         1292235          5284.00
## 51            4253.000        11472161         22779.00
## 52            1272.000         9222933         41728.00
## 53               6.000            8210             6.00
## 54             645.000         1167941          2651.00
## 55            3561.000         5421705         16635.00
## 56            3434.000         4270410          8886.00
## 57            2440.000          817242          4391.00
## 58               4.000            4877             6.00
## 59            3387.000         3320754          4322.00
## 60            2905.000         1438350          4028.00
## 61            2589.000         4846645         14722.00
## 62             374.000         3650720          6917.00
## 63            3204.000         2767873         46023.00
## 64              28.000          289922           143.00
## 65            1534.000         4450824          7315.00
## 66            2209.244         1222921          5553.00
## 67               3.000           30529            18.00
## 68            3173.000         1142964          2346.00
## 69            3948.000          557012          3528.00
## 70              66.000          177465           595.00
## 71            3019.000         1470438          4314.00
## 72            1044.000          667852           469.00
## 73            3934.000          277848           890.00
## 74            3194.000         3037329          6696.00
## 75             255.000          446576           659.00
## 76            3115.000         1451649          7342.00
## 77            3279.000         2554307          8722.00
## 78              22.000         3779254         13535.00
## 79            2766.000         6082510         12522.00
## 80            2130.000          608230           895.00
## 81            3567.000        13661095         41254.00
## 82            3090.000          367551           700.00
## 83            2209.244         5403836        187162.00
## 84            3303.000         2028767          3829.00
## 85            2867.000          105480           352.00
## 86              32.000         1223790          2934.00
## 87            3826.000         2117798          2124.00
```

```
## 88          2658.000          355563          1568.00
## 89          2663.000         8429023         27484.00
## 90          3948.000         3849768          9783.00
## 91          3372.000         3305047         11733.00
## 92           371.000          909596          2214.00
## 93          2209.244          827239          3221.00
## 94          2486.000         3466458          6096.00
## 95          2179.000         3743181         16782.00
## 96            59.000         3726728          6221.00
## 97          2875.000           23360            36.00
## 98          3062.000         2757667          3030.00
## 99          2894.000         5223362         18770.00
## 100         3260.000          943306          3006.00
## 101           27.000         2426078          9230.00
## 102           18.000         4176181          9463.00
## 103           21.000         1544390          2975.00
## 104         3465.000         3429055          7682.00
## 105         3845.000         7908038         27312.00
## 106         2809.000         6132551         14539.00
## 107         1586.000          134353           280.00
## 108         4324.000          386857          4996.00
## 109          147.000         6501107         14139.00
## 110            8.000         5546710         15351.00
## 111           12.000         5165441         17476.00
## 112         3464.000         2545852          3964.00
## 113         2209.244          330363           406.00
## 114          809.000         2897407          5953.00
## 115         3236.000         7075635         15858.00
## 116         3173.000        32626778        370552.00
## 117          432.000           10747             4.00
## 118          103.000         4790221          4740.00
## 119          702.000          523457          2187.00
## 120          461.000         1303646          3306.00
## 121         3875.000         3554189         14152.00
## 122            4.000           26528            58.00
## 123         2023.000           24809           277.00
## 124         4151.000         3305417         14684.00
## 125         2209.244          309610           729.00
## 126          747.000         3047849         11748.00
## 127           78.000         6231191         13331.00
## 128         3003.000         1325872          4829.00
## 129         2104.000          797229          1606.00
## 130         3775.000          439159          1847.00
## 131         1841.000          381071           238.00
## 132          173.000         3156436         18124.00
## 133         3083.000           10649            21.00
## 134         2776.000         1935432          3089.00
## 135         3427.000         2269032          3046.00
## 136           20.000         1223891          1309.00
## 137         3205.000         8479994         35071.00
## 138         2805.000         1142295          3895.00
## 139          685.000         4092871          8781.00
## 140            5.000             702             1.00
## 141            2.000          253631           170.00
```

```
## 142              15.000           3226251          18240.00
## 143             320.000           3281842           4968.00
## 144            2602.000               698             16.00
## 145            2225.000           2063089           5858.00
## 146            3455.000          14141585          36646.00
## 147             449.000            473100            670.00
## 148            3131.000           6637551          19833.00
## 149             291.000            476747           2079.00
## 150             794.000            280566            477.00
## 151              42.000           7750223          17541.00
## 152               2.000            166612            571.00
## 153            1061.000           5976092           9343.00
## 154               4.000            697105           1023.00
## 155            2965.000            719976           1312.00
## 156              68.000            865690           1375.00
## 157            3996.000              2285              9.00
## 158               2.000            550734            894.00
## 159            4276.000          10366624          31552.00
## 160            4004.000             59056            330.00
## 161            3946.000           1438926           4632.00
## 162            4301.000           1341909           1607.00
## 163            3473.000           9214467          39824.00
## 164            3956.000           8748596          20352.00
## 165            3708.000          10341783          24413.00
## 166            3641.000           5536822          29411.00
## 167            3777.000          12632836          36508.00
## 168            3702.000           2732371          13030.00
## 169            2757.000            848970          12607.00
## 170            3711.000           6649290          20750.00
## 171            3158.000           9511288          19903.00
## 172            3972.000            999867           4212.00
## 173            3175.000          10078326          26565.00
## 174            3758.000             84870            265.00
## 175            3442.000           6711914          29903.00
## 176            3723.000           5340100          26134.00
## 177            3355.000           5128288          18475.00
## 178            3003.000           4826940          10521.00
## 179            3411.000           2554327          10062.00
## 180            3240.000           3651828          13998.00
## 181            3181.000           3920842          10535.00
## 182            2991.000          11036701          50002.00
## 183            2855.000           2947239          19201.00
## 184            3366.000           2393017          13291.00
## 185            1648.000           2513544           6970.00
## 186            2602.000           5588384          15144.00
## 187            3003.000           6964819          26601.00
## 188            2575.000          12792898          56001.00
## 189             258.000              6495             82.00
## 190            3108.000           1841293           5879.00
## 191            3031.000           2854910          23254.00
## 192            2666.000           4442147          10605.00
## 193            2766.000          11037833          36874.00
## 194            1603.000            638374           4018.00
## 195            2893.000           6646785          16041.00
```

```
## 196             3261.000          13154873          46684.00
## 197             2002.000             50444            238.00
## 198             2880.000             11496            194.00
## 199             2778.000           2996539           1874.00
## 200             2816.000           3098749           4311.00
## 201             2648.000           3850758          13363.00
## 202             2567.000           2409338           6923.00
## 203               34.000           4032265          18398.00
## 204              420.000           1364537           3824.00
## 205               79.000           5085068          14359.00
## 206               14.000             63724            115.00
## 207               22.000             44963            109.00
## 208             3856.000           9597644          32558.00
## 209             2772.000          11476882          40496.00
## 210             1255.000            419470           2218.00
## 211             3638.000           5216680          20010.00
## 212             3845.000          10164908          22726.00
## 213             3201.000           7384182          23597.00
## 214              200.000            890619           6352.00
## 215             3171.000           5671767          10073.00
## 216             1573.000            831044           2427.00
## 217               66.000           3701061           9325.00
## 218             2815.000           7119456          18803.00
## 219             2777.000           3450614           6823.00
## 220             2209.244             66872            400.00
## 221             2720.000            659772           2841.00
## 222             2209.244           3712851          12732.54
##     replace_mean_Dislikes replace_mean_Comments
## 1                425.0000               636.000
## 2                 61.0000               186.000
## 3                 34.0000                47.000
## 4                132.0000               590.000
## 5                610.0000              1082.000
## 6                  7.0000                 1.000
## 7                419.0000              1020.000
## 8                197.0000               593.000
## 9                419.0000               382.000
## 10               532.0000               770.000
## 11               573.0000              3134.000
## 12                94.0000                70.000
## 13              4382.0000              4392.000
## 14               707.0000              1484.000
## 15                36.0000                39.000
## 16               247.0000               460.000
## 17               146.0000               182.000
## 18               235.0000               685.000
## 19               538.0000              1293.000
## 20               307.0000              1033.000
## 21              1940.0000              2214.000
## 22               207.0000               741.000
## 23               255.0000              1235.000
## 24               454.0000              1150.000
## 25                 0.0000                 0.000
## 26               558.0000              2296.000
```

```
## 27              66.0000             837.000
## 28             187.0000             889.000
## 29              72.0000             162.000
## 30             581.0000             729.000
## 31             152.0000             987.000
## 32             129.0000             228.000
## 33            1342.0000            5278.000
## 34             153.0000             227.000
## 35             446.0000            1122.000
## 36             553.0000             643.000
## 37            1730.0000            6439.000
## 38            1343.0000            2577.000
## 39              98.0000              92.000
## 40             467.0000            1580.000
## 41             331.0000            1286.000
## 42             181.0000             374.000
## 43             413.0000             890.000
## 44              10.0000              12.000
## 45             112.0000             547.000
## 46             269.0000            1285.000
## 47             107.0000             132.000
## 48              34.0000             133.000
## 49            1130.0000            3925.000
## 50             124.0000             362.000
## 51             862.0000            2863.000
## 52             924.0000            3609.000
## 53               0.0000               0.000
## 54              82.0000             797.000
## 55             751.0000            4316.000
## 56             569.0000            3058.000
## 57             112.0000             346.000
## 58               1.0000               1.000
## 59             347.0000            1105.000
## 60             133.0000             543.000
## 61             405.0000            2732.000
## 62             234.0000            1119.000
## 63             944.0000            6946.000
## 64              17.0000               9.000
## 65             546.0000             909.000
## 66             193.0000             335.000
## 67               4.0000               2.000
## 68             167.0000             311.000
## 69             135.0000             464.000
## 70              39.0000              71.000
## 71             168.0000             511.000
## 72              38.0000              44.000
## 73              45.0000              88.000
## 74             564.0000            1061.000
## 75              50.0000              45.000
## 76             533.0000            2305.000
## 77             298.0000             693.000
## 78             362.0000            1221.000
## 79             543.0000            2170.000
## 80             118.0000             387.000
```

```
## 81              3812.0000            18077.000
## 82                19.0000               37.000
## 83              3145.0000            24919.000
## 84               500.0000              665.000
## 85                45.0000               85.000
## 86               123.0000              226.000
## 87               485.0000              626.000
## 88               106.0000              267.000
## 89               977.0000             2195.000
## 90               704.0000             1151.000
## 91              1077.0000             4319.000
## 92               186.0000              632.000
## 93                89.0000              432.000
## 94               411.0000              977.000
## 95               565.0000             4973.000
## 96               405.0000             1074.000
## 97                 5.0000                5.000
## 98               418.0000              251.000
## 99               627.0000             2796.000
## 100              325.0000             1401.000
## 101              184.0000              373.000
## 102              310.0000              885.000
## 103              136.0000              380.000
## 104              675.0000              727.000
## 105             3439.0000             8533.000
## 106              653.0000              846.000
## 107               43.0000              308.000
## 108              233.0000              864.000
## 109              890.0000             2928.000
## 110              535.0000             1271.000
## 111              871.0000             3229.000
## 112              378.0000              554.000
## 113               52.0000               92.000
## 114              153.0000              569.000
## 115              574.0000             1966.000
## 116             4752.0000            38363.000
## 117                1.0000                1.000
## 118              454.0000              773.000
## 119              149.0000              565.000
## 120              211.0000              564.000
## 121              262.0000             1782.000
## 122                1.0000                8.000
## 123               12.0000               52.000
## 124              332.0000             1176.000
## 125               97.0000              113.000
## 126              253.0000             1237.000
## 127             1265.0000             3430.000
## 128              104.0000              378.000
## 129              630.0000              456.000
## 130              105.0000              289.000
## 131               27.0000               43.000
## 132              213.0000             2753.000
## 133                1.0000                0.000
## 134              155.0000              567.000
```

```
## 135             546.0000             554.000
## 136             148.0000             239.000
## 137            2233.0000            3479.000
## 138             193.0000             882.000
## 139             794.0000            2046.000
## 140               0.0000               1.000
## 141              11.0000              58.000
## 142             261.0000            2104.000
## 143             445.0000            2099.000
## 144               1.0000               9.000
## 145             336.0000             346.000
## 146            1459.0000            6811.000
## 147             104.0000             380.000
## 148             815.0000            3403.000
## 149             166.0000             232.000
## 150              56.0000              82.000
## 151             631.0000            2760.000
## 152              36.0000              70.000
## 153             649.0000            1333.000
## 154              39.0000             429.000
## 155              76.0000             189.000
## 156              79.0000              67.000
## 157               0.0000               1.000
## 158              44.0000              77.000
## 159             989.0000            3843.000
## 160               8.0000              39.000
## 161             262.0000             496.000
## 162             764.0000              48.000
## 163             998.0000            1987.000
## 164             649.0000            1842.000
## 165            1675.0000            3426.000
## 166            1840.0000            1281.000
## 167            2210.0000            7559.000
## 168             497.0000            1774.000
## 169             237.0000            1560.000
## 170             750.0000            1666.000
## 171            2581.0000            2955.000
## 172              66.0000             250.000
## 173            1418.0000            2395.000
## 174              13.0000              63.000
## 175             984.0000            1767.000
## 176            2007.0000            3717.000
## 177             858.0000            1579.000
## 178             478.0000             755.000
## 179             464.0000             871.000
## 180             969.0000            2205.000
## 181             565.0000            1668.000
## 182            1005.0000            3525.000
## 183             625.0000            1842.000
## 184             369.0000             584.000
## 185             270.0000            1105.000
## 186             913.0000            1499.000
## 187            1111.0000            1293.000
## 188            2083.0000            4102.000
```

```
## 189                3.0000                7.000
## 190              314.0000              634.000
## 191              459.0000             1087.000
## 192              691.0000             2739.000
## 193             1885.0000             4360.000
## 194              130.0000              269.000
## 195              955.0000             2787.000
## 196             3565.0000             8578.000
## 197                3.0000               28.000
## 198                9.0000               31.000
## 199               32.0000              189.000
## 200              341.0000              881.000
## 201              453.0000             1276.000
## 202              340.0000              714.000
## 203              302.0000             1298.000
## 204              689.0000              772.000
## 205              600.0000             2468.000
## 206               28.0000               14.000
## 207               27.0000               42.000
## 208             2672.0000             8359.000
## 209             1383.0000             4435.000
## 210               46.0000              239.000
## 211              500.0000             2300.000
## 212             4245.0000             5262.000
## 213              786.0000             3481.000
## 214              293.0000              700.000
## 215              480.0000             1712.000
## 216               99.0000              247.000
## 217              641.0000             1859.000
## 218             1128.0000             2290.000
## 219              325.0000              409.000
## 220               67.0000              201.000
## 221              431.0000              606.000
## 222              679.0519             1825.701
##     replace_mean_Aggregate_Followers
## 1                            1120000
## 2                           12350000
## 3                             483000
## 4                             568000
## 5                            1923800
## 6                             310000
## 7                            8153000
## 8                             130655
## 9                             125646
## 10                          21697300
## 11                             24300
## 12                            386400
## 13                          19420105
## 14                           5130800
## 15                             15112
## 16                            253000
## 17                           1658900
## 18                            116100
## 19                            199800
```

```
## 20                888000
## 21               2417000
## 22                105000
## 23               3209000
## 24               4769100
## 25                  2182
## 26               3038193
## 27               8030000
## 28                114000
## 29                744600
## 30                  9536
## 31               1030000
## 32                276750
## 33                395500
## 34                147000
## 35              17064000
## 36                 88586
## 37               5610000
## 38                 21500
## 39               1060000
## 40              13720000
## 41               1888000
## 42                 66600
## 43                412000
## 44               3038193
## 45               1870000
## 46               2750000
## 47               5887700
## 48               3038193
## 49               9414000
## 50               1650000
## 51                671000
## 52               1800000
## 53                 58900
## 54               3038193
## 55               1865000
## 56                301000
## 57               4720000
## 58               3038193
## 59                147000
## 60                 27323
## 61               3038193
## 62               1045200
## 63               5407000
## 64               3038193
## 65               2356000
## 66               1463000
## 67                 18100
## 68               3038193
## 69                  5633
## 70                644000
## 71                130000
## 72                919000
## 73               8839043
```

```
## 74                    9850000
## 75                    3038193
## 76                    2594000
## 77                   14240000
## 78                    6480000
## 79                    3038193
## 80                    1550500
## 81                    1810000
## 82                     648786
## 83                    2720000
## 84                     124000
## 85                      11444
## 86                      47200
## 87                    3603000
## 88                     370000
## 89                   21586000
## 90                     154400
## 91                     250000
## 92                    3038193
## 93                     217000
## 94                    3678000
## 95                       9224
## 96                    3038193
## 97                     804300
## 98                    4521000
## 99                    8620000
## 100                   3185900
## 101                     33500
## 102                    269849
## 103                    216000
## 104                    727000
## 105                   1260000
## 106                  11783000
## 107                   3038193
## 108                   4520000
## 109                   3038193
## 110                     48231
## 111                  10364000
## 112                   1280000
## 113                   3038193
## 114                   3038193
## 115                   1800000
## 116                   4240000
## 117                    818000
## 118                   2740000
## 119                    184100
## 120                    759800
## 121                   2613000
## 122                     25748
## 123                     20700
## 124                  31030000
## 125                    275873
## 126                   3038193
## 127                   6619435
```

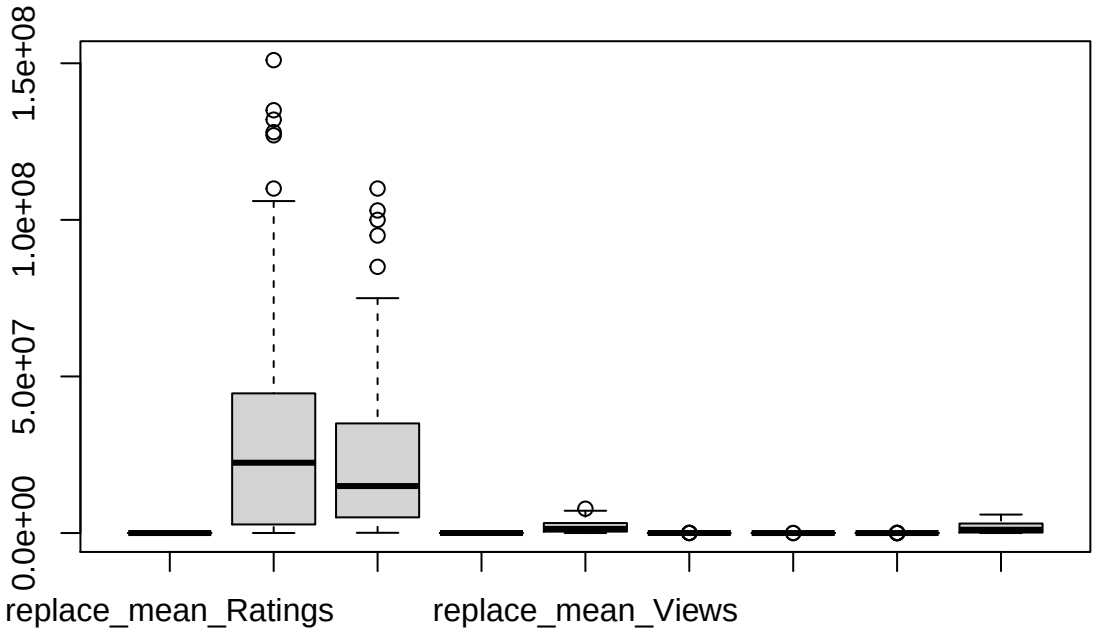
```
## 128                    5563500
## 129                    1174806
## 130                    4690000
## 131                      14586
## 132                    4734000
## 133                       3849
## 134                     148000
## 135                    3038193
## 136                     226000
## 137                    2731000
## 138                      49424
## 139                     420000
## 140                       9842
## 141                    3038193
## 142                       8204
## 143                    1899400
## 144                       3086
## 145                   24388000
## 146                       5987
## 147                     180100
## 148                     269000
## 149                    2536000
## 150                     585000
## 151                     858000
## 152                    3038193
## 153                     781200
## 154                    3038193
## 155                    1810000
## 156                    1818778
## 157                   10280000
## 158                     168700
## 159                   10070000
## 160                   11890000
## 161                     232000
## 162                     250000
## 163                    7336000
## 164                    6605000
## 165                    5070000
## 166                     184000
## 167                    9737600
## 168                     768700
## 169                      55618
## 170                     265000
## 171                    2014000
## 172                    1198000
## 173                    2939000
## 174                    3877901
## 175                   10988000
## 176                    2466000
## 177                    8392000
## 178                    2284000
## 179                    2347000
## 180                       1066
## 181                    7460000
```

```
## 182                          776000
## 183                            2113
## 184                          324925
## 185                         1655987
## 186                         4599000
## 187                         1630000
## 188                         6714000
## 189                          675000
## 190                          788000
## 191                         4184000
## 192                         2007000
## 193                            5699
## 194                            1887
## 195                          253499
## 196                          209000
## 197                          986572
## 198                         1891977
## 199                          155000
## 200                         1520000
## 201                         3045000
## 202                         1334000
## 203                            2208
## 204                            3841
## 205                         3744000
## 206                          129000
## 207                         1188000
## 208                         3038193
## 209                         3038193
## 210                         3038193
## 211                         3038193
## 212                         3038193
## 213                         3038193
## 214                         3038193
## 215                         3038193
## 216                         3038193
## 217                         3038193
## 218                         3038193
## 219                         3038193
## 220                         3038193
## 221                         3038193
## 222                         3038193
```

Other Ways of Removing Outliers ——————————————————————-

```
outliers <- function(x) {

  Q1 <- quantile(x, probs=.25)
  Q3 <- quantile(x, probs=.75)
  iqr = Q3-Q1

  upper_limit = Q3 + (iqr*1.5)
  lower_limit = Q1 - (iqr*1.5)
```

```
  x > upper_limit | x < lower_limit
}

remove_outliers <- function(movie_data, cols = names(movie_data)) {
  for (col in cols) {
    movie_data <- movie_data[!outliers(movie_data[[col]]),]
  }
  movie_data
}

movie_data_without_outliers <- remove_outliers(movie_data)
boxplot(movie_data_without_outliers)
```




```
mode2 <- lm(replace_mean_Ratings ~  replace_mean_Gross+replace_mean_Budget+
      replace_mean_Screens+replace_mean_Views+replace_mean_Likes+
      replace_mean_Dislikes+replace_mean_Comments+
      replace_mean_Aggregate_Followers, data = movie_data_without_outliers)
mode2
```

```
##
## Call:
## lm(formula = replace_mean_Ratings ~ replace_mean_Gross + replace_mean_Budget +
##     replace_mean_Screens + replace_mean_Views + replace_mean_Likes +
##     replace_mean_Dislikes + replace_mean_Comments + replace_mean_Aggregate_Followers,
##     data = movie_data_without_outliers)
##
```

```
## Coefficients:
##                       (Intercept)                replace_mean_Gross
##                         6.406e+00                         6.083e-09
##               replace_mean_Budget               replace_mean_Screens
##                         8.219e-10                        -1.053e-04
##                replace_mean_Views                 replace_mean_Likes
##                         2.056e-07                         4.247e-05
##             replace_mean_Dislikes              replace_mean_Comments
##                        -3.518e-03                         4.347e-04
## replace_mean_Aggregate_Followers
##                        -5.468e-08
```

```
summary(mode2)
```

```
##
## Call:
## lm(formula = replace_mean_Ratings ~ replace_mean_Gross + replace_mean_Budget +
##     replace_mean_Screens + replace_mean_Views + replace_mean_Likes +
##     replace_mean_Dislikes + replace_mean_Comments + replace_mean_Aggregate_Followers,
##     data = movie_data_without_outliers)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.0240 -0.4576  0.0238  0.5994  1.7028
##
## Coefficients:
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                       6.406e+00  1.278e-01  50.122  < 2e-16 ***
## replace_mean_Gross                6.083e-09  2.323e-09   2.618  0.00982 **
## replace_mean_Budget               8.219e-10  3.307e-09   0.249  0.80409
## replace_mean_Screens             -1.053e-04  5.989e-05  -1.758  0.08099 .
## replace_mean_Views                2.056e-07  6.869e-08   2.993  0.00327 **
## replace_mean_Likes                4.247e-05  2.166e-05   1.961  0.05183 .
## replace_mean_Dislikes            -3.518e-03  4.219e-04  -8.338 6.61e-14 ***
## replace_mean_Comments             4.347e-04  1.564e-04   2.779  0.00621 **
## replace_mean_Aggregate_Followers -5.468e-08  4.276e-08  -1.279  0.20308
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7503 on 139 degrees of freedom
## Multiple R-squared:  0.4087, Adjusted R-squared:  0.3747
## F-statistic: 12.01 on 8 and 139 DF,  p-value: 6.118e-13
```

##mode2

Coefficients Function & Fitted function

```
mode2$coefficients
```

```
##                       (Intercept)                replace_mean_Gross
##                      6.406250e+00                      6.083238e-09
##               replace_mean_Budget               replace_mean_Screens
##                      8.218750e-10                     -1.052669e-04
##                replace_mean_Views                 replace_mean_Likes
```

```
##                     2.056063e-07                     4.247493e-05
##            replace_mean_Dislikes            replace_mean_Comments
##                    -3.517640e-03                     4.346602e-04
## replace_mean_Aggregate_Followers
##                    -5.467840e-08
```

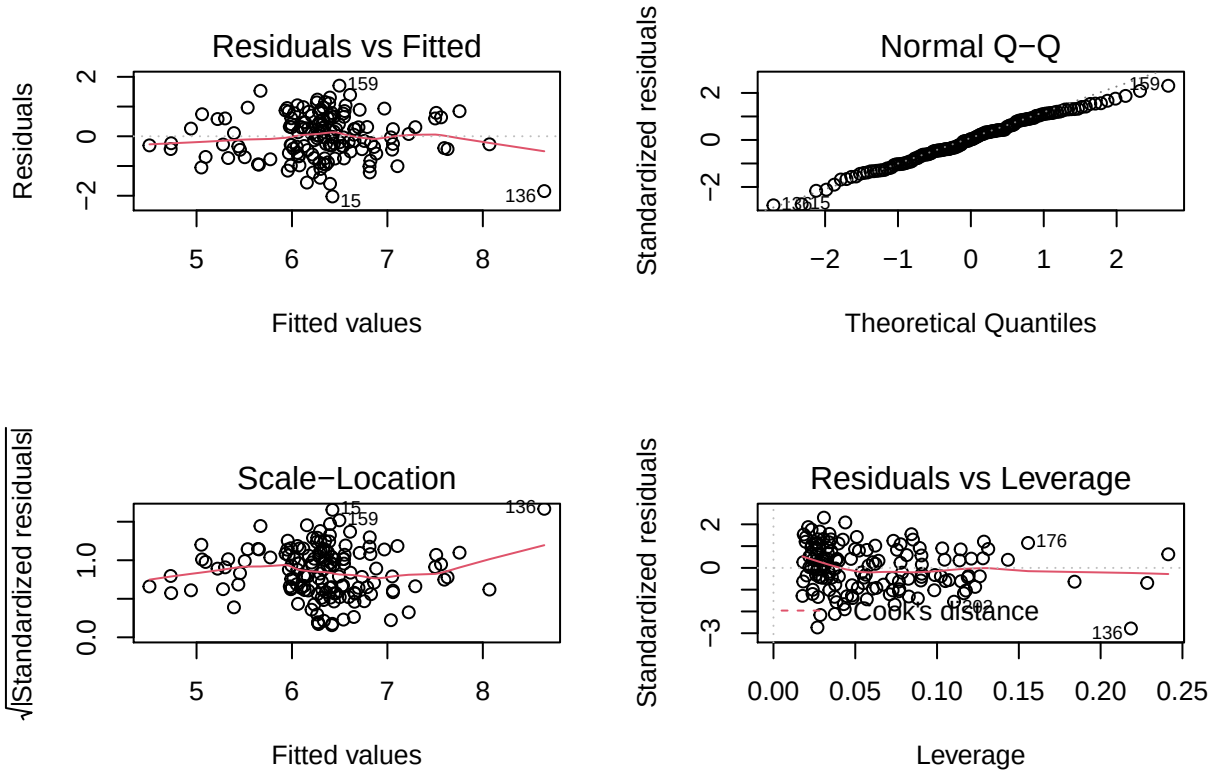
```
mode2$fitted
```

```
##        1        3        4        5        6        8        9       12
## 5.996307 6.264724 6.733561 5.653923 6.156633 6.404149 5.536023 6.164211
##       14       15       16       17       18       20       22       23
## 4.941691 6.424042 6.828363 6.274396 6.662411 6.137923 6.608920 6.449629
##       24       25       26       29       30       31       32       34
## 6.309884 6.175960 6.277484 6.535573 5.050542 7.058145 6.097436 6.023786
##       36       39       41       42       43       44       48       49
## 5.058101 5.992989 6.561813 6.418135 5.773516 6.233743 6.014372 6.545342
##       51       54       55       58       59       60       61       62
## 6.882976 6.413355 6.648594 6.822019 6.328947 6.524212 6.652740 7.630271
##       63       65       67       68       69       70       72       73
## 7.036410 6.268306 6.331475 6.049728 6.399046 6.593941 6.333968 6.440033
##       74       77       78       81       82       84       87       88
## 6.356167 6.205274 5.993289 6.968040 6.343674 6.697152 5.669903 6.220929
##       90       91       93       95       96       97       99      100
## 5.299405 6.212429 6.100798 6.125461 6.347761 5.986654 6.332298 6.233256
##      101      103      104      105      106      107      110      113
## 5.438220 6.057485 6.812373 7.223350 7.105583 5.505138 6.118870 7.050157
##      115      116      117      118      121      122      123      124
## 5.932905 5.955586 6.788112 7.596657 6.371884 6.395747 6.539160 6.260547
##      126      127      129      130      132      133      135      136
## 6.440230 6.537213 5.988150 7.500545 6.389730 4.506650 6.271713 8.643786
##      137      138      139      140      142      143      144      145
## 6.613089 6.500705 5.220515 6.285496 6.655391 5.644049 6.422627 6.295457
##      146      147      148      152      154      155      156      157
## 8.069440 6.545474 6.295421 6.287577 5.965321 6.402715 7.755896 6.205964
##      158      159      160      161      163      176      178      184
## 6.416749 6.497216 6.063183 6.314037 6.440939 7.511661 7.058097 4.729022
##      187      188      190      193      194      195      196      197
## 6.462584 5.977274 5.277473 6.400573 6.301998 6.709325 5.331711 5.455449
##      199      200      201      202      204      205      207      208
## 6.551103 6.057074 6.491866 6.299153 6.356702 6.133383 6.266433 6.078380
##      209      210      211      212      213      214      215      216
## 6.859954 6.127716 6.377081 6.067589 7.562500 4.734097 6.815290 6.327373
##      217      220      221      224      225      226      227      228
## 6.278007 6.397386 7.292690 5.949846 6.757688 6.317184 5.991899 5.391892
##      229      230      231      232
## 6.072432 5.967279 5.094989 6.170112
```

```
extract_eq(mode2,use_cof=TRUE)
```

$$\text{replace\_mean\_Ratings} = \alpha+\beta_1(\text{replace\_mean\_Gross})+\beta_2(\text{replace\_mean\_Budget})+\beta_3(\text{replace\_mean\_Screens})+\beta_4(\text{replac}$$

```
par(mfrow = c(2, 2))
plot(mode2)
```



We can see here,that the coefficient is different between our new model and our previous model

Also, after removing the outlier from our dataset the residual standard error is decreasing, while the R_ squared is increasing

It means that our new model fits better to our data compared to the previous model

VIF for new model

```
vif(mode2)
```

```
##               replace_mean_Gross                replace_mean_Budget
##                         1.645659                           1.637972
##              replace_mean_Screens                 replace_mean_Views
##                         1.654996                           4.454480
##               replace_mean_Likes              replace_mean_Dislikes
##                         4.124335                           3.212534
##            replace_mean_Comments replace_mean_Aggregate_Followers
##                         3.497897                           1.051134
```

```
glance(mode2)
```

```
## # A tibble: 1 x 12
##   r.squared adj.r.squared sigma statistic  p.value    df logLik   AIC   BIC
##       <dbl>         <dbl> <dbl>     <dbl>    <dbl> <dbl>  <dbl> <dbl> <dbl>
## 1     0.409         0.375 0.750      12.0 6.12e-13     8  -163.  346.  376.
```

```
## # ... with 3 more variables: deviance <dbl>, df.residual <int>, nobs <int>
```

```
tidy(mode2)
```

```
## # A tibble: 9 x 5
##   term                              estimate     std.error statistic  p.value
##   <chr>                                <dbl>         <dbl>     <dbl>    <dbl>
## 1 (Intercept)                      6.41e+ 0 0.128            50.1   7.11e-91
## 2 replace_mean_Gross               6.08e- 9 0.00000000232     2.62  9.82e- 3
## 3 replace_mean_Budget              8.22e-10 0.00000000331     0.249 8.04e- 1
## 4 replace_mean_Screens            -1.05e- 4 0.0000599        -1.76  8.10e- 2
## 5 replace_mean_Views               2.06e- 7 0.0000000687      2.99  3.27e- 3
## 6 replace_mean_Likes               4.25e- 5 0.0000217         1.96  5.18e- 2
## 7 replace_mean_Dislikes           -3.52e- 3 0.000422         -8.34  6.61e-14
## 8 replace_mean_Comments            4.35e- 4 0.000156          2.78  6.21e- 3
## 9 replace_mean_Aggregate_Followers -5.47e- 8 0.0000000428     -1.28  2.03e- 1
```

vif<10 for all variables the model good.

```
###************************************************************************ ###************************
###   ### SPLITTING THE DATA   ### TRAINING AND TEST SETS   ###
###************************************************************************ ###************************
###*
```

Let's say we want to split the data in 80:20 for train :test dataset

```
set.seed(232)
ind <- createDataPartition(movie_data$ replace_mean_Ratings,
                           p = 0.8, times = 1, list = FALSE)
length(ind)
```

```
## [1] 187
```

```
train_set <- movie_data[ind, ]
test_set <- movie_data[-ind, ]
nrow(train_set); nrow(test_set)
```

```
## [1] 187
```

```
## [1] 45
```

Training the model ——————————————————————————

```
lm_fit <- lm(replace_mean_Ratings ~ . , data = train_set)
broom::tidy(lm_fit)
```

```
## # A tibble: 9 x 5
##   term                            estimate     std.error statistic   p.value
##   <chr>                              <dbl>         <dbl>     <dbl>     <dbl>
## 1 (Intercept)                     6.28e+0 0.126            49.7   2.73e-106
## 2 replace_mean_Gross              3.72e-9 0.00000000105     3.54  5.15e-  4
## 3 replace_mean_Budget             4.47e-9 0.00000000185     2.41  1.69e-  2
## 4 replace_mean_Screens           -1.26e-4 0.0000593        -2.13  3.43e-  2
## 5 replace_mean_Views              6.20e-8 0.0000000270      2.29  2.30e-  2
```

```
## 6 replace_mean_Likes                1.20e-5 0.00000581        2.06  4.08e-  2
## 7 replace_mean_Dislikes            -3.19e-4 0.0000819        -3.90  1.38e-  4
## 8 replace_mean_Comments            -8.59e-5 0.0000490        -1.75  8.14e-  2
## 9 replace_mean_Aggregate_Followers -8.22e-9 0.0000000163     -0.504 6.15e-  1
```

```
broom::glance(lm_fit)
```

```
## # A tibble: 1 x 12
##   r.squared adj.r.squared sigma statistic  p.value    df logLik   AIC   BIC
##       <dbl>         <dbl> <dbl>     <dbl>    <dbl> <dbl>  <dbl> <dbl> <dbl>
## 1     0.281         0.249 0.878      8.72 5.12e-10     8  -236.  493.  525.
## # ... with 3 more variables: deviance <dbl>, df.residual <int>, nobs <int>
```

We've built a machine learning model and trained it on train_set

###* *** Prediction *** # ————————

```
pred <- predict(object = lm_fit, newdata = test_set, type = "response")

head(pred)
```

```
##        3        4        6       13       17       18
## 6.160153 6.687476 6.004852 5.930496 6.339215 6.431399
```

**** Model Evaluation *** # ————————————-

```
actual <- test_set$replace_mean_Ratings
mae <- Metrics::mae(actual = actual, predicted = pred)
mse <- Metrics::mse(actual = actual, predicted = pred)
rmse <- Metrics::rmse(actual = actual, predicted = pred)
```

These common metrics are used to evaluate the model.

Table of results

```
knitr::kable(cbind(mae, mse, rmse))
```

mae	mse	rmse
0.660215	0.6630907	0.8143038