

Let's load the packages we need to use.

```
library(tidyverse) # Multiple packages
library(ggthemes) # Visualization themes
library(gridExtra) # Grids for visualizations
library(lubridate) # Working with dates
```

Importing the dataset.

```
setwd("C:\\Users\\USA\\Desktop\\Movie")
train_data <- read_csv('train.csv')
test_data <- read_csv('test.csv')
```

Let's investigate missing values and condition the data set little bit to carry out our further analysis.

```
train_data <- train_data %>% mutate(budget = replace(budget, budget == '0', NA))
train_data$homepage[!is.na(train_data$homepage)] <- "YES"
train_data$homepage[is.na(train_data$homepage)] <- "NO"
imdb <- str_replace(train_data$imdb_id, "tt", '')
train_data["imdb_id"] <- imdb
train_data$release_date <- parse_date_time2(train_data$release_date, "mdy", cutoff_2000 = 20)
train_data <- train_data %>% separate(release_date, c("Year", "Month", "Day"))
sum(is.na(train_data$runtime))

## [1] 2

which(is.na(train_data$runtime))

## [1] 1336 2303

train_data <- train_data %>% drop_na(runtime)
train_data$tagline[!is.na(train_data$tagline)] <- "Yes"
train_data$tagline[is.na(train_data$tagline)] <- "NO"
train_data$collection_name <- str_extract(train_data$belongs_to_collection, pattern = "(?<=name\\'\\:\\s{1}\\')\\.(?=\\'\\:\\s{1}\\'poster)")
train_data$Franchise[!is.na(train_data$collection_name)] <- "YES"
train_data$Franchise[is.na(train_data$collection_name)] <- "No"
train_data$prod_country <- str_extract(string = train_data$production_country,
```

```

es, pattern = "[:upper:]+")
genres_matching_point <- "Comedy|Horror|Action|Drama|Documentary|Science Fiction|
Crime|Fantasy|Thriller|Animation|Adventure|Mystery|War|Romance|Music|
Family|Western|History|TV Movie|Foreign"
train_data$main_genre <- str_extract(train_data$genres, genres_matching_point
)
train_data$budget_range[train_data$budget <= 5.10e+06] <- "Low"
train_data$budget_range[train_data$budget > 5.10e+06 & train_data$budget <= 4
.00e+07 ] <- "Med"
train_data$budget_range[train_data$budget > 4.00e+07] <- "Big"

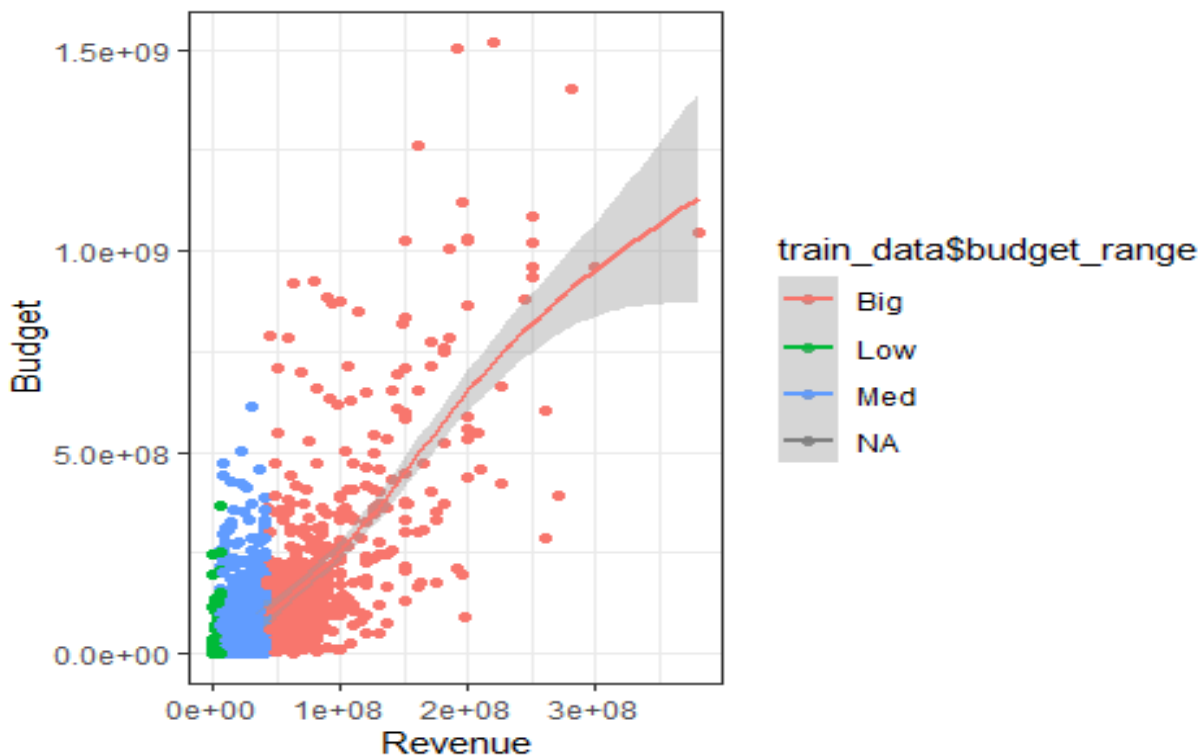
```

Let's start to explore the data and relations between our variable and find some important features of our dataset. Shall We?

```

train_data$budget_range <- as.factor(train_data$budget_range)
ggplot(train_data, aes(train_data$budget, train_data$revenue, color = train_data$budget_range)) + geom_point() + geom_smooth() + theme_bw() + xlab("Revenue") + ylab("Budget")

```



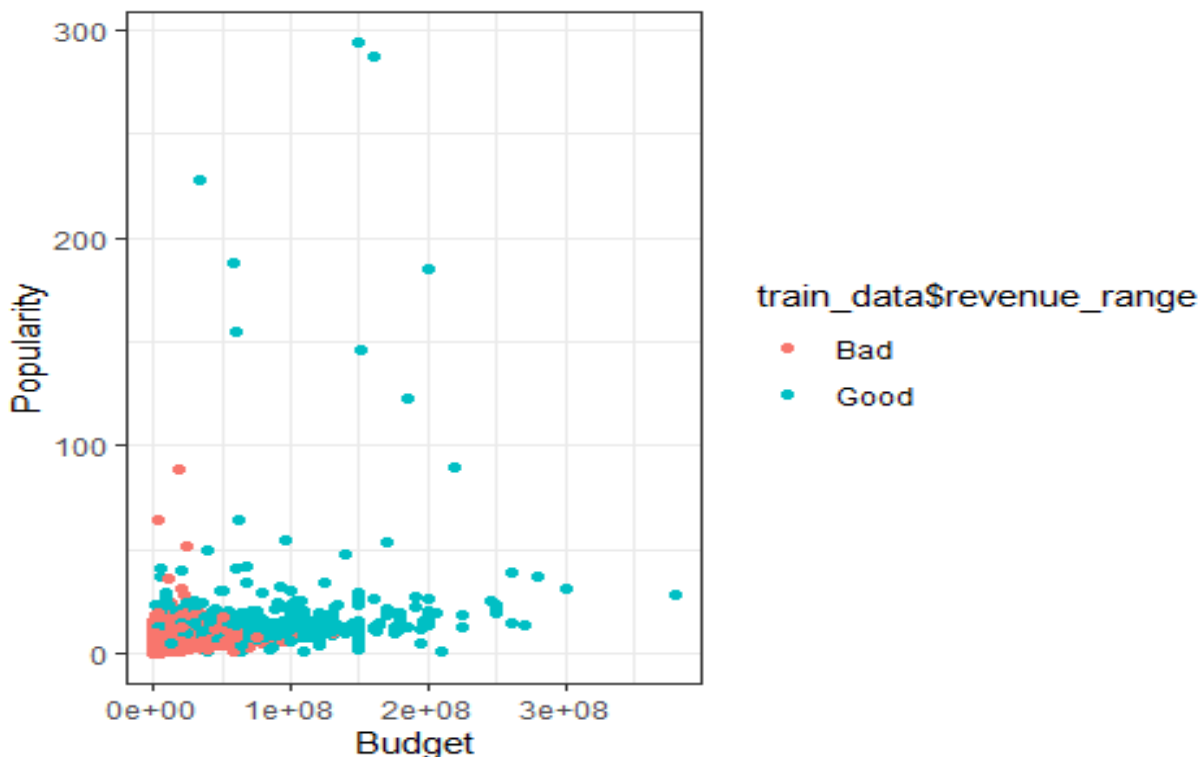
There are very few Low budget movies, Most of them are medium or high budget movies. Budget seems very related with revenue. More budget seems to earn more.

```
train_data$revenue_range[train_data$revenue <= 6.677e+07] <- "Bad"
train_data$revenue_range[train_data$revenue > 6.677e+07] <- "Good"
table(train_data$budget_range, train_data$revenue_range)
```

```
##           Bad Good
## Big    106  396
## Low    523   24
## Med    818  320
```

Observations: 1. Out of every 5 Big Budget, 4 will do good. 2. Only 4% Low buget can make the cut-off 3. 30% medium budget movie earning good 4. Money Brings Money

```
ggplot(train_data, aes(train_data$budget, train_data$popularity, color = train_data$revenue_range)) + geom_point() + theme_bw() + xlab("Budget") + ylab("Popularity")
```



Popularity also has a positive correlation with budget as expected but not as much as revenue. There is a sweetspot where low budget movie seems to have good revenue and good popularity: These movies will be interesting to study. Maybe some other time.

```
ggplot(train_data, aes(train_data$runtime, train_data$revenue, fill = train_data$budget_range)) + geom_col() + xlab("Run Time") + ylab("Revenue") + theme_bw() + theme(legend.position = "top")
```



Observations: 1. Runtime is important, people tend to spend money on movies ranging from 90 min - 145 min. 2. Big budgets and medium budgets movie are clearly aware of this fact. 3. This says something about our attention span, isn't it?

```
Median_budget <- train_data %>% group_by(train_data$budget_range) %>% summarise(median_revenue=median(revenue))
Median_revenue <- train_data %>% group_by(train_data$budget_range) %>% summarise(median_budget=median(budget))
Median <- merge(Median_revenue, Median_budget, by = "train_data$budget_range")
```

```
train_data %>% filter(budget_range == "Big") %>% arrange(desc(revenue)) %>% select(title, revenue) %>% head(10)
```

#Top 10 Big Budgets titles based on Revenue

```
## # A tibble: 10 x 2
##   title                                revenue
##   <chr>                                <dbl>
## 1 The Avengers                        1519557910
```

```
## 2 Furious 7 1506249360
## 3 Avengers: Age of Ultron 1405403694
## 4 Beauty and the Beast 1262886337
## 5 Transformers: Dark of the Moon 1123746996
## 6 The Dark Knight Rises 1084939099
## 7 Pirates of the Caribbean: On Stranger Tides 1045713802
## 8 Finding Dory 1028570889
## 9 Alice in Wonderland 1025491110
## 10 Zootopia 1023784195
```

```
train_data %>% filter(budget_range == "Med") %>% arrange(desc(revenue)) %>% select(title, revenue) %>% head(10)
```

#Top 10 Medium Budget titles based on Revenue

```
## # A tibble: 10 x 2
##   title revenue
##   <chr> <dbl>
## 1 The Passion of the Christ 611899420
## 2 Ghost 505000000
## 3 Jaws 470654000
## 4 The Hangover 459270619
## 5 The Exorcist 441306145
## 6 The Intouchables 426480871
## 7 Dances with Wolves 424208848
## 8 The Bodyguard 411006740
## 9 Monster Hunt 385284817
## 10 Toy Story 373554033
```

```
train_data %>% filter(budget_range == "Low") %>% arrange(desc(revenue)) %>% select(title, revenue) %>% head(10)
```

#Top 10 Low Budgets based on Revenue

```
## # A tibble: 10 x 2
##   title revenue
##   <chr> <dbl>
## 1 My Big Fat Greek Wedding 368744044
## 2 Get Out 252434250
## 3 The Blair Witch Project 248000000
## 4 Paranormal Activity 3 205703818
## 5 Paranormal Activity 193355800
## 6 Lights Out 148868835
## 7 Paranormal Activity 4 142817992
## 8 Animal House 141000000
## 9 Love Story 136400000
## 10 Porky's 125728258
```

Observations:

The top 10 movies by earning for low budget criteria seems very interesting: 6 of them horror, 4 of them comedy.

If you get less money in the movie business, either bring good wit or crazy vision to scare people off. Franchise movies dominate big budget genre.

It Seems like medium budget movie can hold more creativity and experiments.

```
train_data %>% filter(budget_range == "Big") %>% arrange(desc(revenue)) %>% select(title, revenue) %>% tail(10)
```

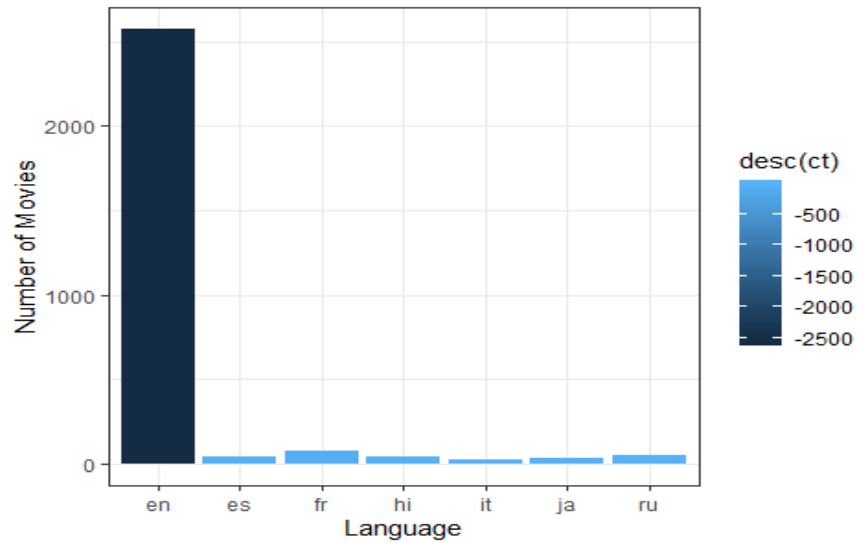
#Top 10 Big Budget yet Fails:

```
## # A tibble: 10 x 2
##   title                revenue
##   <chr>                <dbl>
## 1 Stay                8342132
## 2 Gigli               7266209
## 3 1492: Conquest of Paradise 7191399
## 4 The Adventures of Pluto Nash 7103973
## 5 The Big Bounce      6808550
## 6 A Sound of Thunder  5989640
## 7 Heaven's Gate       3484331
## 8 Child 44            3324330
## 9 Shadow Conspiracy   2154540
## 10 Lolita             1060056
```

I do keep myself informed with movies at least with the big hits: Never heard about any of these movies: seems well justified to me.

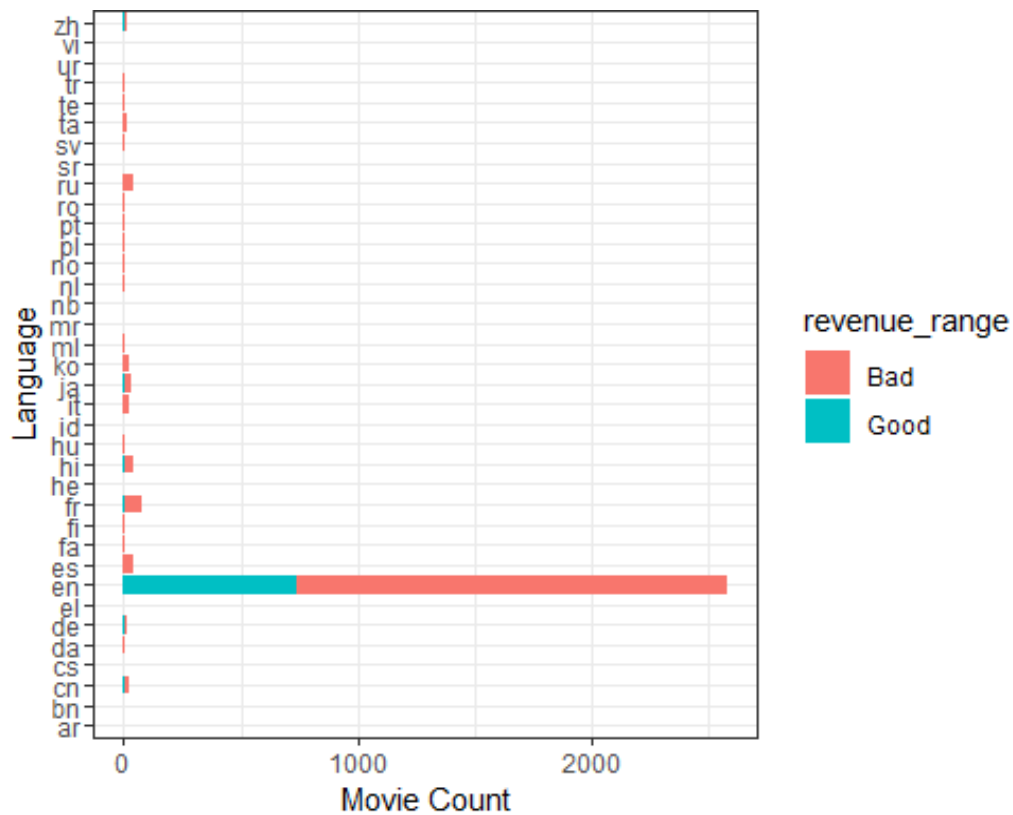
Moving on.

```
language_number <- train_data %>% group_by(original_language) %>% summarise(ct = n()) %>% arrange(desc(ct)) %>% head(7)
language_number$original_language <- as.factor(language_number$original_language)
ggplot(language_number, aes(language_number$original_language, language_number$ct, fill = desc(ct))) + geom_col() + xlab("Language") + ylab("Number of Movies") + theme_bw()
```



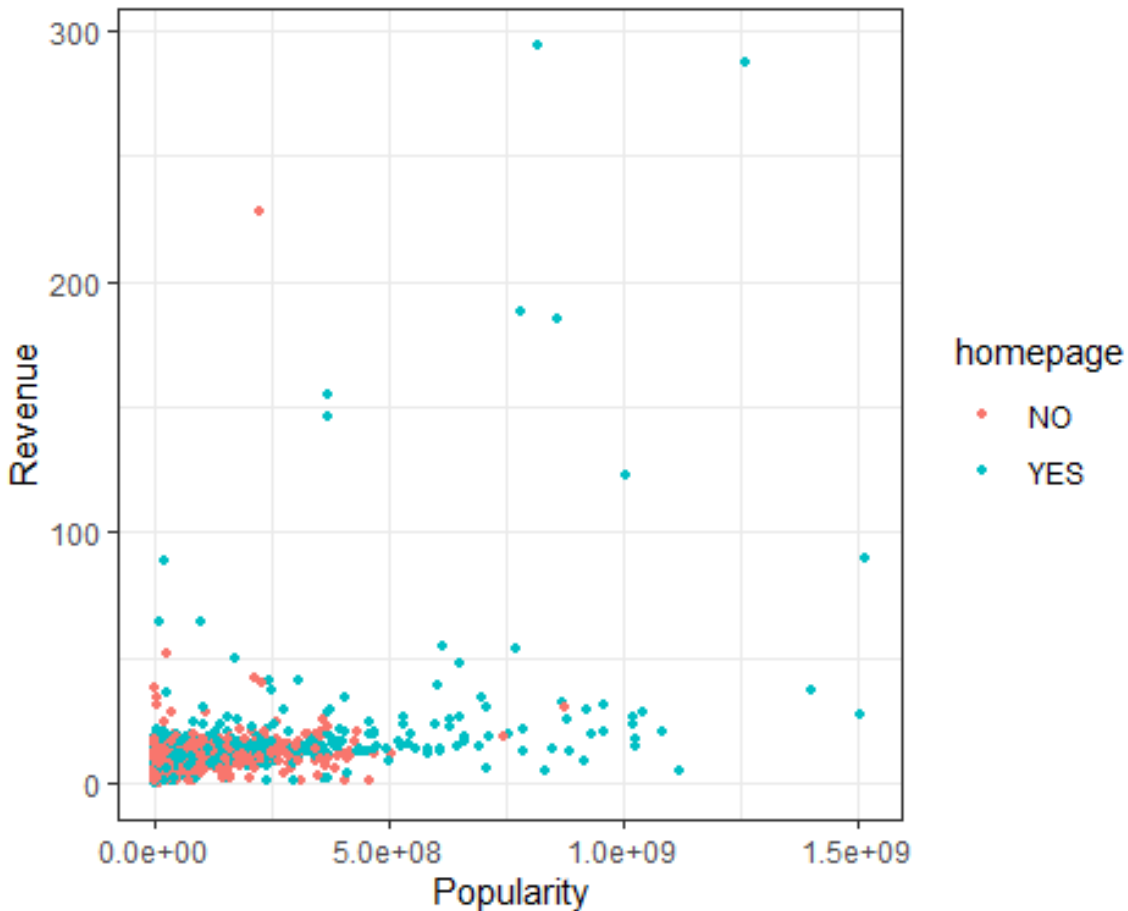
No wonder, there will be monopoly of english language. Other significant languages are french, russian, hindi, spanish and italian.

```
ggplot(train_data, aes(original_language, fill = revenue_range)) + geom_bar()
+ coord_flip() + xlab("Language") + ylab("Movie Count") + theme_bw() + theme(plot.margin = margin(.01, .01, .01, .01, "cm"))
```



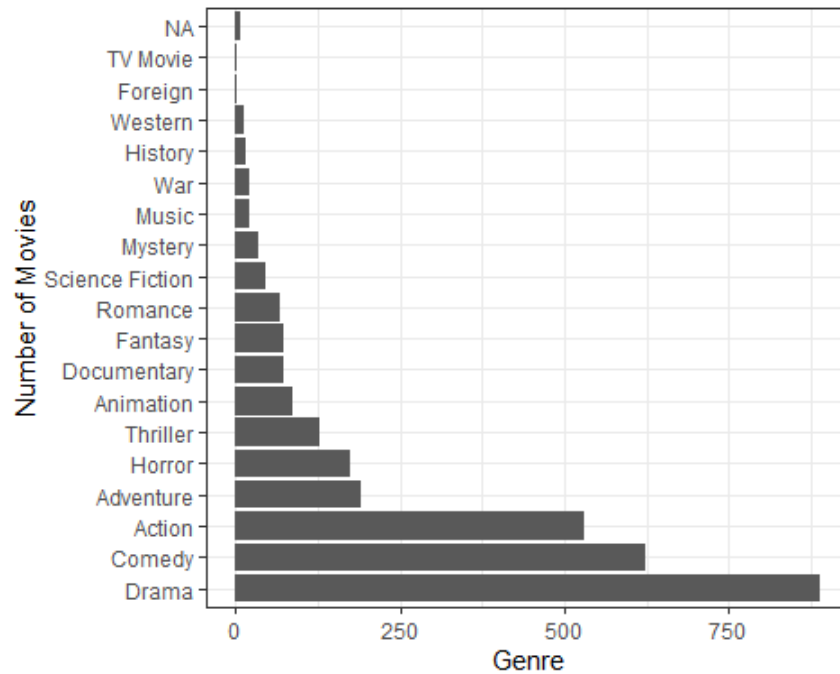
By global standard, other languages other than english are not successful that much except few language like japanese, hindi, french, tr, zh. Russian language film seems to suffer a lot; Giant land with small population effect, I guess.

```
ggplot(train_data, aes(revenue, popularity, color = homepage)) + geom_point(size = 1.2) + theme_bw() + xlab("Popularity") + ylab("Revenue")
```

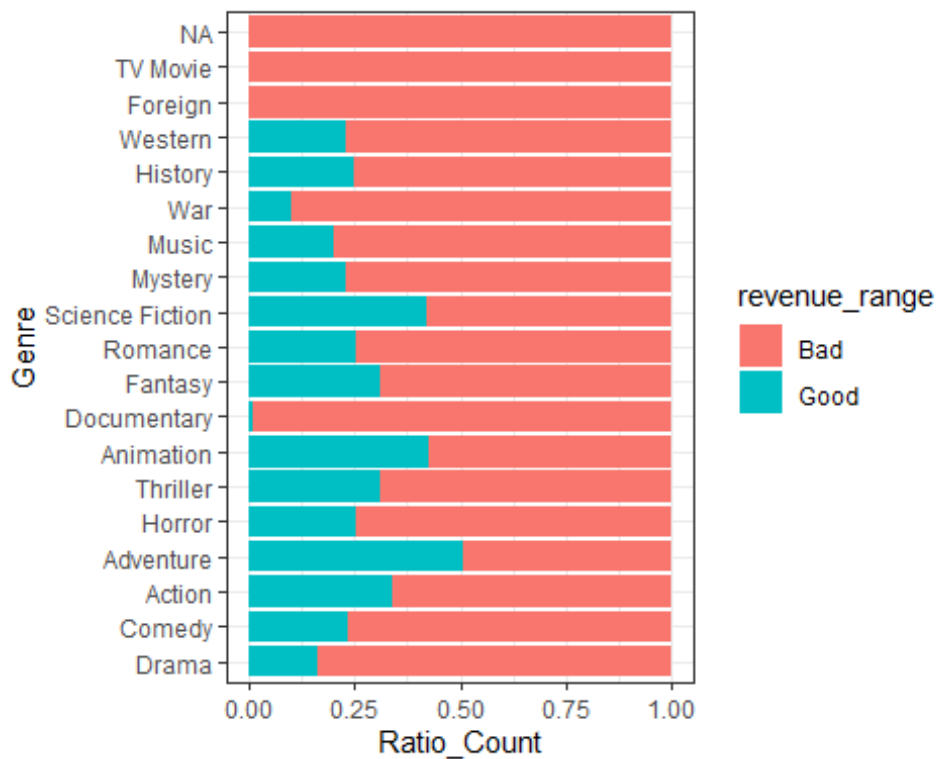


The graph might be misleading: seems like having homepage have clear effect on being the movie popular and successful. Actually most of the successful or popular movies are high budget movies: thereby can afford to build or care about having a homepage. Domain Knowledge!!

```
ggplot(train_data, aes(fct_infreq(train_data$main_genre))) + geom_bar(na.rm=TRUE) + coord_flip() + ylab("Genre") + xlab("Number of Movies") + theme_bw()
```

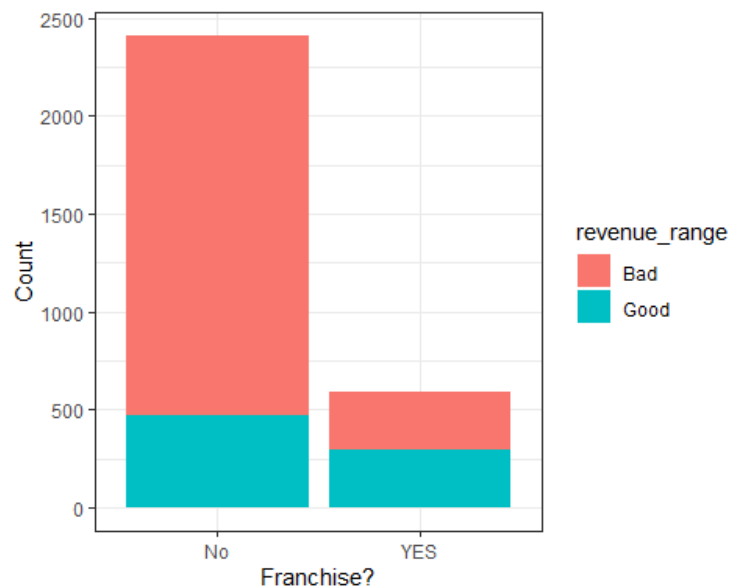



```
ggplot(train_data, aes(fct_infreq(train_data$main_genre), fill = revenue_range)) +
  geom_bar(position = "fill") + coord_flip() + xlab("Genre") + ylab("Ratio_Count") +
  theme_bw()
```



Drama, comedy, action overwhelms other genre. But Revenue wise Adventure, Science fictions & animation beats everybody. Hollywood stands high in every category.

```
ggplot(train_data, aes(Franchise, fill = revenue_range)) + geom_bar() + xlab("Franchise?") + ylab("Count") + theme_bw()
```



This is one interesting plot, looks like probability of being a winner is much higher for a franchise movie.