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6/18/2019
IST 687
Project

DATA SCIENCE PROJECT: COUNTRY POPULATION DENSITY & MOVIE PLOTS

CONTENTS

INTRODUCTION

This report looks at movie plots and genres from 15 countries compared to the country's population and density to discover if there are any associations. As part of this investigation, the report will explore if there are any trends over time or by a country that can also be used to predict the tenure or quantity of movies to be produced by the 15 countries included in the report, going forward.

BUSINESS QUESTIONS

- Is there a movie genre mix per country?
- Sentiment per Country?
- Is there an association between sentiment or genres and country demographics?
- Can you predict sentiment or genre based on country demographics?

DATA ACQUISITION, CLEANSING, & TRANSFORMING

Data Acquisition Process

Two data sets are needed for the project: one with movies and needed data points, such as year, country, plot, and genre and another with the associated countries demographics for area and population by year.

Movie Plots

Retrieved from https://www.kaggle.com/jrobischon/wikipedia-movie-plots

The first dataset contains 34,886 movie records scraped from Wikipedia in January 2019. The dataset was retrieved from the Kaggle website on 5/12/19.

Global Country Demographics

Retrieved from https://www.census.gov/data-tools/demo/idb/informationGateway.php

The second dataset is curated and provided by the US government. The country information is sourced from the countries to which it relates

Data Dictionaries

Movie Plot Data Dictionary

Field Name	*Description*	*Data Type*
Release Year	Year in which the movie was released	Integer
Title	Movie title	String
Origin/Ethnicity	Origin of the movie (i.e., American, Bollywood, Tamil, etc.)	String
Director	Director(s)	String
Cast	Main actors/actresses	String
Genre	Movie genre(s)	String
Wiki Page	URL of Wikipedia page	URL

Census Data Dictionary		
Field Name	*Description*	*Data Type*
Country	Country	String
Year	Year	Integer
Population	Population	Integer
Area	Area (sq. km.)	Integer
Density	Density (persons per sq. km.)	Integer

Cleansing

Movie Plots

The movie file from Kaggle was very clean. The biggest challenge was cleaning up the genres. Built-in text functions efficiently handled the long plot data. Only three records were lost in the reformatting process of interpreting the comma delimited format. UTF-8 encoding should have been handled at this stage but was neglected to cause complications later in the process. Regardless, considering the range of countries involved, the encoding issue impacted very little data and did not affect results.

Country Information

The country file required no cleaning. It was downloadable in a cvs file that was prepared for data use with the removal of a few leading rows.

Transforming

Movie Plots

The movie file did not include the country of origin information. Origin/Ethnicity was used to derive and append country information to match to Country Demographics data set.

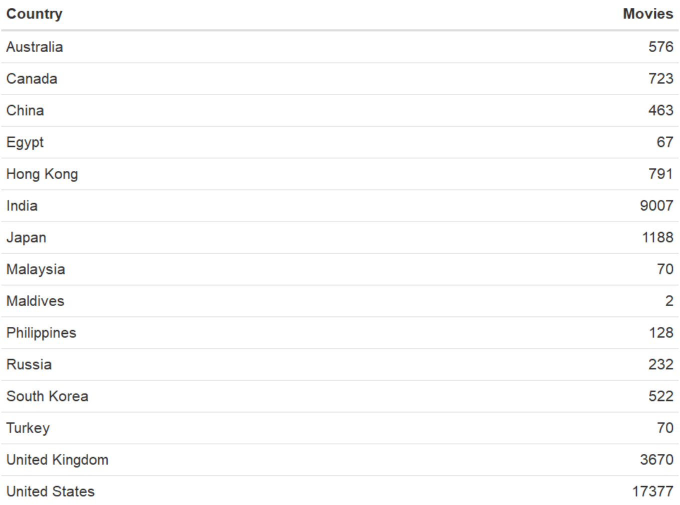
Country Information

Due to time constraints of the project, a year to year match wasn't possible, and the country information was limited after retrieval to the metrics for 2017, which matches the most recent release date in the movie database. The 2017 country population, area, and density data was used in the analysis.

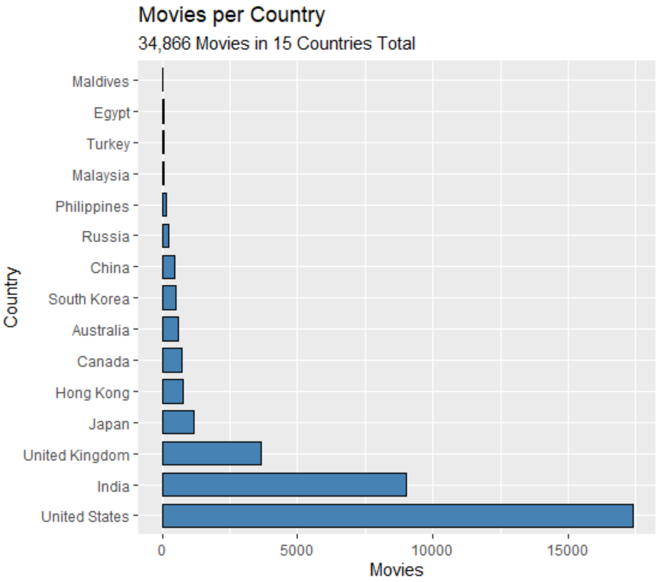
DATA

Movie Plots

15 Countries are represented, and movie release dates range from 1901 to 2017.



Country	Movies
Australia	576
Canada	723
China	463
Egypt	67
Hong Kong	791
India	9007
Japan	1188
Malaysia	70
Maldives	2
Philippines	128
Russia	232
South Korea	522
Turkey	70
United Kingdom	3670
United States	17377



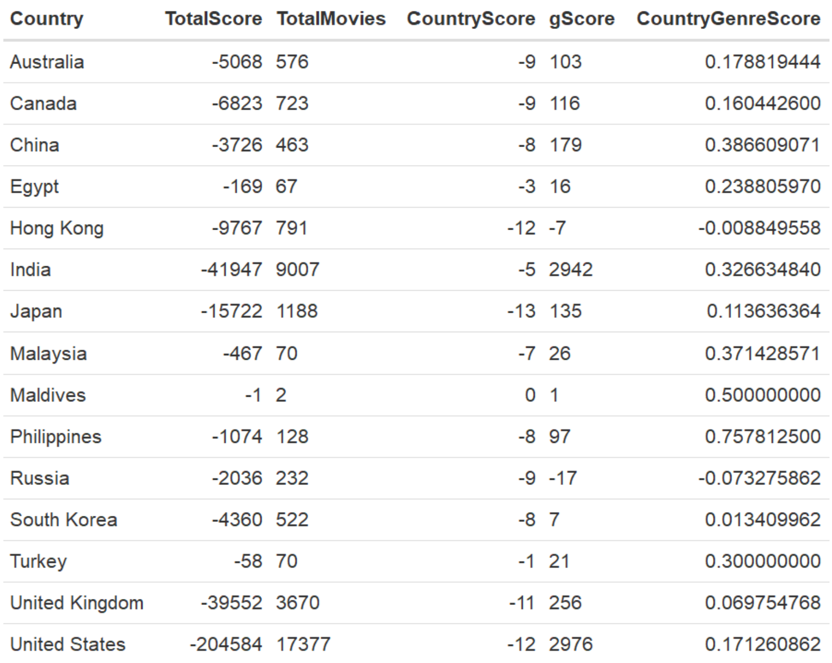
Country Information

The country demographics span 25 years and provide population, area, and density per year.

RESULTS

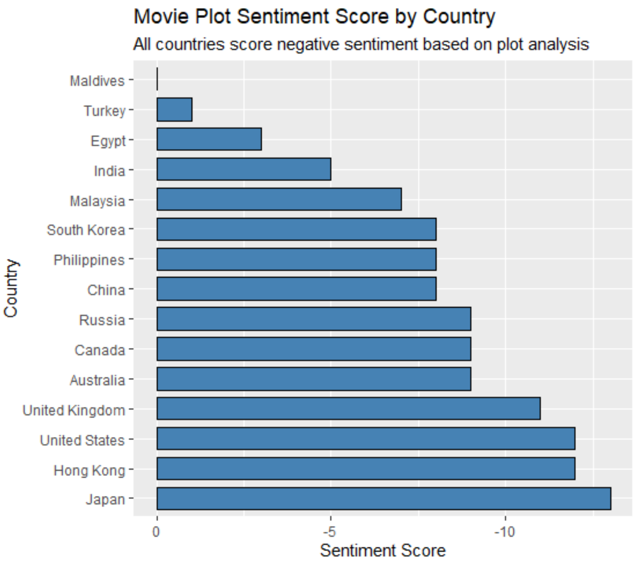
Sentiment Analysis

The sentiment is negative for all countries when based on movie plots, but when genre alone is analyzed all but Russia show positive sentiment. Since plots are generally based on a challenge that is overcome during the course of the film, this result is of no surprise.



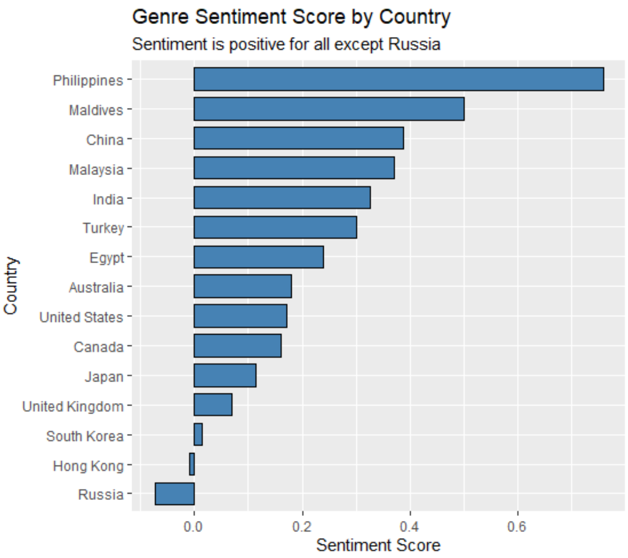
Country	TotalScore	TotalMovies	CountryScore	gScore	CountryGenreScore
Australia	-5068	576	-9	103	0.178819444
Canada	-6823	723	-9	116	0.160442600
China	-3726	463	-8	179	0.386609071
Egypt	-169	67	-3	16	0.238805970
Hong Kong	-9767	791	-12	-7	-0.008849558
India	-41947	9007	-5	2942	0.326634840
Japan	-15722	1188	-13	135	0.113636364
Malaysia	-467	70	-7	26	0.371428571
Maldives	-1	2	0	1	0.500000000
Philippines	-1074	128	-8	97	0.757812500
Russia	-2036	232	-9	-17	-0.073275862
South Korea	-4360	522	-8	7	0.013409962
Turkey	-58	70	-1	21	0.300000000
United Kingdom	-39552	3670	-11	256	0.069754768
United States	-204584	17377	-12	2976	0.171260862

- **CountryScore** is the total genre and plot sentiment score divided by movies for the country.
- **gScore** is the total sentiment score for the country based on genre only.
- **CountryGenreScore** is the genre sentiment score divided by movies for the country.



Movie Plot Sentiment Score by Country

All countries score negative sentiment based on plot analysis



Genre Sentiment Score by Country

Sentiment is positive for all except Russia

Movie Plot (+Genre) Word Clouds & Top 10 Genre Summary

Movie word clouds show a very similar trend amongst all countries to have a high frequency for family terms. Police is also a common plot term amongst countries. There are some country-specific trends visible via the word cloud and seen within the top ten genres for each country, although it seems the similarities outweigh the differences for this level of analysis.

- The United States likes cars, and this word shows up in their plots. Westerns are also a top 10 US genre.
- The UK has a top 10 genre of World War II movies.
- Hong Kong includes martial arts and kung fu in its top 10 genre list.
- Japan made enough Godzilla movies that Godzilla shows up in their word cloud.

Top 10 Genres per Country

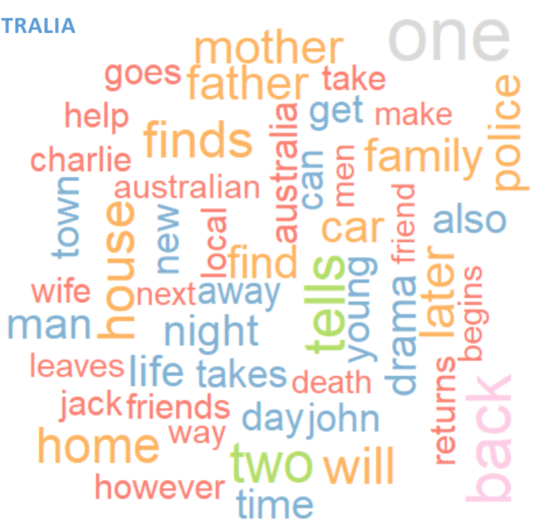
Australia		Canada		China		Egypt		Hong Kong	
drama	41%	drama	49%	drama	32%	drama	57%	action	24%
comedy	21%	comedy	16%	action	16%	romance	13%	comedy	17%
thriller	11%	horror	9%	comedy	12%	comedy	11%	drama	12%
horror	8%	animated	6%	romance	11%	crime	7%	martialarts	11%
action	5%	thriller	5%	fantasy	6%	romcom	4%	crime	11%
adventure	4%	short	4%	crime	5%	musical	2%	horror	6%
crime	3%	board	3%	adventure	5%	political	2%	thriller	6%
animated	3%	national	3%	romcom	5%	biography	1%	romcom	5%
scifi	2%	crime	3%	historical	5%	historical	1%	romance	4%
romance	2%	scifi	3%	mystery	4%		0%	kungfu	3%

India		Japan		Malaysia		Maldives		Philippines	
drama	29%	drama	27%	action	22%	comedy	33%	drama	28%
romance	18%	anime	14%	drama	22%	suspense	33%	comedy	14%
action	17%	action	11%	comedy	19%	thriller	33%	horror	13%
comedy	11%	scifi	11%	horror	15%		0%	romcom	13%
thriller	10%	fantasy	9%	romance	8%		0%	romance	12%
family	4%	horror	9%	historical	3%		0%	action	6%
romcom	3%	comedy	8%	romcom	3%		0%	fantasy	4%
social	3%	toktsu	4%	animated	2%		0%	suspense	4%
crime	3%	romance	4%	crime	2%		0%	thriller	3%
horror	2%	thriller	3%	mystery	2%		0%	adventure	2%

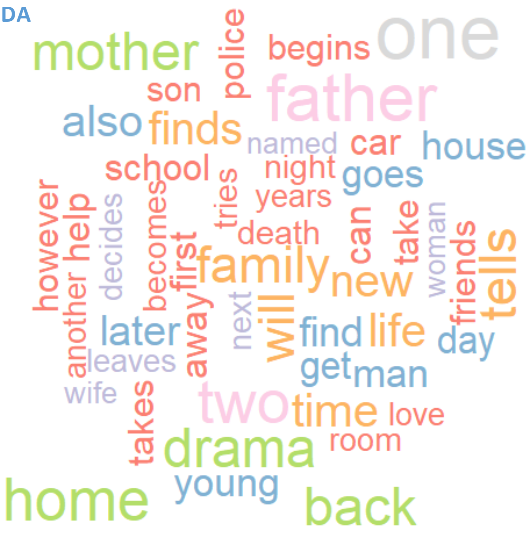
Russia		Turkey		South Korea		United Kingdom		United States	
drama	36%	drama	58%	drama	49%	drama	32%	drama	32%
comedy	21%	comedy	26%	action	10%	comedy	29%	comedy	27%
war	9%	action	3%	ero	9%	crime	10%	horror	6%
crime	7%	horror	3%	melodrama	8%	thriller	8%	western	6%
thriller	6%	romance	3%	comedy	5%	horror	6%	crime	6%
action	5%	animated	2%	horror	5%	adventure	3%	action	5%
historical	5%	documentary	2%	thriller	5%	musical	3%	scifi	5%
fantasy	4%	romcom	2%	romcom	4%	worldwarii	3%	musical	4%
scifi	4%	thriller	2%	animated	3%	mystery	2%	thriller	4%
adventure	3%		0%	historical	3%	romance	2%	animated	4%

Word Clouds

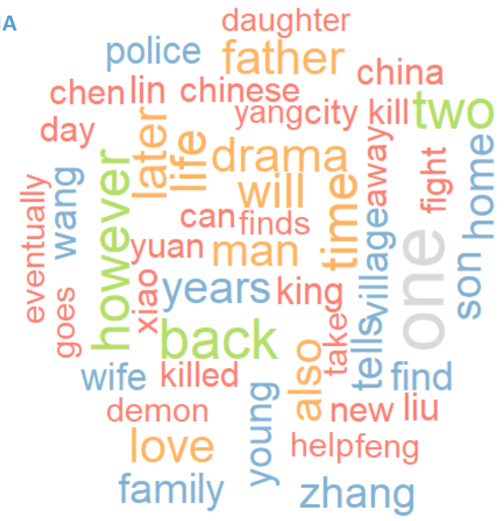
AUSTRALIA



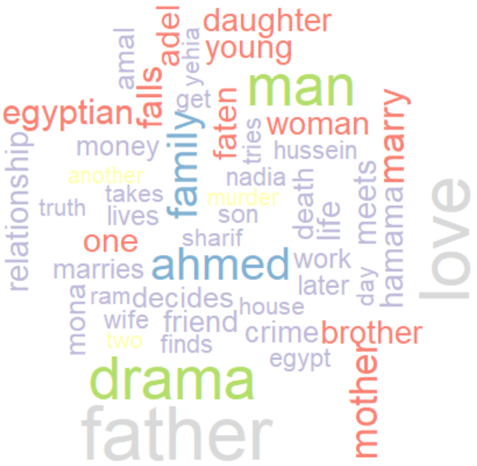
CANADA



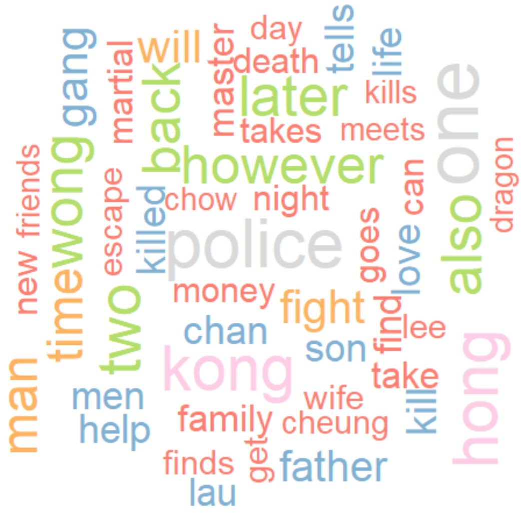
CHINA



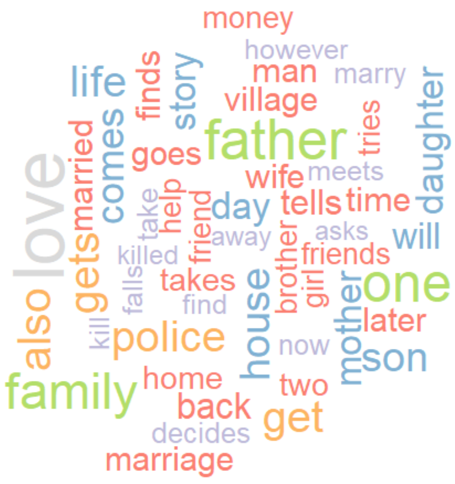
EGYPT



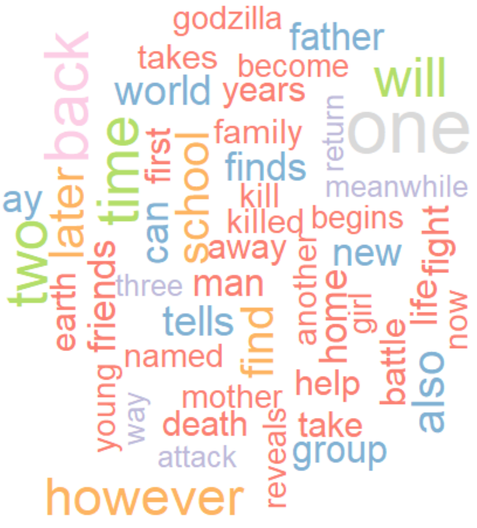
HONG KONG



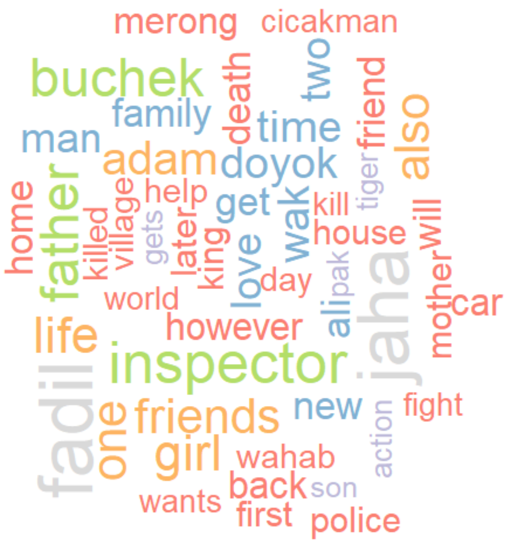
INDIA



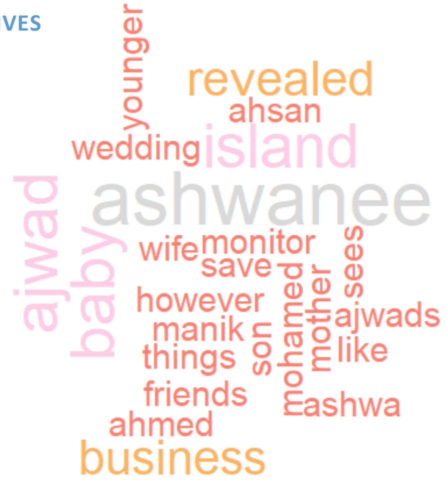
Japan



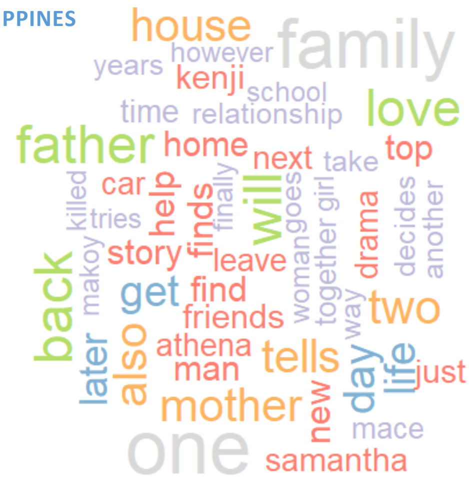
Malaysia



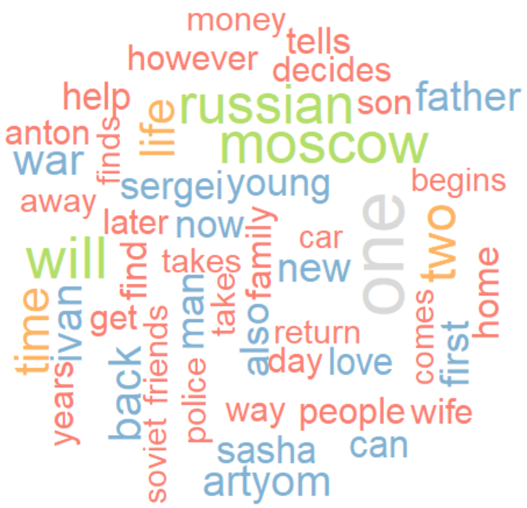
Maldives



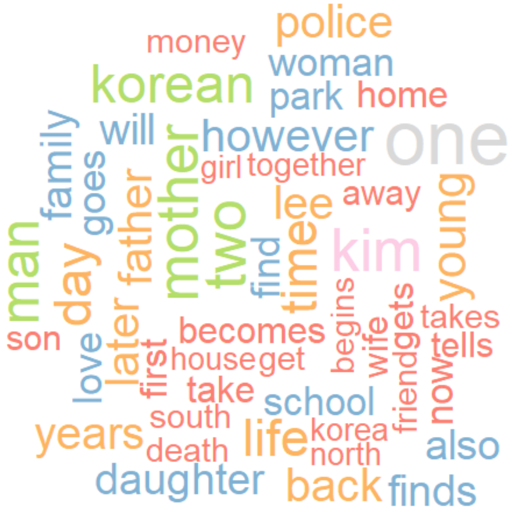
Philippines



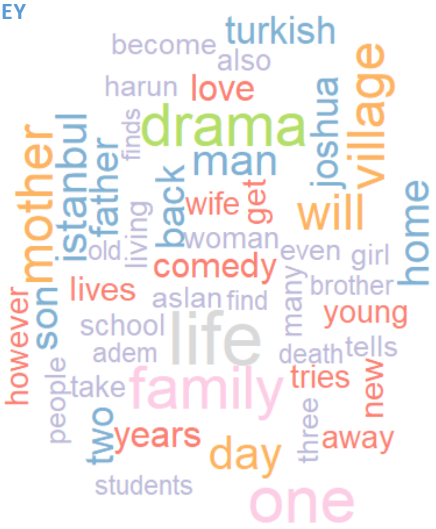
Russia



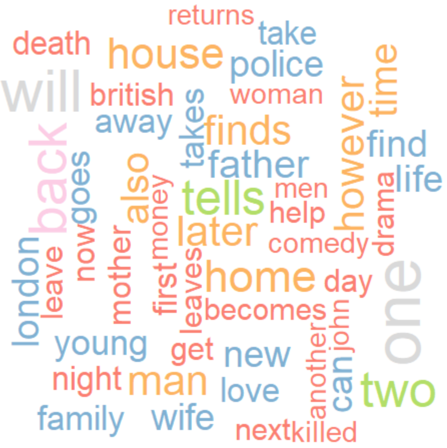
South Korea



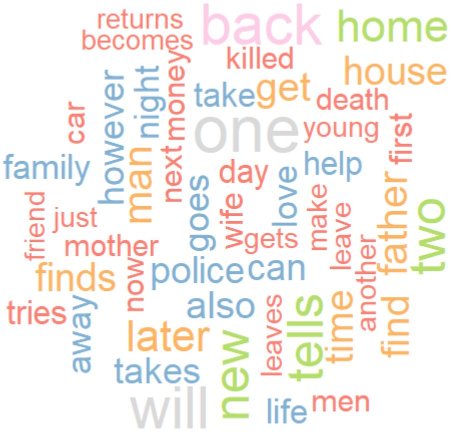
Turkey



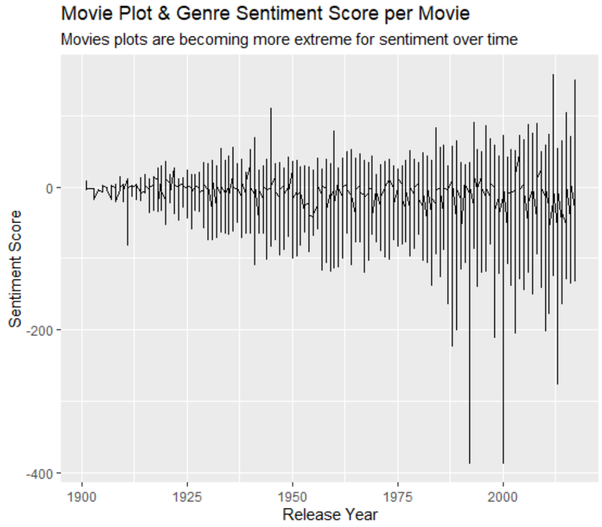
United Kingdom



United States



Trends



Models & Forecasts

There does seem to be slight difference between countries, but there is not enough variation in the top genre, which is drama for 12 out of 15 countries and a correlation between the country demographics of the population, area, and density to genre or sentiment score.

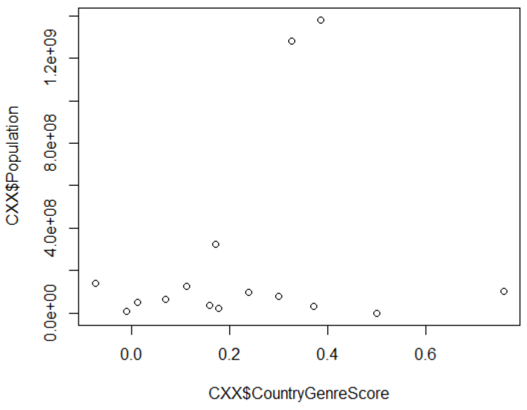
```
Table of data summary by Country, followed by statistical evaluation:
```

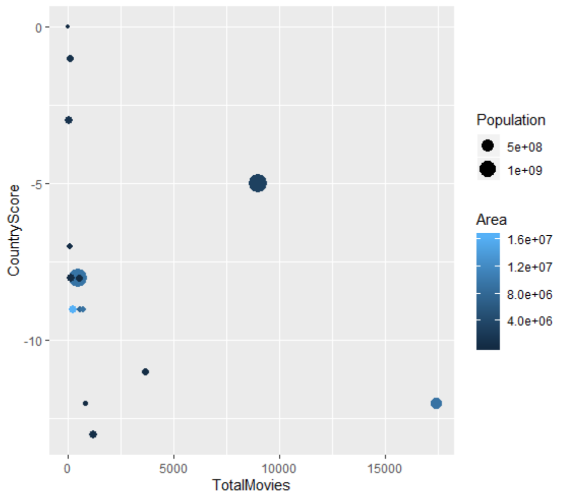
Country	TotalScore	TotalMovies	CountryScore	gScore	CountryGenreScore	TopGenre	TGCounts	TGPercent	Year	Population	Area	Density
Australia	-5068	576	-9	103	0.178819444	drama	199	0.34548611	2017	23232413	7682300	3.0
Canada	-6823	723	-9	116	0.160442600	drama	369	0.51037344	2017	35623680	9093507	3.9
China	-3726	463	-8	179	0.386609071	drama	219	0.47300216	2017	1379302771	9326410	147.9
Egypt	-169	67	-3	16	0.238805970	drama	47	0.70149254	2017	97041072	995450	97.5
Hong Kong	-9767	791	-12	-7	-0.008849558	action	156	0.19721871	2017	7191503	1073	6702.2
India	-41947	9007	-5	2942	0.326634840	drama	1971	0.21882980	2017	1281935911	2973193	431.2
Japan	-15722	1188	-13	135	0.113636364	drama	269	0.22643098	2017	126451398	364485	346.9
Malaysia	-467	70	-7	26	0.371428571	action	20	0.28571429	2017	31381992	328657	95.5
Maldives	-1	2	0	1	0.500000000	comedy	1	0.50000000	2017	392709	298	1317.8
Philippines	-1074	128	-8	97	0.757812500	drama	55	0.42968750	2017	104256076	298170	349.7
Russia	-2036	232	-9	-17	-0.073275862	drama	58	0.25000000	2017	142257519	16377742	8.7
South Korea	-4360	522	-8	7	0.013409962	drama	38	0.07279693	2017	51181299	96920	528.1
Turkey	-58	70	-1	21	0.300000000	drama	36	0.51428571	2017	80845215	769632	105.0
United Kingdom	-39552	3670	-11	256	0.069754768	drama	956	0.26049046	2017	64769452	241930	267.7
United States	-204584	17377	-12	2976	0.171260862	drama	5094	0.29314611	2017	325719178	9148655	35.6

```
Country     TotalScore          TotalMovies        CountryScore
Australia:1   Min.   :-204584.0   Min.   :    2.0   Min.   :-13.000
Canada   :1   1st Qu.: -12744.5   1st Qu.:   99.0   1st Qu.:-10.000
China    :1   Median :  -4360.0   Median :  522.0   Median : -8.000
Egypt    :1   Mean   : -22356.9   Mean   : 2325.7   Mean   : -7.667
Hong Kong:1   3rd Qu.:   -770.5   3rd Qu.:  989.5   3rd Qu.: -6.000
India    :1   Max.   :     -1.0   Max.   :17377.0   Max.   :  0.000
(Other)  :9
gScore         CountryGenreScore    TopGenre
Min.   : -17.0   Min.   :-0.07328   Length:15
1st Qu.:  11.5   1st Qu.: 0.09170   Class :character
Median :  97.0   Median : 0.17882   Mode  :character
Mean   : 456.7   Mean   : 0.23377
3rd Qu.: 157.0   3rd Qu.: 0.34903
Max.   :2976.0   Max.   : 0.75781
Max.   :16377742   Max.   :6702.20
```

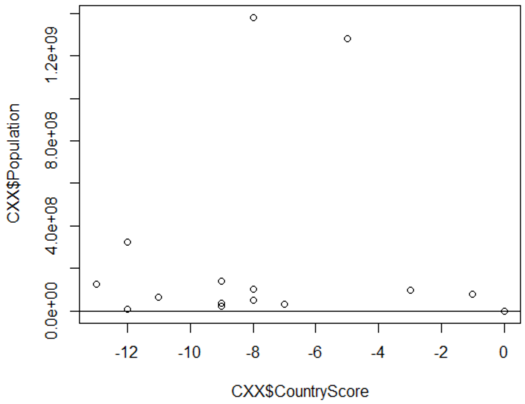
```
TGCounts         TGPercent          Year        Population
Min.   :   1.0   Min.   :0.0728   Min.   :2017   Min.   :3.927e+05
1st Qu.:  42.5   1st Qu.:0.2382   1st Qu.:2017   1st Qu.:3.350e+07
Median : 156.0   Median :0.2931   Median :2017   Median :8.085e+07
Mean   : 632.5   Mean   :0.3519   Mean   :2017   Mean   :2.501e+08
3rd Qu.: 319.0   3rd Qu.:0.4865   3rd Qu.:2017   3rd Qu.:1.344e+08
Max.   :5094.0   Max.   :0.7015   Max.   :2017   Max.   :1.379e+09

Area                Density
Min.   :     298   Min.   :   3.00
1st Qu.:  270050   1st Qu.:  65.55
Median :  769632   Median : 147.90
Mean   : 3846561   Mean   : 696.05
3rd Qu.: 8387904   3rd Qu.: 390.45
Max.   :16377742   Max.   :6702.20
```

```
2 Plots testing for visual confirmation of patterns and variations in data:
```





```
Testing for Density predicting Country Sentiment Score:
```



```
Testing for Density predicting Country Sentiment Score:
Residuals:
    Min      1Q  Median      3Q     Max 
-5.9599 -2.1006 -0.2321  1.4269  7.1026 

Coefficients:
              Estimate Std. Error t value Pr(>|t|)    
(Intercept) -7.103e+00  1.389e+00  -5.112 0.000256 ***
Population   1.132e-09  2.520e-09   0.449 0.661275    
Area        -2.201e-07  2.188e-07  -1.006 0.334245    
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 4.062 on 12 degrees of freedom
Multiple R-squared:  0.08047,	Adjusted R-squared:  -0.07279 
F-statistic: 0.5251 on 2 and 12 DF,  p-value: 0.6045
```

CONCLUSION

Unfortunately, we can see from the data there is not enough variation in the data to predict genre based on the country statistics of population, area, and density. It will take more data and in-depth analysis to predict genre mixes per country or trends over time. There are indicators of variations per country, and it would take far more data to build a prediction model, where it might be driven by culture, tradition, economic resources in the movie industry, the appetite of market, the market served and government censorship.

- Is there a movie genre mix per country?
    - Yes. As seen in the top 10 genres per country. However, the top genre is drama 80% of the time.
- Sentiment per Country?
    - Yes. Each country has a sentiment score in the negative, ranging from 0 to -13.
- Is there an association between sentiment or genres and country demographics?
    - No. There doesn’t seem to be for the country demographics included in the report (population, area, and density). There are differences in countries though that could be driven by factors not explored in this report or available in this data set.
- Can you predict sentiment or genre based on country demographics?
    - No, you can’t predict sentiment or genre based on population, area, or density.

CODE

```
###########################################
#Amy McVicar
#6/18/2019
```

```
#IST 687
#DATA SCIENCE PROJECT: COUNTRY POPULATION DENSITY & MOVIE PLOTS

#########################################
#LIBRARIES
install.packages("tidytext")
library(tidytext)
install.packages("NLP")
library(NLP)
install.packages("tm")
library(tm)
install.packages("dplyr")
library(dplyr)
install.packages("textdata")
library(textdata)
install.packages("data.table")
library(data.table)
install.packages("sqldf")
library(sqldf)
install.packages("ggplot2")
library(ggplot2)
install.packages("wordcloud")
library(wordcloud)
install.packages("formattable")
library(formattable)
install.packages("openxlsx")
library(openxlsx)
#install.packages("wordcloud2")
#library(wordcloud2)
#install.packages("gtable")
#library(gtable)#install.packages("tidyverse")
#library(tidyverse)
install.packages("arules")
library(arules)

#########################################
#LOAD MOVIE FILE & MAKE COPY
movies_0 <- read.csv("/Data/wiki_movie_plots_deduped.csv")

#copy movie file
movies <- movies_0

#########################################
#CLEAN MOVIE GENRE

movies$Genre <- trimws(movies$Genre )
movies$Genre <- gsub("/", " \\| ",movies$Genre)
movies$Genre <- gsub(",", " \\|",movies$Genre)
movies$Genre <- gsub("  ", " ",movies$Genre)
movies$Genre <- gsub("  ", " ",movies$Genre)
movies$Genre <- gsub("film", "",movies$Genre)
movies$Genre <- gsub("usa", "",movies$Genre)
```

```
movies$Genre <- gsub("usa | can", "",movies$Genre)
movies$Genre <- gsub("-", "",movies$Genre)
movies$Genre <- gsub("[140]", "",movies$Genre)
movies$Genre <- gsub("[144]", "",movies$Genre)
movies$Genre <- gsub("( genre)", "",movies$Genre)
movies$Genre <- gsub("| 7", "",movies$Genre)
movies$Genre <- gsub("\\[\\]", "",movies$Genre)
movies$Genre <- gsub("&", "\\|",movies$Genre)
movies$Genre <- gsub("\\(\\)", "\\|",movies$Genre)
movies$Genre <- gsub("fantasychildren's", "fantasy children's",movies$Genre)
movies$Genre <- gsub("fantasycomedy", "fantasy comedy",movies$Genre)
movies$Genre <- gsub("fantasyperiod", "fantasy period",movies$Genre)
movies$Genre <- gsub("\\|thriller", "\\| thriller",movies$Genre)
movies$Genre <- gsub("action adventure science fiction", "action adventure \\| science fiction",movies$Genre )
movies$Genre <- gsub("horror in 3d\\.", "horror \\| 3d",movies$Genre )
movies$Genre <- gsub("science fiction", "sci-fi",movies$Genre )
movies$Genre <- gsub("science fiction", "sci-fi",movies$Genre )
movies$Genre <- gsub("scifi", "sci-fi",movies$Genre )
movies$Genre <- gsub("\\[\\]", "sci-fi",movies$Genre )
movies$Genre <- gsub("sci-fi horror", "sci-fi \\| horror",movies$Genre )
movies$Genre <- gsub("action???masala", "action \\| masala",movies$Genre )
movies$Genre <- gsub("actionadventure", "action \\| adventure",movies$Genre )
movies$Genre <- gsub("; ", " \\|",movies$Genre )
movies$Genre <- gsub("ancientcostume", " ancient costume",movies$Genre )
movies$Genre <- gsub("6.", "",movies$Genre )
movies$Genre <- gsub(".mm", "",movies$Genre )
movies$Genre <- gsub("adventurecomedy" , "adventure \\| comedy",movies$Genre )
movies$Genre <- gsub("and", "\\|", movies$Genre )
movies$Genre <- gsub("horror comedy \\| horror","horror \\| comedy",movies$Genre )
movies$Genre <- gsub("horror masala", "horror \\| masala",movies$Genre )
movies$Genre <- gsub("horror musical" , "horror \\| musical",movies$Genre )
movies$Genre <- gsub("horror masala", "horror \\| masala",movies$Genre )
movies$Genre <- gsub("horrorthriller", " horror \\| thriller",movies$Genre )
movies$Genre <- gsub("imax" , "",movies$Genre )
movies$Genre <- gsub("imdb", "",movies$Genre )
movies$Genre <- gsub("comedydrama", "comedy drama",movies$Genre )
movies$Genre <- gsub("sciencefiction", "sci-fi",movies$Genre )
movies$Genre[14853] <- "action"
movies$Genre[15508] <- "action"
movies$Genre[31151] <- "action"
movies$Genre[17256] <- "comdedy | drama"
movies$Genre <- gsub("world war i", "world-war-i",movies$Genre )
movies$Genre <- gsub("world war ii", "world-war-ii",movies$Genre )
movies$Genre <- gsub("martial arts", "martial-arts",movies$Genre )
movies$Genre <- gsub("comingofage", "coming-of-age",movies$Genre )
movies$Genre <- gsub("coming of age", "coming-of-age",movies$Genre )
movies$Genre <- gsub("romcom", "rom-com",movies$Genre )
movies$Genre <- gsub("rom com", "rom-com",movies$Genre )
movies$Genre <- gsub("romantic comedy", "rom-com",movies$Genre )
movies$Genre <- gsub("crimethriller", "crime thriller",movies$Genre )
movies$Genre <- gsub("//[not in citation given//]", "",movies$Genre )
movies$Genre <- gsub("comedyhorror", "comedy horror",movies$Genre )
```

```
movies$Genre <- gsub("comedythriller", "comedy thriller",movies$Genre )
movies$Genre <- gsub("comedy \\| romance", "rom-com",movies$Genre)
movies$Genre <- gsub("romance \\| comedy", "rom-com",movies$Genre)
movies$Genre <- gsub("comedy romance", "rom-com",movies$Genre)
movies$Genre <- gsub("romance comedy", "rom-com",movies$Genre)
movies$Genre <- gsub("romantic comedy", "rom-com",movies$Genre)
movies$Genre <- gsub("romantic", "romance",movies$Genre)
#movies$Genre <- gsub("unknown", "",movies$Genre )
movies$Genre <- gsub("action\\S", "action ",movies$Genre)
movies$Genre <- gsub("action omedy", "action \\| comedy ",movies$Genre)
movies$Genre <- gsub("animation", "animated",movies$Genre)
movies$Genre <- gsub("  ", " ",movies$Genre)
movies$Genre <- gsub("biographical", "biography",movies$Genre)
movies$Genre <- gsub("biographic", "biography",movies$Genre)
movies$Genre <- gsub("biopic", "biography",movies$Genre)
movies$Genre <- gsub("action hriller", "action \\| thriller",movies$Genre)
movies$Genre <- gsub("action ove", "action",movies$Genre)
movies$Genre <- gsub("action rama", "action",movies$Genre)
movies$Genre <- gsub("kung fu", "kung-fu",movies$Genre)
movies$Genre <- gsub("martialarts", "martial-arts",movies$Genre)
movies$Genre[movies$Genre == ""] <- "unknown"
movies$Genre[movies$Genre == " "] <- "unknown"

#Create Genre word columns for Sentiment & Word Cloud

movies$gSent <- movies$Genre
movies$gSent <- gsub("unknown", "",movies$gSent)
movies$wCloud <- movies$Genre
movies$gSent <- gsub("\\|", " ",movies$gSent)
movies$wCloud <- gsub("\\|", " ",movies$wCloud)
movies$wCloud <- gsub("unknown", "",movies$wCloud)

# update rom-com for Sentiment Analysis
movies$gSent <- gsub("rom-com", "romantic comedy",movies$gSent)
movies$wCloud <- gsub("rom-com", "romantic comedy",movies$gSent)

########################################
# COUNTS

# if can't find count(), reload dplyr package
#install.packages("dplyr")
#library(dplyr)

movieCounts <- count(movies, movies$Genre, name = "Movies")

movieCounts <- count(movies, movies$gSent, name = "Movies")

movieCounts <- count(movies, movies$wCloud, name = "Movies")

movieCounts <- count(movies,movies$Origin.Ethnicity, name = "Movies")

########################################
```

```
#ADD COUNTRY INFORMATION

#begin add country & ISO Codes process

movies$Country <- "unknown"
movies$ISO <- "unknown"

# Create CountryCodes Table
Ethnicity <- c("Australian", "Canadian", "Chinese", "Hong Kong", "Egyptian",
               "Assamese", "Bangladeshi", "Bengali", "Bollywood", "Kannada",
               "Malayalam", "Marathi", "Punjabi", "Tamil", "Telugu",
               "Japanese", "Malaysian", "Maldivian", "Filipino", "Russian",
               "South_Korean", "Turkish", "British", "American")
Country <- c("Australia", "Canada", "China", "Hong Kong", "Egypt", "India",
             "India", "India", "India", "India", "India", "India", "India",
             "India", "India", "Japan", "Malaysia", "Maldives", "Philippines",
             "Russia", "South Korea", "Turkey", "United Kingdom",
             "United States")
ISO <- c("AU", "CA", "CN", "HK", "IN", "IN", "IN", "IN", "IN", "IN", "IN",
         "IN", "IN", "IN", "IN", "JP", "MY", "MV", "PH", "RU", "KR", "TR",
         "GB", "US")
CountryCodes <- data.frame(Ethnicity,Country, ISO)

# apply country data to movie table
movies$Country <- CountryCodes$Country[match(movies$Origin.Ethnicity,CountryCodes$Ethnicity)]
movies$ISO <- CountryCodes$ISO[match(movies$Country,CountryCodes$Country)]


# Counts - Country
movieCounts <- count(movies, Country, name = "Movies")

# create table graphic - counts by country

formattable(movieCounts, align = c("l", rep("r", NCOL(movieCounts) - 1)))

#create graph by movie counts

ggplot(movieCounts, aes(x=reorder(Country, -Movies),y=Movies, fill = variable, width =
.75))+geom_bar(colour="black",fill="steel blue", stat="identity")+coord_flip()+ labs(x = "Country", y = "Movies",
title = "Movies per Country", subtitle = "34,866 Movies in 15 Countries Total")

# Counts - ISO
movieCounts <- count(movies, movies$ISO, name = "Movies")


########################################
# SENTIMENT BY MOVIE

# get AFINN

# if can't find get_sentiments, reload tidytrext package
#install.packages("tidytext")
```

```
#library(tidytext)

afinn <- get_sentiments(lexicon = c("afinn"))


#Prepare for Plot Sentiment Loop

sList <- character()
counter <- 0

#Sentiment Loop

for (i in 1:nrow(movies)) {
  counter <- (counter + 1)
  Y <- character()
  vPlot <- movies$Plot[counter]
  words.vec <- VectorSource(vPlot)
  words.corpus <- Corpus(words.vec)
  words.corpus <- tm_map(words.corpus, content_transformer(tolower))
  words.corpus <- tm_map(words.corpus, removePunctuation)
  words.corpus <- tm_map(words.corpus, removeNumbers)
  words.corpus <- tm_map(words.corpus, removeWords, stopwords("english"))
  tdm <- TermDocumentMatrix(words.corpus)
  m <- as.matrix(tdm)
  wordCounts <- rowSums(m)
  X <- data.frame(wordCounts)
  setDT(X, keep.rownames = TRUE)[]
  colnames(X) <- c("Names", "Freq")
  join_string <- "select X.*, afinn.* from X join afinn on X.Names=afinn.word"
  newX <- sqldf(join_string,stringsAsFactors = FALSE)

  if (nrow(newX)==0)
  {Y<-0}
  else {
    newX$FreqScore <- (newX$Freq*newX$value)
    Y <- sum(newX$FreqScore)
  }
  sList <- c(sList, Y)
}

#release vPlot memory

vPlot <- character()

#Add Plot Sentiments to movies

movies$Sentiment <- sList


#Prepare for Genre Sentiment Loop

sList <- character()
```

```
rowcount <- nrow(movies)
counter <- 0

#Genre Sentiment Loop

for (i in 1:rowcount) {
  counter <- (counter + 1)
  Y <- character()
  vsG <- movies$gSent[counter]
  words.vec <- VectorSource(vsG)
  words.corpus <- Corpus(words.vec)
  words.corpus <- tm_map(words.corpus, content_transformer(tolower))
  words.corpus <- tm_map(words.corpus, removePunctuation)
  words.corpus <- tm_map(words.corpus, removeNumbers)
  words.corpus <- tm_map(words.corpus, removeWords, stopwords("english"))
  tdm <- TermDocumentMatrix(words.corpus)
  m <- as.matrix(tdm)
  wordCounts <- rowSums(m)
  X <- data.frame(wordCounts)
  setDT(X, keep.rownames = TRUE)[]
  colnames(X) <- c("Names", "Freq")
  join_string <- "select X.*, afinn.* from X join afinn on X.Names=afinn.word"
  newX <- sqldf(join_string,stringsAsFactors = FALSE)

  if (nrow(newX)==0)
  {Y<-0}
  else {
    newX$FreqScore <- (newX$Freq*newX$value)
    Y <- sum(newX$FreqScore)
  }

sList <- c(sList, Y)

}


#Add Genre sentiments to movies

movies$gScore<- sList

########################################
#Total Sentiment Score

movies$Sentiment <- as.numeric(movies$Sentiment)
movies$gScore <- as.numeric(movies$gScore)
movies$TotalScore <- movies$Sentiment+movies$gScore


########################################
#Graph Sentiment per Country

#CountryStats <- CountryStats[,-1:-6]
```

```
CountryStats <- data.frame(tapply(movies$TotalScore,movies$Country, sum))
CountryStats$TotalMovies <- c(tapply(movies$TotalScore,movies$Country, length))
setDT(CountryStats, keep.rownames = TRUE)[]

colnames(CountryStats) <- c("Country", "TotalScore","TotalMovies")
CountryStats$CountryScore <- c(round(CountryStats$TotalScore/CountryStats$TotalMovies))


#GGPLOT Sent by county
ggplot(CountryStats, aes(x=reorder(Country, CountryScore),y=CountryScore, fill = variable, width =
.75))+geom_bar(colour="black",fill="steel blue", stat="identity")+coord_flip()+scale_y_reverse()+ labs(x =
"Country", y = "Sentiment Score", title = "Movie Plot Sentiment Score by Country", subtitle = "All countries score
negative sentiment based on plot analysis")


########################################
#Graph Sentiment per Country based on Genre

CountryStats$gScore <- c(tapply(movies$gScore,movies$Country,sum))
CountryStats$CountryGenreScore <- c((CountryStats$gScore/CountryStats$TotalMovies))

#Table of Sent
formattable(CountryStats,align = c("l", rep("r", NCOL(movieCounts) - 1)))


ggplot(CountryStats, aes(x=reorder(Country, CountryGenreScore), y=CountryGenreScore, fill = variable, width =
.75))+geom_bar(colour="black",
                          fill="steel blue", stat="identity")+coord_flip()+
                            labs(x = "Country", y= "Sentiment Score",
                           title = "Genre Sentiment Score by Country", subtitle = "Sentiment is positive for all except
Russia")

########################################
#WORD CLOUD

#create country files - loop

for(i in unique(movies$Country)) {
  nam <- paste("movies", i, sep = ".")
  assign(nam, movies[movies$Country==i,])
}


###################################
#Word Loop & Function

#prepare for word loop
s1 <- character()
sList <- character()
rowcount <- nrow(movies)
counter <- 0
```

```
#word loop & function

fWord <- function(countryfile)
{
testtab <- countryfile

counter <- 0
s1 <- character()

for (i in 1:nrow(testtab)) {
  counter <- (counter + 1)
  s1 <- paste(s1, testtab$wCloud[counter], testtab$Plot[counter], sep = " ")

}

s1 <- gsub("film", "", s1)
s1 <- gsub("movie", "", s1)

words.vec <- VectorSource(s1)
words.corpus <- Corpus(words.vec)
words.corpus <- tm_map(words.corpus, content_transformer(tolower))
words.corpus <- tm_map(words.corpus, removePunctuation)
words.corpus <- tm_map(words.corpus, removeNumbers)
words.corpus <- tm_map(words.corpus, removeWords, stopwords("english"))
tdm <- TermDocumentMatrix(words.corpus)
m <- as.matrix(tdm)
wordCounts <- rowSums(m)
wordCounts <- sort(wordCounts, decreasing = TRUE)
X <- data.frame(word=names(wordCounts),freq=wordCounts)

cdf <- testtab$Country[1]
cdf <- as.character(cdf)
return(assign(cdf,X,envir=.GlobalEnv))

}

# Use function to process country files to create word cloud files
fWord(movies.Australia)
fWord(movies.Canada)
fWord(movies.China)
fWord(movies.Egypt)
fWord(`movies.Hong Kong`)
fWord(movies.India)
fWord(movies.Japan)
fWord(movies.Malaysia)
fWord(movies.Maldives)
fWord(movies.Philipines)
fWord(movies.Russia)
fWord(`movies.South Korea`)
fWord(movies.Turkey)
fWord(`movies.United Kingdom`)
fWord(`movies.United States`)

# Word Cloud Creators

wordcloud(Australia$word,Australia$freq, min.freq = 3, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

wordcloud(Canada$word,Canada$freq, min.freq = 3, max.words=50, rot.per=.4, colors = brewer.pal(9,"Set3"))

wordcloud(China$word,China$freq, min.freq = 3, max.words=50, rot.per=.4, colors = brewer.pal(9,"Set3"))

wordcloud(Egypt$word,Egypt$freq, min.freq = 3, max.words=50, rot.per=.4, colors = brewer.pal(9,"Set3"))

wordcloud(`Hong Kong`$word,`Hong Kong`$freq, min.freq = 3, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

wordcloud(India$word,India$freq, min.freq = 3, max.words=50, rot.per=.4, colors = brewer.pal(9,"Set3"))

wordcloud(Japan$word,Japan$freq, min.freq = 3, max.words=50, rot.per=.4, colors = brewer.pal(9,"Set3"))

wordcloud(Malaysia$word,Malaysia$freq, min.freq = 3, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

wordcloud(Maldives$word,Maldives$freq, min.freq = 2, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

wordcloud(Philipines$word,Philipines$freq, min.freq = 3, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

wordcloud(Russia$word,Russia$freq, min.freq = 3, max.words=50, rot.per=.4, colors = brewer.pal(9,"Set3"))

wordcloud(`South Korea`$word,`South Korea`$freq, min.freq = 3, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

#Encoding Issue (UTF-8 char mishandled) on Turkey file - delete these bad rows, or run at your peril
#Next time, deal with encoding in the beginning!

Turkey <- Turkey[-23,]
Turkey <- Turkey[1:50,]

wordcloud(Turkey$word,Turkey$freq, min.freq = 3, max.words=50, rot.per=.4, colors = brewer.pal(9,"Set3"))

wordcloud(`United Kingdom`$word,`United Kingdom`$freq, min.freq = 3, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

wordcloud(`United States`$word,`United States`$freq, min.freq = 3, max.words=50, rot.per=.4, colors =
brewer.pal(9,"Set3"))

##################################################
# GENRE FREQ LOOP & FUNCTION

#Prepare for Loop
```

```
sList <- character()
rowcount <- nrow(movies)
counter <- 0

#Genre Freq Loop & Function

gWord <- function(countryfile)
{
  testtab <- countryfile

  counter <- 0
  s1 <- character()

  for (i in 1:nrow(testtab)) {
    counter <- (counter + 1)
    s1 <- paste(s1, testtab$wCloud[counter], sep = " ")

  }

  s1 <- gsub("film", "", s1)
  s1 <- gsub("movie", "", s1)

  words.vec <- VectorSource(s1)
  words.corpus <- Corpus(words.vec)
  words.corpus <- tm_map(words.corpus, content_transformer(tolower))
  words.corpus <- tm_map(words.corpus, removePunctuation)
  words.corpus <- tm_map(words.corpus, removeNumbers)
  words.corpus <- tm_map(words.corpus, removeWords, stopwords("english"))
  tdm <- TermDocumentMatrix(words.corpus)
  m <- as.matrix(tdm)
  wordCounts <- rowSums(m)
  wordCounts <- sort(wordCounts, decreasing = TRUE)
  X <- data.frame(word=names(wordCounts),freq=wordCounts)

  cdf <- paste(testtab$Country[1],"G",sep="")
  cdf <- as.character(cdf)
  return(assign(cdf,X,envir=.GlobalEnv))

}

#Use Genre Freq Function to process country files

gWord(movies.Australia)
gWord(movies.Canada)
gWord(movies.China)
gWord(movies.Egypt)
gWord(`movies.Hong Kong`)
gWord(movies.India)
gWord(movies.Japan)
gWord(movies.Malaysia)
gWord(movies.Maldives)
gWord(movies.Philipines)
gWord(movies.Russia)
gWord(`movies.South Korea`)
gWord(movies.Turkey)
gWord(`movies.United Kingdom`)
gWord(`movies.United States`)

########################################
#CREATE TOP 10 Genres per Country

TAustralia<- AustraliaG[1:10,]
TCanada <- CanadaG[1:10,]
TChina <- ChinaG[1:10,]
TEgypt <- EgyptG[1:10,]
THK <- `Hong KongG`[1:10,]
TIndia <- IndiaG[1:10,]
TJapan <- JapanG[1:10,]
TMalaysia <- MalaysiaG[1:10,]
TMaldives <- MaldivesG[1:10,]
TPhilipines <- PhilipinesG[1:10,]
TRussia <- RussiaG[1:10,]

TSK <- `South KoreaG`[1:10,]
TTurkey <- TurkeyG[1:10,]
TUK <- `United KingdomG`[1:10,]
TUS <- `United StatesG`[1:10,]

# Export 10 Ten for treatment in Excel, next time handle in R, but out of time on this project!
Z <- list("Australia"=TAustralia, "Canada"=TCanada, "China"=TChina, "Egypt"=TEgypt,"Hong Kong"= THK,
"India"=TIndia, "Japan"=TJapan, "Malaysia"=TMalaysia, "Maldives"=TMaldives,
"Philippines"=TPhilipines,"Russia"=TRussia,"South Korea"=TSK, "Turkey"=Turkey, "UK"=TUK, "US"=TUS)
write.xlsx(Z, file = "writeXLSX3.xlsx")

########################################
#lLOAD COUNTRY DEMOS

CDemos <- read.csv("/Data/census_data_All.csv")

#Make a copy to manipulate
CDX <- CDemos

#2017 year only
CDX <- CDX[CDX$Year == 2017,]
row.names(CDX) <- 1:15

#Adding Metrics, I'm sure there is a better way to loop this,
#but MSWord manipulation made code creation quite easy
CountryStats$TopGenre <- c(as.String(TAustralia[1,1]), as.String(TCanada[1,1]), as.String(TChina[1,1]),
as.String(TEgypt[1,1]), as.String(THK[1,1]), as.String(TIndia[1,1]), as.String(TJapan[1,1]), as.String(TMalaysia[1,1]),
as.String(TMaldives[1,1]), as.String(TPhilipines[1,1]), as.String(TRussia[1,1]), as.String(TSK[1,1]),
as.String(TTurkey[1,1]), as.String(TUK[1,1]), as.String(TUS[1,1]))
```

```
CountryStats$TGCounts<- c(as.String(TAustralia[1,2]), as.String(TCanada[1,2]), as.String(TChina[1,2]), as.String(TEgypt[1,2]), as.String(THK[1,2]), as.String(TIndia[1,2]), as.String(TJapan[1,2]), as.String(TMalaysia[1,2]), as.String(TMaldives[1,2]), as.String(TPhilipines[1,2]), as.String(TRussia[1,2]), as.String(TSK[1,2]), as.String(TTurkey[1,2]), as.String(TUK[1,2]), as.String(TUS[1,2]))

#Check dataframe
#str(CountryStats)

#convert

CountryStats$TGCounts <- as.integer(CountryStats$TGCounts)

#add percent metric
CountryStats$TGPercent <- (CountryStats$TGCounts/CountryStats$TotalMovies)

# Create table - Country Stats

formattable(CountryStats)

#merge tables to one mega table with movie & country stats
CXX <- merge(CountryStats,CDX)

# Creat table - Country Stats & Country Stats Mega Table
formattable(CXX, align = c("l", rep("r", NCOL(movieCounts) - 1)))

#Create table statistics
#summary(movies)
summary (CXX)

###################################################################
#MODELS, PLOTS & SCATTER PLOTS

ggplot(movies, aes(x=Release.Year, y=TotalScore, group=1))+geom_line()+labs(x="Release Year", y="Sentiment Score", title="Movie Plot & Genre Sentiment Score per Movie", subtitle = "Movies plots are becoming more extreme for sentiment over time")

ggplot(CXX, aes(x=TotalMovies, y=CountryScore))+geom_point(aes(size=Population, color=Area))

plot(CXX$CountryScore,CXX$Population)
plot(CXX$CountryScore,CXX$Density)

#Model
m.m <- lm(formula = CountryScore ~ Density, data = CXX)
plot(CXX$CountryScore,CXX$Density)
summary(m.m)
abline(m.m)
```