Sample

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```r
suppressMessages(library(ggplot2))
suppressMessages(library(readr))
suppressMessages(library(gridExtra))
suppressMessages(library(dplyr))
library(plyr)
```

```
## --------------------------------------------------------------------------
## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:
## library(plyr); library(dplyr)
## --------------------------------------------------------------------------
##
## Attaching package: 'plyr'
## The following objects are masked from 'package:dplyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
```

```r
suppressMessages(library(tidyr))
```

```
## Warning: package 'tidyr' was built under R version 3.4.2
```

```r
suppressMessages(library(viridis))
```

```
## Warning: package 'viridis' was built under R version 3.4.3
```

```r
library(pheatmap)
```

```
## Warning: package 'pheatmap' was built under R version 3.4.2
```

```r
options(warn=-1)
```

```r
movie_data<-read.csv("C:/Users/Yaroslav Hrushchak/Desktop/Data Mining/imdbRatingAnalysis/data/imdb/movie
head(movie_data)
```

```
##     X    tconst                   primaryTitle
## 1   9 tt0000009                     Miss Jerry
## 2 146 tt0000147  The Corbett-Fitzsimmons Fight
## 3 333 tt0000335          Soldiers of the Cross
## 4 572 tt0000574    The Story of the Kelly Gang
## 5 612 tt0000615            Robbery Under Arms
## 6 627 tt0000630                         Hamlet
##                  originalTitle startYear                  genres
## 1                   Miss Jerry      1894                 Romance
## 2 The Corbett-Fitzsimmons Fight      1897 Documentary,News,Sport
## 3          Soldiers of the Cross      1900         Biography,Drama
## 4    The Story of the Kelly Gang      1906  Biography,Crime,Drama
## 5            Robbery Under Arms      1907                   Drama
```

```
## 6                      Amleto      1908                Drama
analyse_years <- 1925:2015
movie_data_filtered <- movie_data
movie_data_filtered$startYear <- as.numeric(as.character(movie_data_filtered$startYear))
movie_data_filtered <- movie_data_filtered[movie_data_filtered$startYear %in% analyse_years, ]
movie_data_filtered$genres <- as.character(movie_data_filtered$genres)

getGenres <- function(data_frame, year){
    genres_temp = c()
    genres_temp<- apply(data_frame[data_frame$startYear == year,], 1, function(x)
      {
        genres_temp <- c(genres_temp, (strsplit(x["genres"], ",")[[1]]))
      })
    genres_temp<- genres_temp %>% unlist() %>% as.character()
    genres_temp
}

get_movie_genres_stats <- function(range){
  genres <-  strsplit(movie_data_filtered$genres %>% table() %>% names() %>% paste(collapse=','), ",")[
  years = data.frame(matrix(ncol = length(genres)+1, nrow = 0))
  colnames(years) <- c("year",genres)

  for (i in range){
    year_df <- (c(c("year"= i), sort(getGenres(movie_data_filtered, i) %>% table(), decreasing = TRUE))
    res_df <- setNames(data.frame(matrix(ncol = year_df %>% nrow(), nrow=0)), (year_df %>% rownames()))
    res_df[nrow(res_df)+1,] <- year_df[,1]
    years <- rbind.fill(years, res_df)
  }
  years
}

(as.data.frame(c(2015,sort(getGenres(movie_data_filtered, 2015) %>% table(), decreasing = TRUE))))

##             c(2015, sort(getGenres(movie_data_filtered, 2015) %>% table(), decreasing = TRUE))
##                                                                                          2015
## Documentary                                                                              5930
## Drama                                                                                    5309
## Comedy                                                                                   2701
## Thriller                                                                                 1305
## Horror                                                                                   1134
## Action                                                                                   1046
## Romance                                                                                  1026
## Biography                                                                                 970
## Crime                                                                                     716
## Adventure                                                                                 687
## Family                                                                                    683
## History                                                                                   678
## Mystery                                                                                   535
## Music                                                                                     459
## Sci-Fi                                                                                    389
## Fantasy                                                                                   353
## Animation                                                                                 306
## Sport                                                                                     241
## War                                                                                       167
```

```
## News                                                                    166
## Musical                                                                 151
## Western                                                                  52
## Reality-TV                                                               20
## Talk-Show                                                                10
```

```r
#movie_data[movie_data$startYear==2015,c("primaryTitle","genres")] %>% na.omit() %>% filter(as.list(gen

#sort(getGenres(2015) %>% table(), decreasing = TRUE)

#movie_data[apply(movie_data[,c("primaryTitle","genres","startYear")], 1, function(x){grepl("Fantastica

#movie_data[movie_data$startYear==2015,] %>% na.omit()
#movies_documen[movies_documen$startYear==2015,] %>% na.omit()

#movie_data[,grepl("Drama", movie_data[,c("primaryTitle","genres")][,2]%>% as.character())]

#sort(movie_data$genres %>% table(), decreasing = TRUE)
```

```r
# seq(min(range), max(range))
range <- 1925:2015
movie_genres_stats <- get_movie_genres_stats(range)[,-c(1,3,13,25:29)] %>% (t)
movie_genres_stats[is.na(movie_genres_stats)] <- 0
movies_genres_stats_sum <- cbind(movie_genres_stats, movie_genres_stats %>% rowSums())
movies_genres_stats_sum[order(movies_genres_stats_sum[,92]),] -> movies_genres_stats_sum_sorted
movies_genres_stats_sum_sorted[,]/movies_genres_stats_sum_sorted[,92]
```

```
##                    [,1]        [,2]        [,3]        [,4]
## Sport       0.0036111947 0.0024074631 0.0030093289 0.0024074631
## Animation   0.0024390244 0.0007317073 0.0004878049 0.0004878049
## Sci-Fi      0.0010801080 0.0000000000 0.0001800180 0.0000000000
## Western     0.0395185917 0.0291000539 0.0251481947 0.0238907850
## War         0.0012630249 0.0031575624 0.0044205873 0.0045784654
## Fantasy     0.0012446411 0.0011063477 0.0004148804 0.0004148804
## Music       0.0000000000 0.0000000000 0.0001382743 0.0002765487
## Musical     0.0002590674 0.0002590674 0.0002590674 0.0006476684
## History     0.0014086160 0.0015260007 0.0018781547 0.0032867707
## Mystery     0.0012759541 0.0022039207 0.0019719290 0.0024359123
## Biography   0.0003928501 0.0005892752 0.0004910627 0.0008839128
## Family      0.0004526525 0.0001810610 0.0005431831 0.0006337136
## Horror      0.0003995206 0.0005326941 0.0006658676 0.0003329338
## Adventure   0.0052999127 0.0071704701 0.0039281706 0.0044269859
## Thriller    0.0003752748 0.0008577709 0.0006433282 0.0009113815
## Crime       0.0018017164 0.0023706794 0.0024655066 0.0024180930
## Action      0.0027256417 0.0041402153 0.0024496274 0.0030016561
## Romance     0.0045390942 0.0068939627 0.0058359783 0.0052899218
## Comedy      0.0031754798 0.0038811419 0.0042339730 0.0035129704
## Documentary 0.0012498002 0.0011626048 0.0016857770 0.0016131142
## Drama       0.0038084078 0.0038816464 0.0045001058 0.0046791335
##                    [,5]        [,6]        [,7]        [,8]
## Sport       0.0042130605 0.0027083960 0.0027083960 0.0081251881
## Animation   0.0000000000 0.0009756098 0.0009756098 0.0014634146
## Sci-Fi      0.0007200720 0.0003600360 0.0009000900 0.0010801080
## Western     0.0156278067 0.0138315071 0.0150889168 0.0172444764
## War         0.0026839280 0.0033154405 0.0036311967 0.0028418061
```

```
## Fantasy      0.0001382935 0.0013829346 0.0009680542 0.0015212280
## Music        0.0012444690 0.0029037611 0.0009679204 0.0009679204
## Musical      0.0091968912 0.0189119171 0.0106217617 0.0082901554
## History      0.0022303087 0.0010564620 0.0010564620 0.0016433854
## Mystery      0.0045238371 0.0035958705 0.0046398330 0.0068437536
## Biography    0.0004910627 0.0005892752 0.0007857003 0.0004910627
## Family       0.0003621220 0.0006337136 0.0004526525 0.0003621220
## Horror       0.0004661073 0.0001997603 0.0008656279 0.0015980823
## Adventure    0.0046763936 0.0034293553 0.0028058361 0.0034293553
## Thriller     0.0010186029 0.0003752748 0.0008577709 0.0009113815
## Crime        0.0035560192 0.0044094638 0.0054999763 0.0059266986
## Action       0.0016905879 0.0018975987 0.0016905879 0.0022426166
## Romance      0.0050851507 0.0075424047 0.0066550630 0.0066550630
## Comedy       0.0027612868 0.0044027183 0.0051544020 0.0053998497
## Documentary  0.0014241909 0.0019182979 0.0010463443 0.0034878144
## Drama        0.0042152890 0.0041501880 0.0048011979 0.0045245187
##                       [,9]        [,10]        [,11]        [,12]
## Sport        0.0036111947 0.0027083960 0.0033102618 0.003912128
## Animation    0.0002439024 0.0004878049 0.0012195122 0.001219512
## Sci-Fi       0.0016201620 0.0010801080 0.0019801980 0.002160216
## Western      0.0104185378 0.0093407580 0.0210167056 0.018681516
## War          0.0048942217 0.0026839280 0.0025260499 0.003315440
## Fantasy      0.0016595215 0.0015212280 0.0022126953 0.001659522
## Music        0.0024889381 0.0026272124 0.0048396018 0.004563053
## Musical      0.0104922280 0.0147668394 0.0158031088 0.016839378
## History      0.0015260007 0.0024650781 0.0026998474 0.003873694
## Mystery      0.0062637745 0.0077717202 0.0075397286 0.007655724
## Biography    0.0007857003 0.0013749754 0.0011785504 0.001571401
## Family       0.0005431831 0.0008147746 0.0014484881 0.001991671
## Horror       0.0011319750 0.0010653882 0.0011985617 0.001265148
## Adventure    0.0032422995 0.0046763936 0.0058610799 0.005611672
## Thriller     0.0007505495 0.0008577709 0.0011258243 0.001501099
## Crime        0.0050732540 0.0049784268 0.0062111801 0.007586174
## Action       0.0016905879 0.0021391112 0.0039332045 0.003070660
## Romance      0.0071328624 0.0079178185 0.0088734173 0.007883690
## Comedy       0.0058600641 0.0061361928 0.0065043644 0.007194686
## Documentary  0.0034442168 0.0012207351 0.0009882141 0.003357021
## Drama        0.0044675553 0.0047360969 0.0046628583 0.005118565
##                      [,13]        [,14]        [,15]        [,16]
## Sport        0.0045139934 0.0063195907 0.0024074631 0.0042130605
## Animation    0.0009756098 0.0009756098 0.0002439024 0.0012195122
## Sci-Fi       0.0009000900 0.0016201620 0.0014401440 0.0014401440
## Western      0.0186815161 0.0150889168 0.0190407760 0.0206574457
## War          0.0067887591 0.0085254184 0.0071045153 0.0072623934
## Fantasy      0.0017978150 0.0009680542 0.0022126953 0.0034573365
## Music        0.0074668142 0.0071902655 0.0066371681 0.0058075221
## Musical      0.0163212435 0.0148963731 0.0112694301 0.0111398964
## History      0.0038736941 0.0036389248 0.0035215401 0.0034041554
## Mystery      0.0064957662 0.0078877160 0.0071917411 0.0061477787
## Biography    0.0011785504 0.0014731880 0.0020624632 0.0025535258
## Family       0.0021727322 0.0020822017 0.0025348542 0.0023537932
## Horror       0.0004661073 0.0001997603 0.0017312558 0.0010653882
## Adventure    0.0068587106 0.0072951740 0.0073575259 0.0061104876
## Thriller     0.0012866563 0.0008041602 0.0010186029 0.0010186029
```

```
## Crime       0.0073491063 0.0074913470 0.0078706557 0.0049784268
## Action      0.0041057135 0.0035881866 0.0039677063 0.0024496274
## Romance     0.0100337872 0.0087369032 0.0061090065 0.0063137777
## Comedy      0.0073941123 0.0071333241 0.0062435762 0.0062435762
## Documentary 0.0029355772 0.0012788653 0.0012788653 0.0008428885
## Drama       0.0053545563 0.0053952444 0.0052813176 0.0046954088
##                     [,17]        [,18]        [,19]        [,20]
## Sport       0.0033102618 0.0027083960 0.0012037316 0.0012037316
## Animation   0.0019512195 0.0002439024 0.0009756098 0.0034146341
## Sci-Fi      0.0010801080 0.0007200720 0.0009000900 0.0012601260
## Western     0.0176037363 0.0192204060 0.0159870666 0.0159870666
## War         0.0086832965 0.0192611304 0.0211556678 0.0170508368
## Fantasy     0.0023509888 0.0012446411 0.0017978150 0.0031807496
## Music       0.0077433628 0.0087112832 0.0080199115 0.0067754425
## Musical     0.0120466321 0.0085492228 0.0116580311 0.0138601036
## History     0.0029346167 0.0037563094 0.0035215401 0.0029346167
## Mystery     0.0070757453 0.0070757453 0.0054518037 0.0053358079
## Biography   0.0014731880 0.0020624632 0.0014731880 0.0014731880
## Family      0.0023537932 0.0019011407 0.0013579576 0.0021727322
## Horror      0.0010653882 0.0011319750 0.0011985617 0.0014649088
## Adventure   0.0067340067 0.0056740242 0.0046140417 0.0040528744
## Thriller    0.0012866563 0.0021444272 0.0017691524 0.0011258243
## Crime       0.0041723958 0.0049784268 0.0030344697 0.0032241240
## Action      0.0034846812 0.0032086669 0.0020701076 0.0019666023
## Romance     0.0061772636 0.0057335927 0.0046756083 0.0047438654
## Comedy      0.0068418550 0.0059674475 0.0053384877 0.0041112492
## Documentary 0.0007556931 0.0010463443 0.0009300839 0.0005522373
## Drama       0.0038816464 0.0038328207 0.0035480038 0.0032550494
##                     [,21]        [,22]        [,23]        [,24]
## Sport       0.0003009329 0.0003009329 0.0027083960 0.004814926
## Animation   0.0021951220 0.0012195122 0.0021951220 0.002926829
## Sci-Fi      0.0010801080 0.0003600360 0.0005400540 0.000720072
## Western     0.0134722472 0.0156278067 0.0150889168 0.018861146
## War         0.0126302494 0.0102620777 0.0053678560 0.007262393
## Fantasy     0.0029041626 0.0031807496 0.0027658692 0.003180750
## Music       0.0055309735 0.0078816372 0.0063606195 0.005530973
## Musical     0.0104922280 0.0112694301 0.0101036269 0.008937824
## History     0.0021129241 0.0017607700 0.0030520014 0.002230309
## Mystery     0.0064957662 0.0074237327 0.0068437536 0.005799791
## Biography   0.0014731880 0.0015714005 0.0016696130 0.001374975
## Family      0.0014484881 0.0020822017 0.0033496288 0.002172732
## Horror      0.0010653882 0.0011319750 0.0004661073 0.001065388
## Adventure   0.0032422995 0.0039905225 0.0061104876 0.004863449
## Thriller    0.0015010990 0.0010722136 0.0012866563 0.001501099
## Crime       0.0037456735 0.0056896306 0.0068275568 0.006306007
## Action      0.0015870825 0.0027946453 0.0034156776 0.003381176
## Romance     0.0038906522 0.0046414798 0.0049827651 0.004914508
## Comedy      0.0037890991 0.0039578444 0.0040498872 0.004233973
## Documentary 0.0009010187 0.0007702257 0.0012933979 0.000959149
## Drama       0.0031492603 0.0042315642 0.0047279592 0.004931400
##                     [,25]        [,26]        [,27]        [,28]
## Sport       0.0042130605 0.0048149263 0.0063195907 0.0045139934
## Animation   0.0021951220 0.0021951220 0.0026829268 0.0017073171
## Sci-Fi      0.0007200720 0.0010801080 0.0032403240 0.0021602160
```

```
## Western       0.0183222562 0.0231722651 0.0192204060 0.0192204060
## War           0.0078939059 0.0082096621 0.0097884433 0.0067887591
## Fantasy       0.0040105103 0.0042870972 0.0047019776 0.0048402711
## Music         0.0047013274 0.0024889381 0.0052544248 0.0052544248
## Musical       0.0116580311 0.0119170984 0.0155440415 0.0136010363
## History       0.0031693861 0.0035215401 0.0037563094 0.0035215401
## Mystery       0.0040598538 0.0046398330 0.0030158914 0.0041758497
## Biography     0.0025535258 0.0017678256 0.0017678256 0.0030445885
## Family        0.0030780373 0.0031685678 0.0040738729 0.0029875068
## Horror        0.0009988014 0.0003329338 0.0009988014 0.0005326941
## Adventure     0.0064222472 0.0064845991 0.0061104876 0.0077316374
## Thriller      0.0017691524 0.0017691524 0.0020372058 0.0019299845
## Crime         0.0077758286 0.0091982362 0.0073965198 0.0059741122
## Action        0.0032431686 0.0032086669 0.0027256417 0.0031741651
## Romance       0.0056312071 0.0046756083 0.0064844203 0.0061772636
## Comedy        0.0050470186 0.0053231473 0.0060134689 0.0065043644
## Documentary   0.0010899420 0.0021217538 0.0012062025 0.0023106771
## Drama         0.0054359325 0.0056556483 0.0062659701 0.0060137038
##                       [,29]        [,30]        [,31]         [,32]        [,33]
## Sport         0.005416792  0.003009329  0.003912128  0.0039121276 0.0030093289
## Animation     0.001951220  0.001707317  0.001951220  0.0009756098 0.0009756098
## Sci-Fi        0.004320432  0.003960396  0.003420342  0.0054005401 0.0066606661
## Western       0.015088917  0.013292617  0.014190767  0.0149092869 0.0143703970
## War           0.009472687  0.007420272  0.009156931  0.0099463214 0.0093148090
## Fantasy       0.004840271  0.006638086  0.006499793  0.0052551514 0.0091273683
## Music         0.005807522  0.005392699  0.004286504  0.0051161504 0.0035951327
## Musical       0.014637306  0.013860104  0.013471503  0.0161917098 0.0160621762
## History       0.005517079  0.005164925  0.005869233  0.0039910788 0.0031693861
## Mystery       0.003943858  0.004407841  0.003827862  0.0028998956 0.0048718246
## Biography     0.003339226  0.002553526  0.003633864  0.0024553133 0.0033392261
## Family        0.005250770  0.005884483  0.005522361  0.0055223610 0.0059750136
## Horror        0.001198562  0.001464909  0.001198562  0.0019976029 0.0039952058
## Adventure     0.008355157  0.008666916  0.007731637  0.0066093029 0.0074822297
## Thriller      0.001769152  0.002198038  0.001501099  0.0021980378 0.0028949767
## Crime         0.006827557  0.007112038  0.007775829  0.0071594519 0.0095301313
## Action        0.003415678  0.002794645  0.003243169  0.0034156776 0.0045887386
## Romance       0.006757449  0.007474148  0.008429746  0.0080543326 0.0078154329
## Comedy        0.006489024  0.005860064  0.006489024  0.0066424287 0.0070412812
## Documentary   0.002223482  0.001729375  0.001554984  0.0015985816 0.0020054933
## Drama         0.006265970  0.006860017  0.006746090  0.0072262097 0.0078446690
##                       [,34]        [,35]        [,36]        [,37]        [,38]
## Sport         0.0015046645 0.001504664 0.001805597 0.002708396 0.001504664
## Animation     0.0007317073 0.002926829 0.001463415 0.003414634 0.003414634
## Sci-Fi        0.0086408641 0.006120612 0.004140414 0.004680468 0.004860486
## Western       0.0122148374 0.009340758 0.011137058 0.011675948 0.011496318
## War           0.0143669087 0.015945690 0.014366909 0.015156299 0.014840543
## Fantasy       0.0062232056 0.006776379 0.006914673 0.007191260 0.006776379
## Music         0.0034568584 0.002627212 0.002212389 0.002765487 0.003871681
## Musical       0.0158031088 0.016709845 0.015932642 0.013989637 0.015673575
## History       0.0041084634 0.004930156 0.004225848 0.004812771 0.005047541
## Mystery       0.0055677996 0.007075745 0.005335808 0.005567800 0.007191741
## Biography     0.0024553133 0.002455313 0.002651738 0.001964251 0.001964251
## Family        0.0072424407 0.005975014 0.007876154 0.007423502 0.007151910
## Horror        0.0042615528 0.003728859 0.004061793 0.003262751 0.003795445
```

```
## Adventure    0.0082928046 0.008916324 0.007606934 0.011036289 0.012719790
## Thriller     0.0033238621 0.004235244 0.003645526 0.004932182 0.003699137
## Crime        0.0092930634 0.009008582 0.012327533 0.008961168 0.008866341
## Action       0.0041057135 0.004761248 0.005140767 0.006555341 0.007141871
## Romance      0.0097948875 0.009009931 0.008566261 0.008839289 0.008634518
## Comedy       0.0077009220 0.007547517 0.007792965 0.007593539 0.008207158
## Documentary  0.0015113863 0.001467789 0.002557731 0.002848382 0.002615861
## Drama        0.0078528067 0.007722605 0.008170174 0.008227137 0.008568918
##                      [,39]       [,40]       [,41]       [,42]       [,43]
## Sport        0.003009329 0.005115859 0.004213060 0.004814926 0.003310262
## Animation    0.001951220 0.002439024 0.004146341 0.003902439 0.005121951
## Sci-Fi       0.005220522 0.004680468 0.007020702 0.008280828 0.008280828
## Western      0.008622238 0.014909287 0.019400036 0.024788935 0.019220406
## War          0.013577518 0.015787812 0.019419009 0.014840543 0.012946006
## Fantasy      0.006499793 0.009127368 0.007329553 0.008712488 0.008021021
## Music        0.002212389 0.003180310 0.003456858 0.003042035 0.004424779
## Musical      0.015284974 0.018264249 0.015544041 0.016839378 0.019559585
## History      0.004578002 0.005399695 0.004695387 0.004812771 0.004578002
## Mystery      0.006495766 0.007075745 0.006959749 0.006495766 0.007191741
## Biography    0.001473188 0.001767826 0.002455313 0.001964251 0.001767826
## Family       0.007695093 0.006608727 0.006337136 0.007514032 0.007332971
## Horror       0.004394726 0.004061793 0.004261553 0.003928619 0.003728859
## Adventure    0.010101010 0.012220975 0.013717421 0.016086794 0.016523257
## Thriller     0.003323862 0.004449686 0.005468289 0.004449686 0.006647724
## Crime        0.008629273 0.009767199 0.008818928 0.011426675 0.013086150
## Action       0.007072868 0.009004968 0.010109026 0.011109578 0.009591499
## Romance      0.007610662 0.008805160 0.010409201 0.010613972 0.010238558
## Comedy       0.008299201 0.008713394 0.008069094 0.008161136 0.008207158
## Documentary  0.003240761 0.003066370 0.002732121 0.002194417 0.002383340
## Drama        0.007893495 0.008056247 0.008446853 0.008926973 0.009097863
##                      [,44]       [,45]       [,46]       [,47]       [,48]
## Sport        0.005717725 0.004513993 0.006319591 0.003310262 0.007824255
## Animation    0.005121951 0.003902439 0.006097561 0.004634146 0.004146341
## Sci-Fi       0.007560756 0.007380738 0.006480648 0.006480648 0.006120612
## Western      0.021196336 0.017783366 0.016166697 0.020477816 0.019938926
## War          0.017366593 0.016735081 0.016261446 0.011367225 0.009156931
## Fantasy      0.009265662 0.010372009 0.011478357 0.009403955 0.009265662
## Music        0.002212389 0.003595133 0.006222345 0.003456858 0.004009956
## Musical      0.014766839 0.013989637 0.015284974 0.012176166 0.012176166
## History      0.004812771 0.005517079 0.005517079 0.006573541 0.006338772
## Mystery      0.006263775 0.006263775 0.006263775 0.007887716 0.008815683
## Biography    0.001571401 0.002553526 0.003044588 0.002946376 0.003241014
## Family       0.006789788 0.007151910 0.009053051 0.006699258 0.010773131
## Horror       0.005593288 0.004194966 0.006658676 0.008056998 0.009788254
## Adventure    0.015400923 0.015213867 0.016772665 0.014465644 0.013655069
## Thriller     0.006058007 0.005682732 0.005629121 0.006862167 0.008095213
## Crime        0.011758570 0.013323218 0.010383576 0.010004267 0.012564601
## Action       0.009384488 0.012765664 0.010902567 0.010247033 0.012006624
## Romance      0.011330671 0.011740214 0.011706085 0.009760759 0.009248831
## Comedy       0.008866799 0.008774756 0.009587801 0.008698053 0.008713394
## Documentary  0.003182631 0.002891979 0.004359768 0.004083649 0.003705803
## Drama        0.010163892 0.011384535 0.010953241 0.009895350 0.009903488
##                      [,49]       [,50]       [,51]       [,52]       [,53]
## Sport        0.006018658 0.004814926 0.003310262 0.006018658 0.006921457
```

```
## Animation   0.005609756 0.004390244 0.004878049 0.004390244 0.006585366
## Sci-Fi       0.005580558 0.005940594 0.005940594 0.005580558 0.008460846
## Western      0.012933357 0.006107419 0.009520388 0.006825939 0.003412969
## War          0.011051468 0.010262078 0.010893590 0.010735712 0.008999053
## Fantasy      0.009818836 0.010233716 0.007606140 0.007191260 0.008989075
## Music        0.005116150 0.003733407 0.005116150 0.004286504 0.003595133
## Musical      0.008808290 0.009974093 0.009326425 0.007901554 0.006735751
## History      0.007277850 0.005282310 0.005164925 0.004695387 0.004343233
## Mystery      0.005335808 0.006263775 0.008699687 0.005683795 0.006031783
## Biography    0.004419564 0.003044588 0.003830289 0.002848163 0.003928501
## Family       0.009143581 0.009777295 0.008419337 0.011406844 0.009596234
## Horror       0.009255560 0.009588494 0.007657478 0.006791850 0.006725263
## Adventure    0.011659808 0.011472752 0.011971568 0.009913954 0.010724529
## Thriller     0.008416877 0.008631319 0.007398274 0.007237442 0.006701335
## Crime        0.014461145 0.012706842 0.010810298 0.011900811 0.010241335
## Action       0.014525255 0.013283191 0.009522495 0.010902567 0.012420646
## Romance      0.007644790 0.009282960 0.007576533 0.006996348 0.006928091
## Comedy       0.008191817 0.009050884 0.009771887 0.009280992 0.007746943
## Documentary 0.003734868 0.004040052 0.004970136 0.004388833 0.004635887
## Drama        0.009765148 0.009667497 0.008959523 0.009097863 0.008821184
##                  [,54]       [,55]       [,56]       [,57]       [,58]
## Sport        0.007523322 0.009328920 0.004213060 0.003310262 0.005416792
## Animation    0.007560976 0.008048780 0.006829268 0.009512195 0.012195122
## Sci-Fi       0.007560756 0.010261026 0.009360936 0.007920792 0.009900990
## Western      0.003592599 0.004670379 0.002155560 0.002514819 0.002694449
## War          0.008209662 0.010104200 0.009788443 0.010735712 0.008841175
## Fantasy      0.009127368 0.010095422 0.009403955 0.009127368 0.011340064
## Music        0.004286504 0.005669248 0.006498894 0.005392699 0.005669248
## Musical      0.008031088 0.008419689 0.010492228 0.009585492 0.008808290
## History      0.005047541 0.005517079 0.006104003 0.006456157 0.004930156
## Mystery      0.007539729 0.006727758 0.006379770 0.007771720 0.006611762
## Biography    0.002553526 0.003928501 0.004124926 0.004714202 0.003535651
## Family       0.009958356 0.009686764 0.007876154 0.010320478 0.011497375
## Horror       0.005859635 0.005726462 0.008589692 0.009455320 0.008989213
## Adventure    0.010163362 0.011285696 0.008417508 0.009664547 0.008479860
## Thriller     0.006754946 0.005361068 0.007130220 0.006647724 0.007505495
## Crime        0.008961168 0.008961168 0.007965483 0.007538761 0.008771514
## Action       0.012179133 0.013697212 0.013041678 0.011730610 0.012524151
## Romance      0.007678919 0.007747176 0.007474148 0.008054333 0.007747176
## Comedy       0.007670241 0.008851458 0.008851458 0.008912820 0.009280992
## Documentary 0.004548691 0.004374301 0.005159059 0.004679484 0.004563224
## Drama        0.009577983 0.009748873 0.009781423 0.009683772 0.009862800
##                  [,59]       [,60]       [,61]       [,62]       [,63]
## Sport        0.005416792 0.005115859 0.006319591 0.008727054 0.004814926
## Animation    0.011463415 0.010975610 0.011463415 0.015365854 0.010975610
## Sci-Fi       0.011701170 0.012061206 0.010441044 0.013681368 0.014941494
## Western      0.001616670 0.001437040 0.002335190 0.002335190 0.001796300
## War          0.012472371 0.009788443 0.013103884 0.010893590 0.010419956
## Fantasy      0.011754944 0.010925183 0.012722998 0.012446411 0.015073987
## Music        0.006637168 0.007881637 0.006775442 0.006913717 0.006498894
## Musical      0.009326425 0.007383420 0.008549223 0.006476684 0.007642487
## History      0.005751849 0.005869233 0.004695387 0.003873694 0.005517079
## Mystery      0.007075745 0.006959749 0.006843754 0.006147779 0.008119708
## Biography    0.003830289 0.004812414 0.004812414 0.004615989 0.004124926
```

```
## Family       0.010048886 0.011225783 0.010592070 0.012855332 0.010863661
## Horror       0.007590891 0.006858437 0.008523106 0.008989213 0.012118791
## Adventure    0.008791620 0.008479860 0.009976306 0.010101010 0.010911585
## Thriller     0.007291052 0.008041602 0.007773548 0.009006594 0.011311853
## Crime        0.008155137 0.009435304 0.010004267 0.011379261 0.012232706
## Action       0.013386696 0.012317140 0.013179685 0.014697764 0.016698868
## Romance      0.008259104 0.008156718 0.008873417 0.008736903 0.008259104
## Comedy       0.008928161 0.009311673 0.009879270 0.009465077 0.010186080
## Documentary  0.005129994 0.005231722 0.005057331 0.004839343 0.004548691
## Drama        0.010001139 0.010139479 0.010033690 0.010505672 0.011286884
##                      [,64]       [,65]       [,66]       [,67]       [,68]
## Sport        0.0063195907 0.005416792 0.005115859 0.005115859 0.007824255
## Animation    0.0095121951 0.008048780 0.008536585 0.012439024 0.009756098
## Sci-Fi       0.0171017102 0.014221422 0.013501350 0.012601260 0.010801080
## Western      0.0007185198 0.001437040 0.001796300 0.002335190 0.001796300
## War          0.0115251026 0.011998737 0.010419956 0.008051784 0.006788759
## Fantasy      0.0163186281 0.014797400 0.014520813 0.018393030 0.012031531
## Music        0.0074668142 0.006222345 0.005254425 0.006913717 0.007605088
## Musical      0.0077720207 0.004404145 0.005310881 0.005181347 0.005051813
## History      0.0048127715 0.006456157 0.005399695 0.006573541 0.006104003
## Mystery      0.0095116576 0.009511658 0.008351699 0.009163670 0.008699687
## Biography    0.0051070517 0.005205264 0.004517776 0.005205264 0.004419564
## Family       0.0082382763 0.008600398 0.007785624 0.008509868 0.006699258
## Horror       0.0154481289 0.014649088 0.013250766 0.009521907 0.009255560
## Adventure    0.0097892505 0.009539843 0.007357526 0.007918693 0.006484599
## Thriller     0.0115799067 0.013563502 0.013831555 0.013188227 0.012812952
## Crime        0.0117111564 0.013133564 0.014224077 0.011948224 0.012422360
## Action       0.0185619652 0.018354954 0.020494066 0.018423958 0.017871929
## Romance      0.0091805740 0.008600389 0.007883690 0.009351217 0.010852872
## Comedy       0.0101400586 0.010431528 0.010477549 0.010446868 0.010186080
## Documentary  0.0051735914 0.005260787 0.005362515 0.006249001 0.006932031
## Drama        0.0105544977 0.010302231 0.010310369 0.010473121 0.009781423
##                      [,69]       [,70]       [,71]        [,72]        [,73]
## Sport        0.005115859 0.008125188 0.004213060 0.0090279868 0.0069214565
## Animation    0.009512195 0.011707317 0.011219512 0.0139024390 0.0163414634
## Sci-Fi       0.010441044 0.010801080 0.016381638 0.0174617462 0.0181818182
## Western      0.001975930 0.002874079 0.003412969 0.0007185198 0.0003592599
## War          0.007736028 0.006157247 0.009156931 0.0077360278 0.0080517840
## Fantasy      0.011754944 0.013552759 0.011893237 0.0118932374 0.0106485963
## Music        0.007190265 0.006637168 0.004977876 0.0071902655 0.0084347345
## Musical      0.005310881 0.004792746 0.004922280 0.0044041451 0.0049222798
## History      0.006690926 0.004695387 0.005399695 0.0062213875 0.0085690809
## Mystery      0.007075745 0.009511658 0.010091637 0.0089316785 0.0102076325
## Biography    0.007660577 0.006776665 0.008642703 0.0074641524 0.0076605775
## Family       0.009324642 0.010320478 0.009143581 0.0107731305 0.0111352526
## Horror       0.007923825 0.006991610 0.009988014 0.0085231056 0.0091889732
## Adventure    0.006796359 0.007731637 0.007108118 0.0074198778 0.0068587106
## Thriller     0.013617113 0.012759342 0.013724334 0.0133490591 0.0149037688
## Crime        0.013038737 0.011237021 0.011521502 0.0119482244 0.0116637428
## Action       0.016388352 0.016215843 0.017561413 0.0156983163 0.0161813414
## Romance      0.010238558 0.010136173 0.011296543 0.0110235146 0.0128664551
## Comedy       0.009679844 0.010400847 0.009572461 0.0111678709 0.0122417046
## Documentary  0.006278066 0.007527866 0.008225429 0.0085015477 0.0105361061
## Drama        0.009887213 0.009797699 0.009903488 0.0100499650 0.0111241313
```

```
##                    [,74]        [,75]        [,76]        [,77]        [,78]
## Sport       0.009629853 0.008727054 0.012037316 0.010532651 0.013541980
## Animation   0.014146341 0.018780488 0.020000000 0.017560976 0.018292683
## Sci-Fi      0.014581458 0.012601260 0.014041404 0.015841584 0.014941494
## Western     0.001796300 0.001616670 0.001975930 0.001257410 0.001975930
## War         0.008051784 0.007262393 0.007262393 0.009472687 0.009788443
## Fantasy     0.012031531 0.012584705 0.014520813 0.015903748 0.018531323
## Music       0.009126106 0.010370575 0.012997788 0.010923673 0.012721239
## Musical     0.003626943 0.004663212 0.008419689 0.007512953 0.008419689
## History     0.004578002 0.007160465 0.006808311 0.005164925 0.007043080
## Mystery     0.011599582 0.009743649 0.012179562 0.015195453 0.015543440
## Biography   0.005499902 0.006973090 0.008839128 0.006874877 0.008249853
## Family      0.010682600 0.012674271 0.011587905 0.012131088 0.012764802
## Horror      0.010320948 0.012784658 0.014382741 0.013783460 0.013850047
## Adventure   0.008666916 0.006796359 0.008604564 0.009851602 0.010662177
## Thriller    0.014314051 0.017798746 0.019514287 0.019460677 0.018281242
## Crime       0.013655114 0.012327533 0.015836139 0.015599071 0.015077521
## Action      0.014732266 0.015387800 0.015456804 0.017423406 0.017561413
## Romance     0.014265725 0.014402239 0.015938023 0.017337292 0.019623904
## Comedy      0.012686579 0.013821774 0.014128584 0.015095034 0.015386503
## Documentary 0.010754095 0.011393527 0.013399021 0.014881342 0.016959498
## Drama       0.011270609 0.011937894 0.012735381 0.013817685 0.015095292
##                    [,79]        [,80]        [,81]        [,82]        [,83]
## Sport       0.010833584 0.016250376 0.023171833 0.027685826 0.033403551
## Animation   0.018780488 0.020243902 0.021463415 0.028048780 0.035853659
## Sci-Fi      0.014041404 0.018721872 0.019081908 0.019441944 0.025922592
## Western     0.002694449 0.001796300 0.003772229 0.002874079 0.003772229
## War         0.008683296 0.014998421 0.012156615 0.014366909 0.020682033
## Fantasy     0.017701563 0.017286682 0.019914258 0.022265247 0.022680127
## Music       0.014103982 0.017560841 0.021570796 0.024198009 0.025995575
## Musical     0.007642487 0.007512953 0.009326425 0.011269430 0.010492228
## History     0.007747388 0.009156004 0.012442775 0.014438314 0.017607700
## Mystery     0.015311449 0.019371303 0.021923211 0.022619186 0.024243127
## Biography   0.007464152 0.009624828 0.013160479 0.013651542 0.018071106
## Family      0.013217454 0.011768966 0.013670107 0.016204961 0.016657614
## Horror      0.015048608 0.020974830 0.025036623 0.031495539 0.033426555
## Adventure   0.011348048 0.010911585 0.011472752 0.013717421 0.013156254
## Thriller    0.020479279 0.022141211 0.023535088 0.025893958 0.027395057
## Crime       0.014224077 0.014318904 0.015124935 0.017021478 0.020055948
## Action      0.016146840 0.016905879 0.016733370 0.016043334 0.017526911
## Romance     0.018156377 0.018975462 0.020442988 0.020238217 0.021159687
## Comedy      0.017871662 0.017825640 0.020203415 0.021798825 0.022105635
## Documentary 0.019488163 0.024676287 0.028658209 0.030896223 0.035139731
## Drama       0.015404521 0.016665853 0.019221067 0.020482398 0.021637941
##                    [,84]        [,85]        [,86]        [,87]        [,88]
## Sport       0.042732471 0.049954860 0.053566055 0.064700572 0.064098706
## Animation   0.032926829 0.040000000 0.048048780 0.061219512 0.059268293
## Sci-Fi      0.025022502 0.034563456 0.043384338 0.047704770 0.051305131
## Western     0.004670379 0.005029639 0.007364828 0.007724088 0.007903718
## War         0.019576887 0.017998105 0.021787180 0.021313546 0.020839912
## Fantasy     0.025169409 0.031807496 0.034849952 0.042594385 0.041764625
## Music       0.034015487 0.046875000 0.053097345 0.067616150 0.071764381
## Musical     0.012046632 0.013471503 0.017875648 0.017875648 0.018005181
## History     0.019603240 0.039558634 0.071135110 0.076652189 0.089799272
```

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```
## Mystery      0.027027027 0.032594827 0.040134555 0.042686463 0.047326296
## Biography    0.022588882 0.042918876 0.078766451 0.089275192 0.099194657
## Family       0.021817853 0.032409922 0.044359949 0.055404671 0.061289154
## Horror       0.035956852 0.046344387 0.050805700 0.058463178 0.064056466
## Adventure    0.016772665 0.023506672 0.030240678 0.035727647 0.039094650
## Thriller     0.031094194 0.039832735 0.044872139 0.047606283 0.053396237
## Crime        0.020672325 0.024892134 0.025034375 0.027073159 0.027120573
## Action       0.019700524 0.024427270 0.029637041 0.030534088 0.030672095
## Romance      0.022081158 0.024640797 0.028360807 0.028360807 0.028975120
## Comedy       0.024912943 0.030911071 0.033012717 0.035114363 0.037584181
## Documentary 0.044440569 0.055267326 0.063129442 0.068273968 0.075046141
## Drama        0.025039467 0.030573051 0.034275670 0.036155461 0.038059665
##                     [,89]       [,90]       [,91] [,92]
## Sport       0.080650015 0.08245561 0.072524827     1
## Animation   0.061951220 0.06853659 0.074634146     1
## Sci-Fi      0.064086409 0.06372637 0.070027003     1
## Western     0.007724088 0.01095743 0.009340758     1
## War         0.018471740 0.02620777 0.026365646     1
## Fantasy     0.043977320 0.04909418 0.048817591     1
## Music       0.073838496 0.08047566 0.063467920     1
## Musical     0.018264249 0.01865285 0.019559585     1
## History     0.105528818 0.10951990 0.079586806     1
## Mystery     0.056605962 0.05834590 0.062057766     1
## Biography   0.126399529 0.13720291 0.095266156     1
## Family      0.079666848 0.08057215 0.061832337     1
## Horror      0.067385804 0.07464376 0.075509389     1
## Adventure   0.048385085 0.04944507 0.042835765     1
## Thriller    0.066530853 0.06878250 0.069961936     1
## Crime       0.033236926 0.03347399 0.033948130     1
## Action      0.033639249 0.03512283 0.036088877     1
## Romance     0.034367428 0.03774615 0.035015870     1
## Comedy      0.039839232 0.04227837 0.041434642     1
## Documentary 0.080699307 0.08594556 0.086178082     1
## Drama       0.042592321 0.04330843 0.043202643     1
```

`(movies_genres_stats_sum_sorted[,]/movies_genres_stats_sum_sorted[,92])[,-ncol(movies_genres_stats_sum_s`