How a company squeezes into "making movie business" and gets successful

Phase 1 Final Project

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Overview

This project analyzes the three publically available online databases, IMDb, TN, and BOM. IMDb (an acronym for Internet Movie Database) is an online database of information related to films, television programs, home videos, video games, and streaming content online. The Numbers (TN) is a film industry data website that tracks box office revenue in a systematic, algorithmic way. Box Office Mojo (BOM) is an American website that tracks box-office revenue in an organized, algorithmic way. Descriptive analysis suggests that a company looking into joining a lucrative movie business needs to partner with the studios producing the highest ROIs, look into investing in making movies in Horror, Mystery, and Thriller genres, and carefully plan the release date of their products.

Business Problem

Microsoft sees all the big companies creating original video content, and they want to get in on the fun. They have decided to create a new movie studio, but they don't know anything about producing movies. They need recommendations on how to minimize the risk to their investment and maximize their future products' profitability. Though the scope of this project is limited and, further in-depth analysis should be considered, the results of the study reveals several valuable recommendations.

Data Understanding

As pointed out in the overview section, the project uses the data from three databases already available as zipped CSV files imported from IMDb, TN, and BOM databases. Additional data from Rotten Tomatoes (RT) and The Movie Database (TMdb) were explored and initially considered, and it has been decided not to use this information in the analysis performed. This data might be considered for future exploration. To make this decision, analysis of the content in all the sources available was performed, a data diagram of all the tables was created, and only tables with movie financial and most easily joined tables have been chosen for further analysis.
The decision has been made to limit the analysis considering only data for movies released within the last decade

The rest of the tables should be considered for performing analysis of ratings and professional staff performance. Another consideration for the data sources' choice was the number of movie records available in each of the tables. Please see below the description and the results of the data sources analysis.

- The CSV zipped files were unzipped, and the data was imported into an SQLite database.
- To investigate in more detail data available in all available tables, an Entity Relation Diagram was created with LucidChart online application. Please see the diagram below
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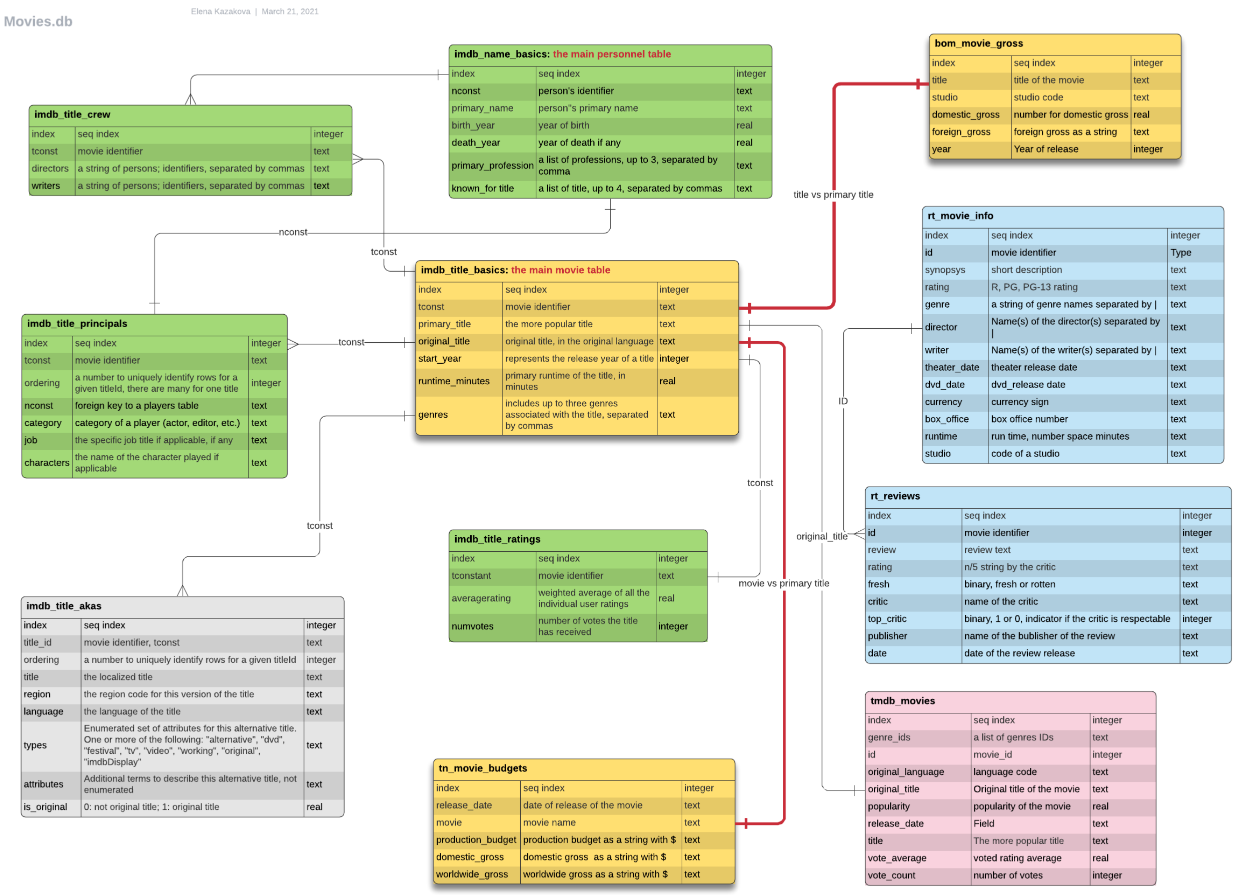


Movies.db

Elena Kazakova | March 21, 2021

imdb_name_basics: the main personnel table

index	seq index	integer
nconst	person's identifier	text
primary_name	person''s primary name	text
birth_year	year of birth	real
death_year	year of death if any	real
primary_profession	a list of professions, up to 3, separated by comma	text
known_for title	a list of title, up to 4, separated by commas	text

bom_movie_gross

index	seq index	integer
title	title of the movie	text
studio	studio code	text
domestic_gross	number for domestic gross	real
foreign_gross	foreign gross as a string	text
year	Year of release	integer

imdb_title_crew

index	seq index	integer
tconst	movie identifier	text
directors	a string of persons; identifiers, separated by commas	text
writers	a string of persons; identifiers, separated by commas	text

rt_movie_info

index	seq index	integer
id	movie identifier	Type
synopsys	short description	text
rating	R, PG, PG-13 rating	text
genre	a string of genre names separated by |	text
director	Name(s) of the director(s) separated by |	text
writer	Name(s) of the writer(s) separated by |	text
theater_date	theater release date	text
dvd_date	dvd_release date	text
currency	currency sign	text
box_office	box office number	text
runtime	run time, number space minutes	text
studio	code of a studio	text

imdb_title_basics: the main movie table

index	seq index	integer
tconst	movie identifier	text
primary_title	the more popular title	text
original_title	original title, in the original language	text
start_year	represents the release year of a title	integer
runtime_minutes	primary runtime of the title, in minutes	real
genres	includes up to three genres associated with the title, separated by commas	text

imdb_title_principals

index	seq index	integer
tconst	movie identifier	text
ordering	a number to uniquely identify rows for a given titleId, there are many for one title	integer
nconst	foreign key to a players table	text
category	category of a player (actor, editor, etc.)	text
job	the specific job title if applicable, if any	text
characters	the name of the character played if applicable	text

rt_reviews

index	seq index	integer
id	movie identifier	integer
review	review text	text
rating	n/5 string by the critic	text
fresh	binary, fresh or rotten	text
critic	name of the critic	text
top_critic	binary, 1 or 0, indicator if the critic is respectable	integer
publisher	name of the bublisher of the review	text
date	date of the review release	text

imdb_title_ratings

index	seq index	integer
tconstant	movie identifier	text
averagerating	weighted average of all the individual user ratings	real
numvotes	number of votes the title has received	integer

imdb_title_akas

index	seq index	integer
title_id	movie identifier, tconst	text
ordering	a number to uniquely identify rows for a given titleId	integer
title	the localized title	text
region	the region code for this version of the title	text
language	the language of the title	text
types	Enumerated set of attributes for this alternative title. One or more of the following: "alternative", "dvd", "festival", "tv", "video", "working", "original", "imdbDisplay"	text
attributes	Additional terms to describe this alternative title, not enumerated	text
is_original	0: not original title; 1: original title	real

tmdb_movies

index	seq index	integer
genre_ids	a list of genres IDs	text
id	movie_id	integer
original_language	language code	text
original_title	Original title of the movie	text
popularity	popularity of the movie	real
release_date	Field	text
title	The more popular title	text
vote_average	voted rating average	real
vote_count	number of votes	integer

tn_movie_budgets

index	seq index	integer
release_date	date of release of the movie	text
movie	movie name	text
production_budget	production budget as a string with $	text
domestic_gross	domestic gross as a string with $	text
worldwide_gross	worldwide gross as a string with $	text

- Data in the tables was reviewed for duplicates and NULL values. Where appropriate NULL values in categorical columns were replaced with a "Missing" category
- Date values in text format were converted by DateTime pandas method into separate columns (year, month, quarter)
- Records for movies released before 2010 and after 2019 were deleted

- Three tables with financial data, studio and genres data to be used in the analysis process were joined using movie titles and year of release.

Methods

TA descriptive analysis of the data was performed. The study was intended to answer four main questions:

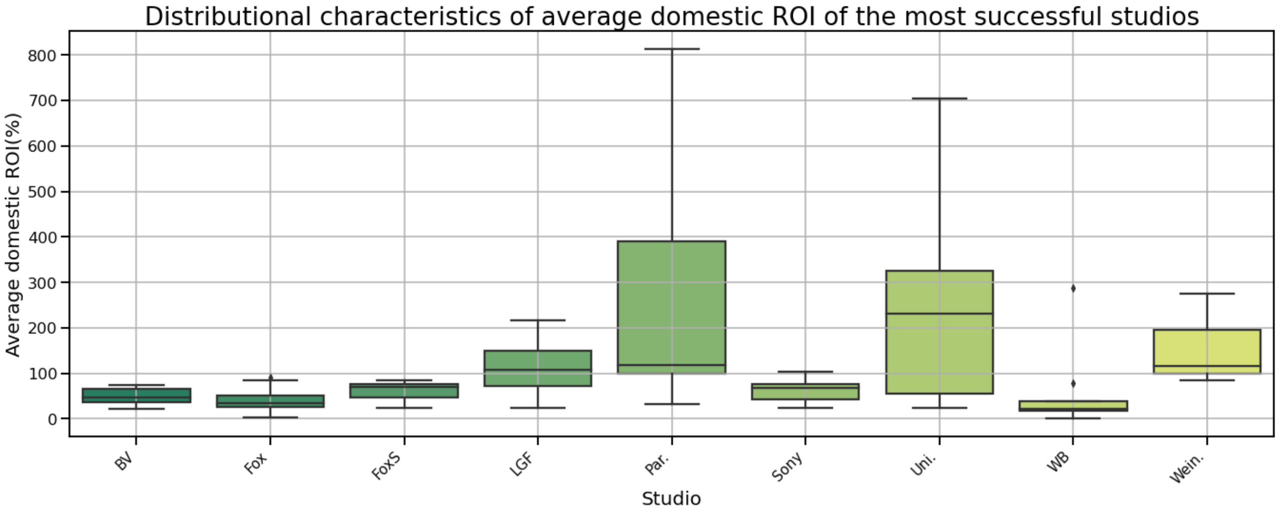
- What studios are most successful in the movie production business?
- Does the runtime of a movie affect the movie's profitability?
- How does the timing of a movie release affect its' profitability?
- What movie genres are most profitable considering Return of Investment measurement?

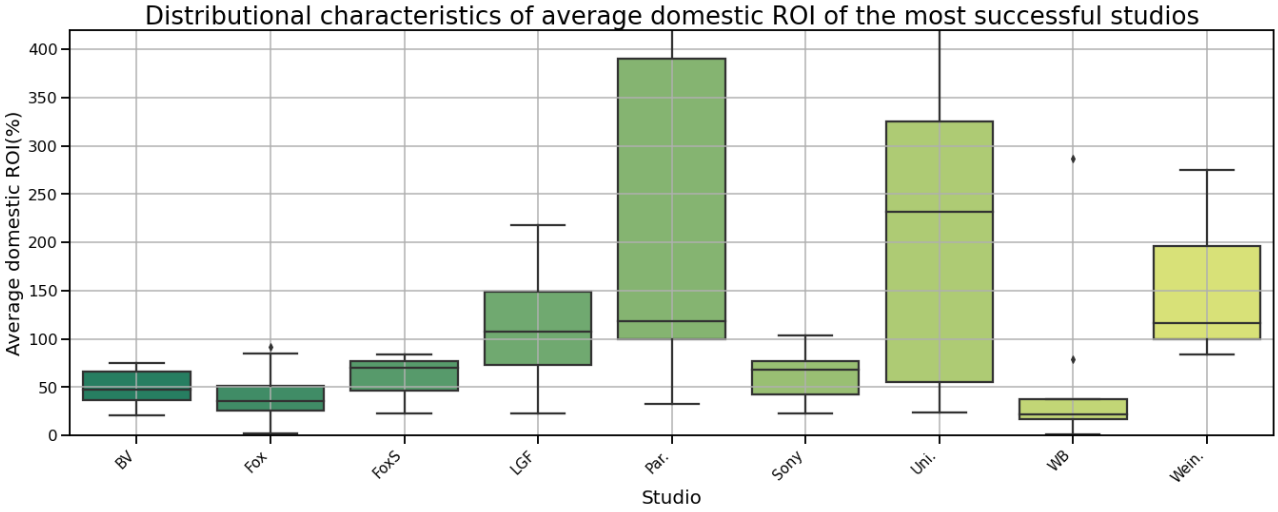
Results

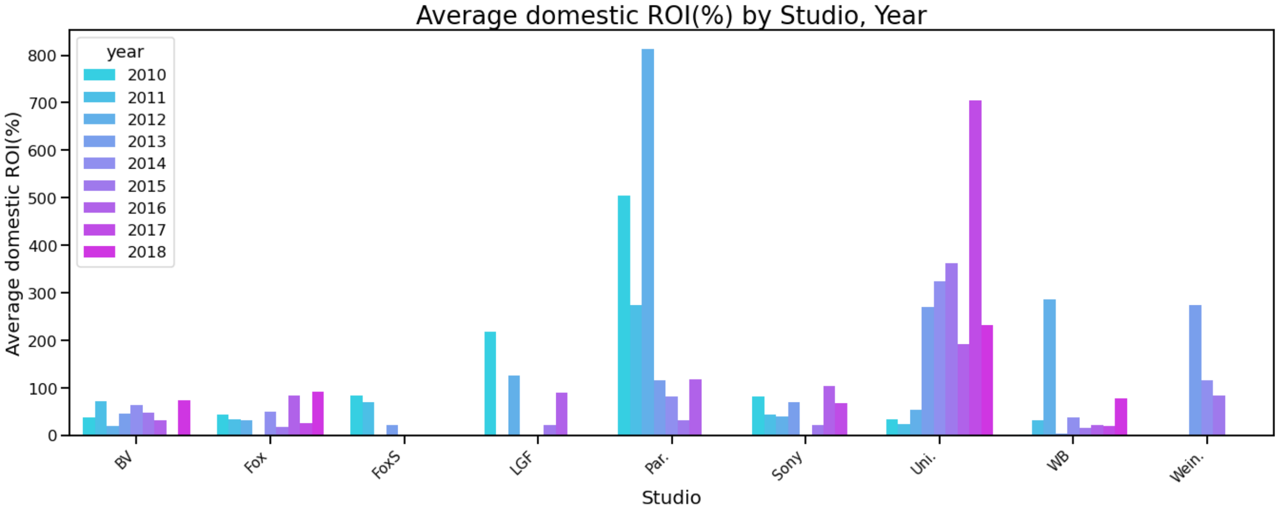
Descriptive analysis of studio profitability data

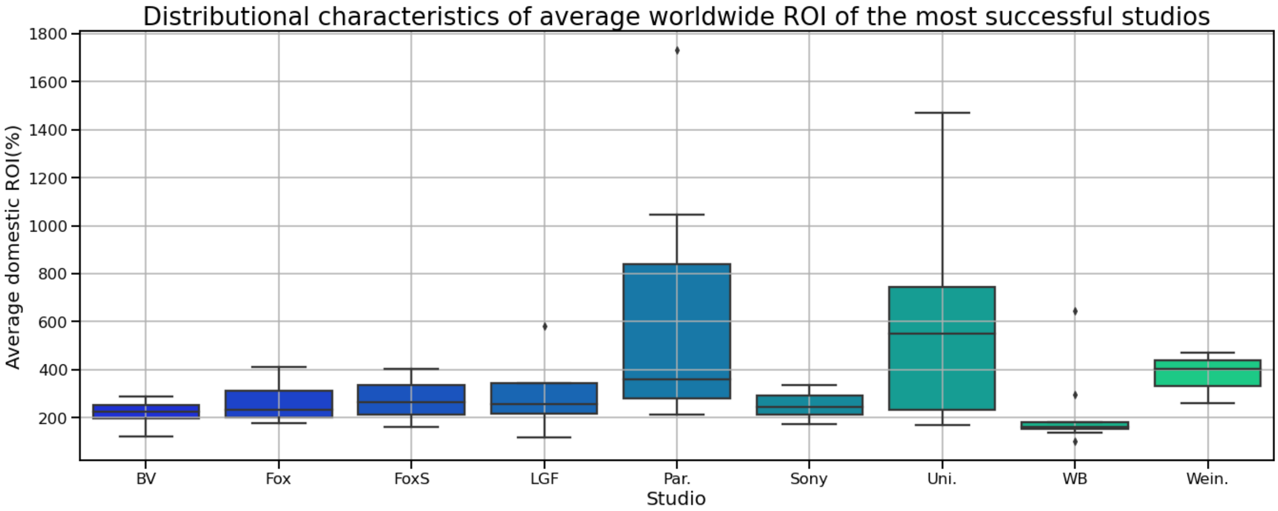
The results of the analysis for Domestic and Worldwide ROI of movies produced by different studios are as follows:

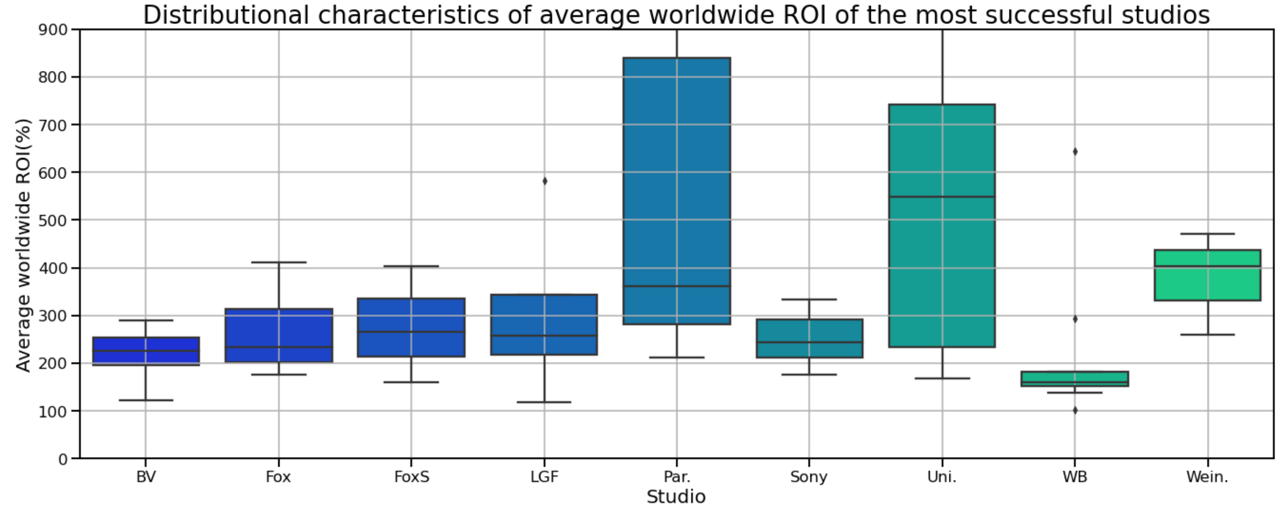
- Visualization of the results

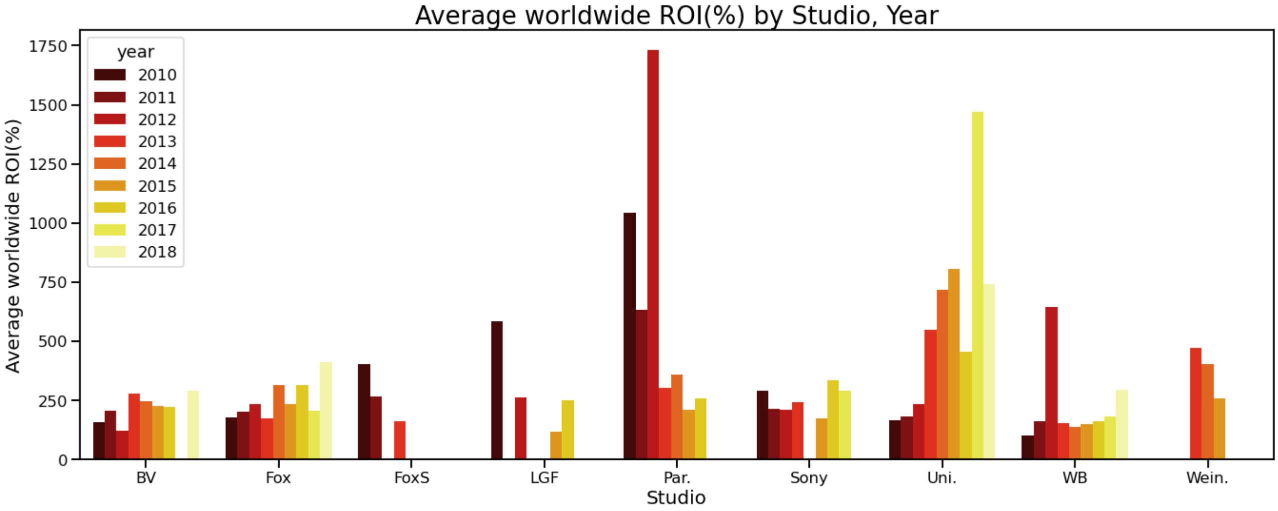












The visualized data indicates that

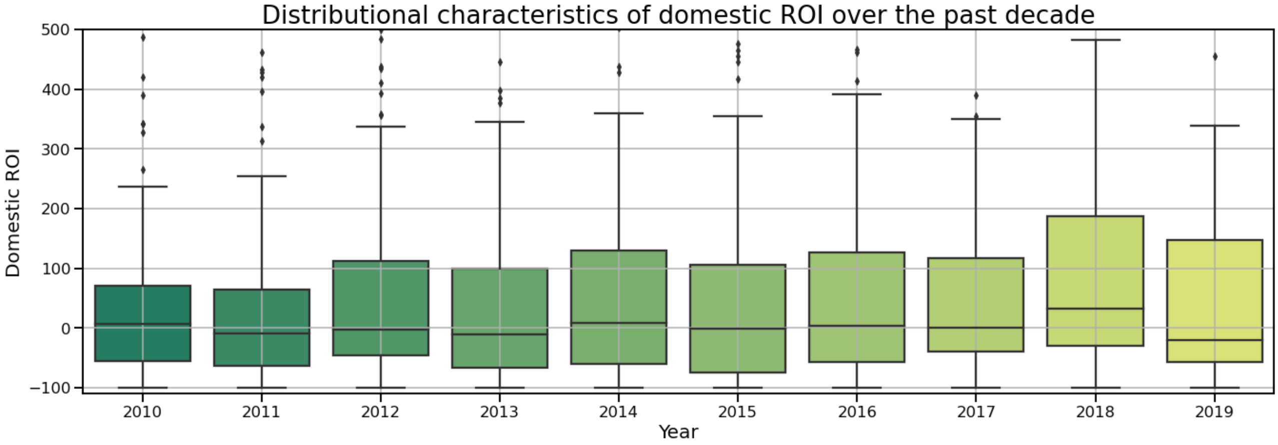
- Universal Studios, Paramount Pictures, The Weinstein Company, and Lions Gate Films Corporation studios (in that order) have been the most successful studios over the course of the last nine years. The median of the average domestic ROI for these studios is above 100 %, and lower and upper quartiles are between 50% and 400%, with wiskers of all four never going below the red line.
- The same tendencies can be observed in the analysis of movies' worldwide profitability by significant players in the industry. Universal Studios, Paramount Picture, The Weinstein Company, and Lions Gate

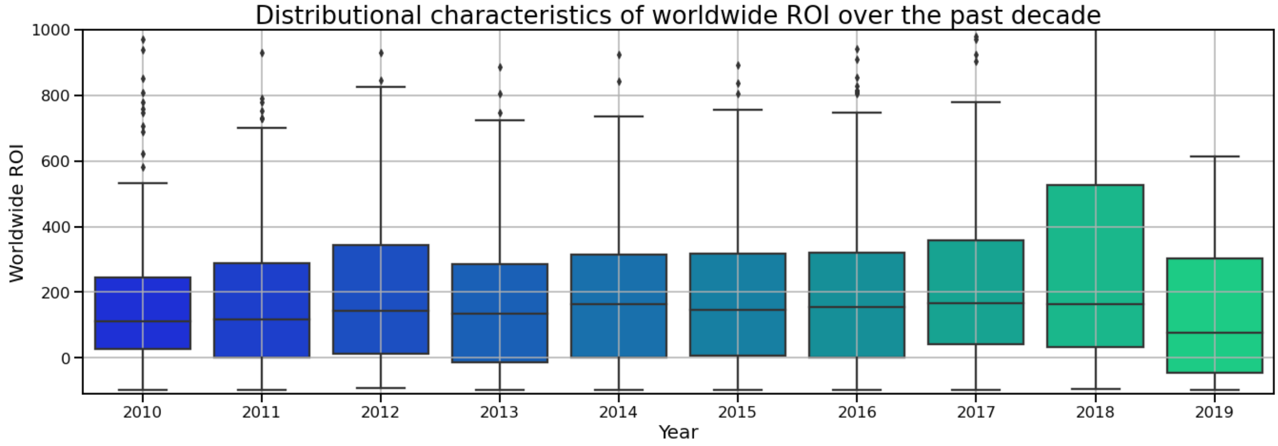
Films Corporation studios remain the most successful American studios globally. However, all of the studios under consideration maintained an average ROI above 100%.

ROI statistics evaluation

The results of the analysis of ROI statistical characteristics are as follows:

- Visualization of the results





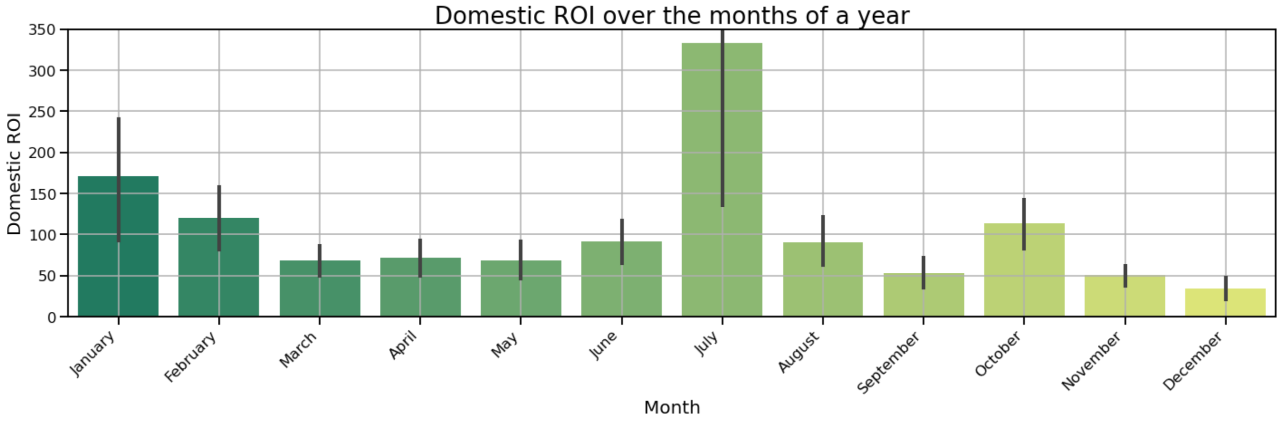
The visualized data indicates that

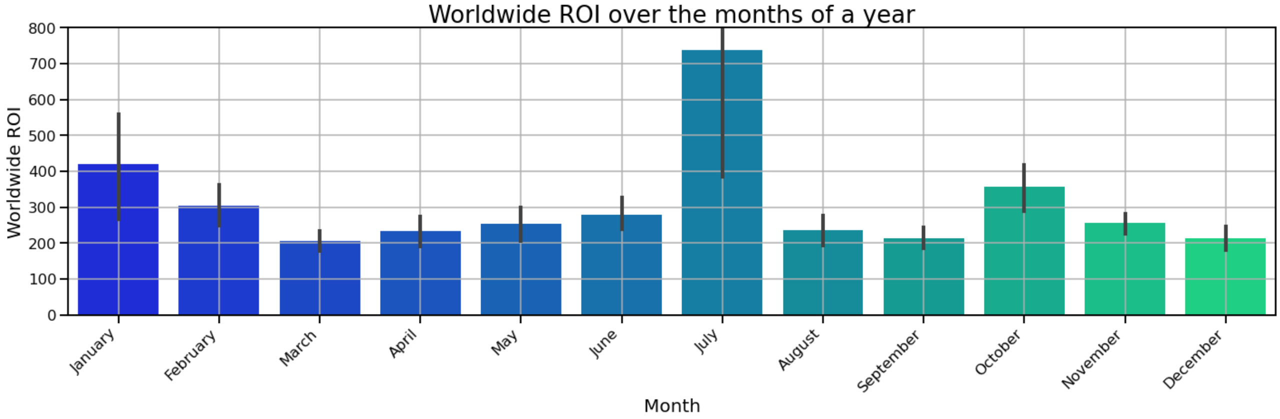
- Though the distribution of domestic ROI shows that the median of it over the years is remaining close to 0%, the overall tendency is shifted toward the upper quartile, and the mean is close to 100%. The distribution of worldwide ROI assures a more promising outcome for newcoming studios, with lower and upper quartiles above 0% and the mean of the distribution slightly above 300%.
- The customer should be advised to expand into foreign markets to increase their overall profit. Additional analysis is suggested for the most promising foreign markets.

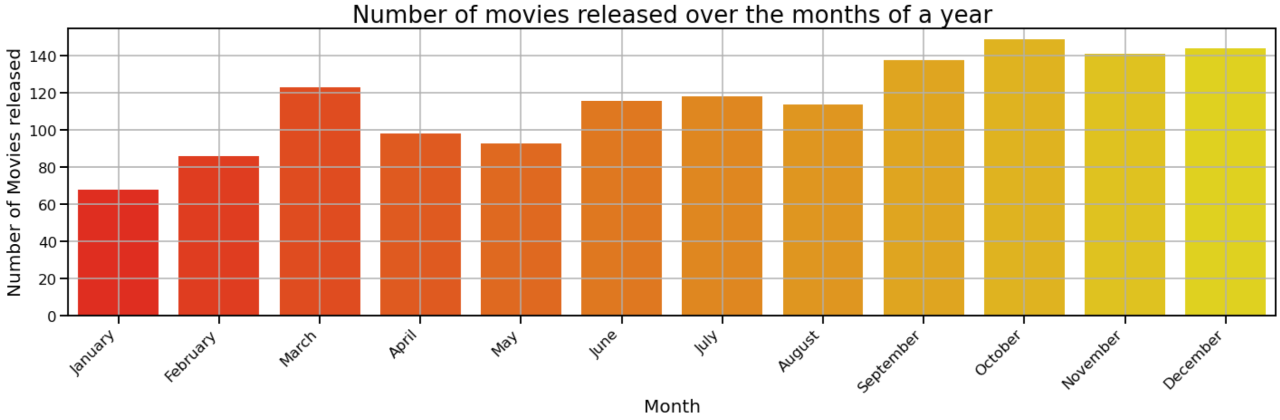
Descriptive analysis of month of release/ROI correlation

The results of the analysis are as follows:

- Visualization of the results

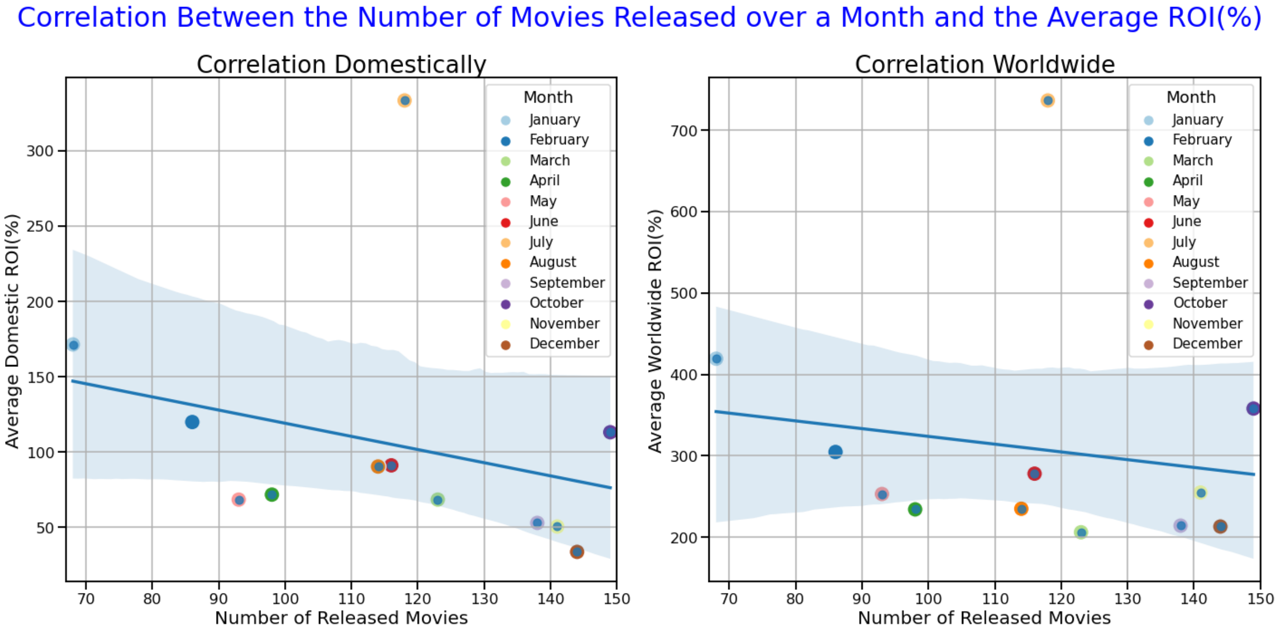






- The data above suggests a negative correlation between the number of the movies released and the ROI (domestic and worldwide), which might be related to the choice of released movies customers have in a particular month along with holidays and weather in each month.

- Visualization of the results of descriptive analysis of potential correlation is presented below



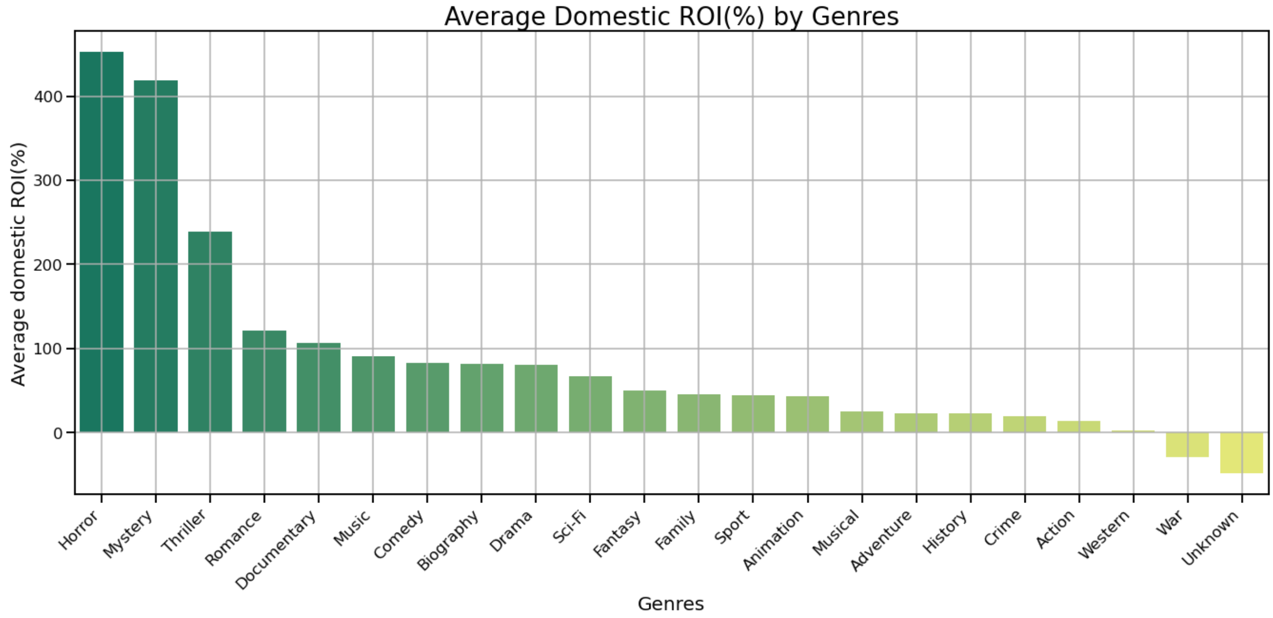
The visualized data indicates that

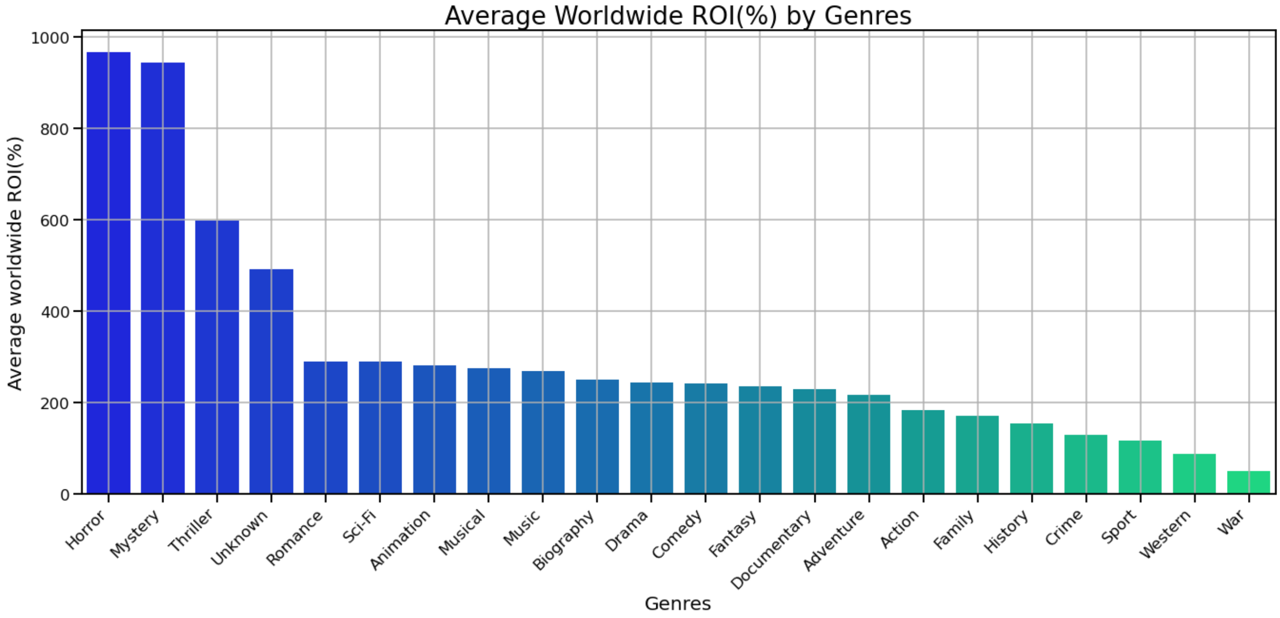
- The negative correlation between the number of movies released over a time period suggests that the customer should consider this factor when planning a movie release. The only exception is the month of July, an outlier among other months of a year. It seems that no matter how many movies are in the theaters, it will be more profitable than in other months of a year.

Descriptive analysis of genre effect on movies profitability

The results of the analysis are as follows:

- Visualization of the results





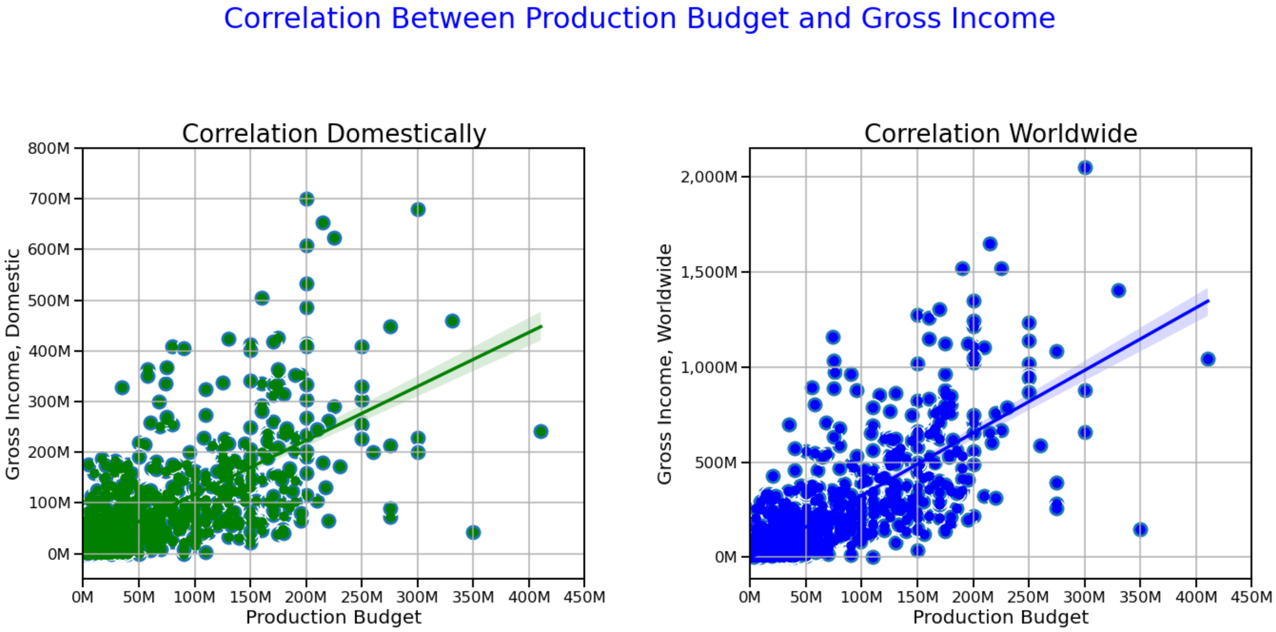
The visualized data indicates that

- The three most profitable genres are Horror, Mystery, and Thriller (in that order), both domestically and abroad. There is a strong presence on the second plot of the "Unknown" category of movies released internationally. That might be in part due to a practice of categorizing them abroad differently. It is just a guess, but given the significance of the difference, the issue should not be brushed aside but further investigated

Descriptive analysis of a size of production budget on gross income of a movie

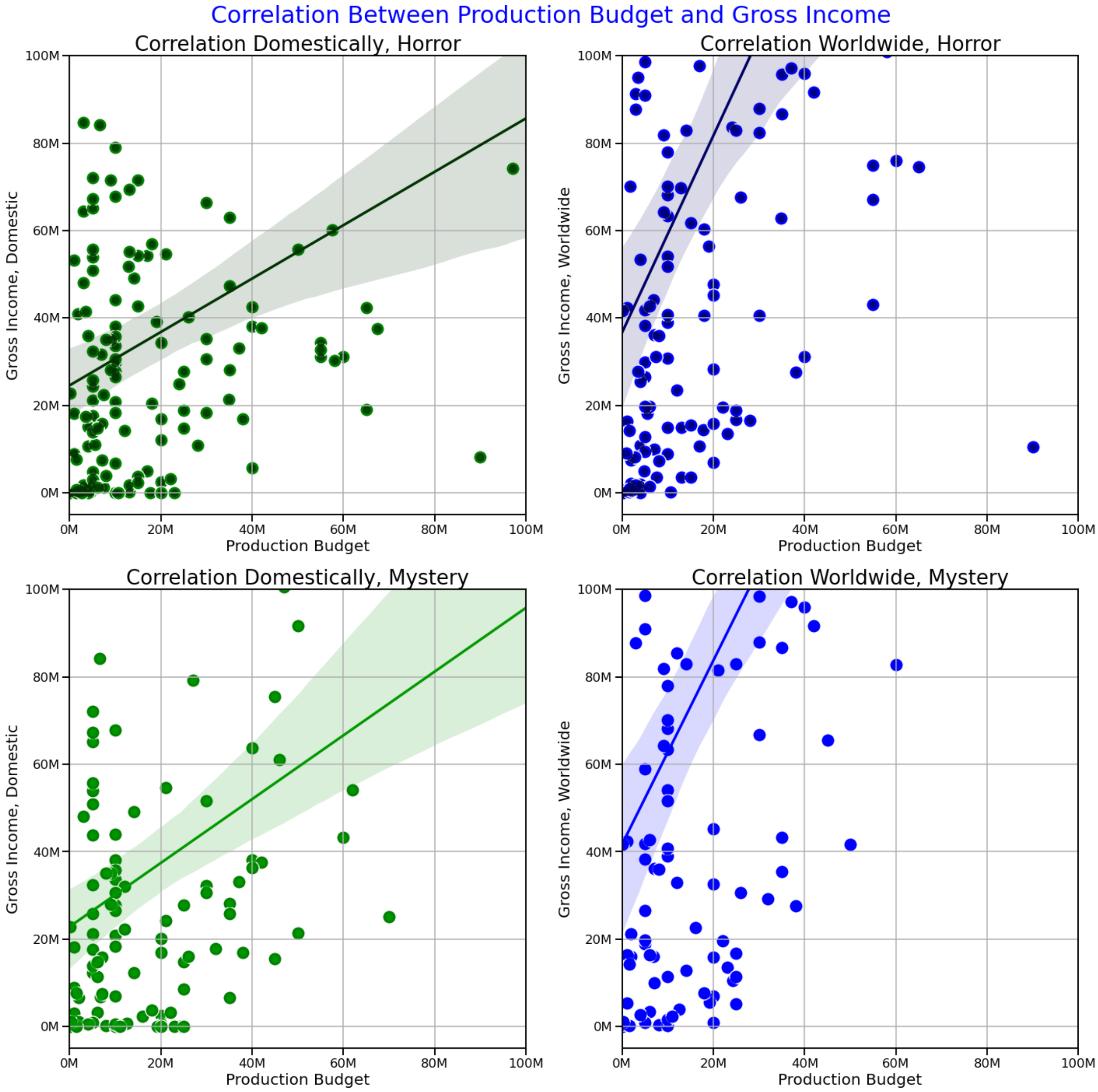
The results of the analysis are as follows:

- Visualization of the results



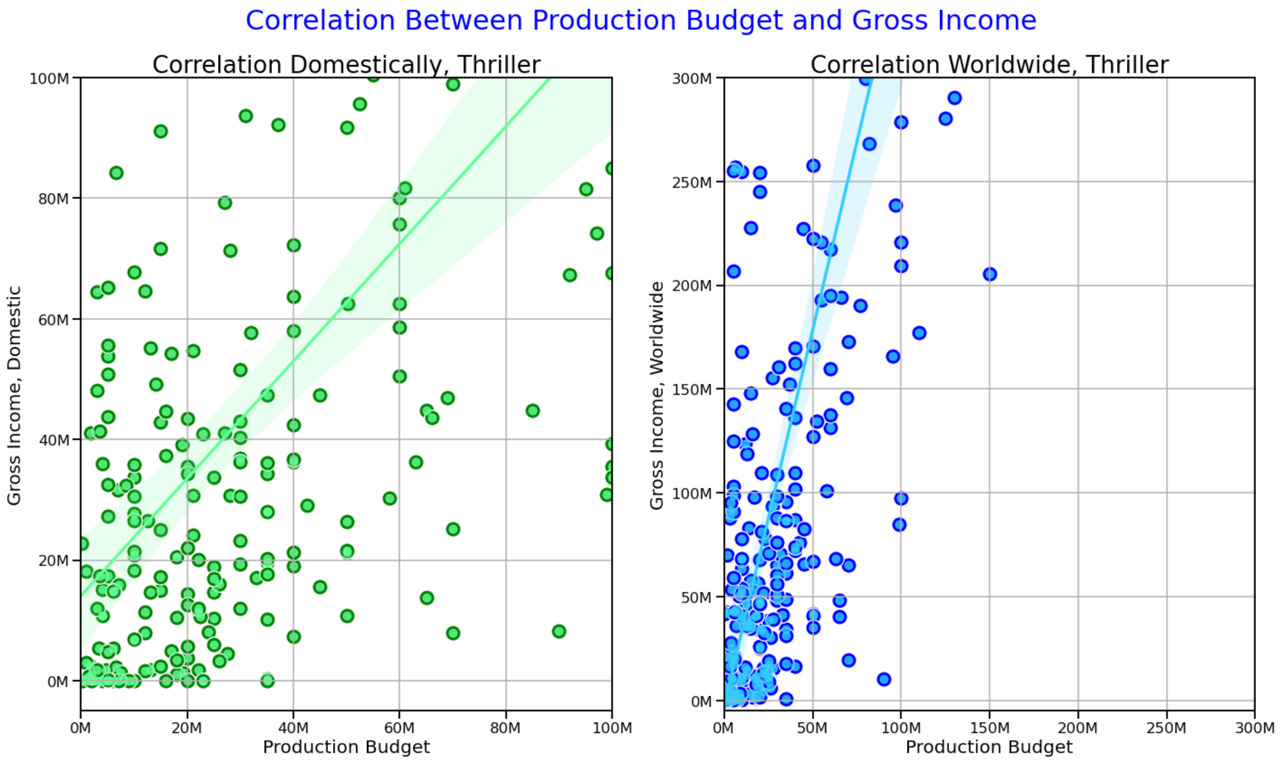
- The correlation between Gross Income and budget can be seen in the plots above. However, it might be too congested because the movies of different genres are combined in these plots. It is logical to assume that movies of different genres might have different budget needs. For example, horror movies are cheaper to produce, while sci-fi or action movies are pretty expensive. The next step is to put side by side the plotted correlations within all three genres that performed the best on their ROI (Horror, Mystery, Thriller), both domestically and abroad.

- Visualization of the results
  Horror and Mystery categories:



- One can expect a ratio between gross income and production for movies in Horror and Mystery categories with budgets of 20 million and lower close to 2.0 domestically and to 3 .5 internationally. However, as the budget grows, the return drops

- Visualization of the results
  Thriller category:



- Visual investigation of the plots above suggests that while Thriller movies do not perform entirely as well as horror and mystery movies domestically, i.e., the regression model indicates that 20 million investment would generate slightly above 30 million in gross income. Internationally, thriller movies tend to do much better, and an estimated average ratio of gross income to production budget ratio is about 3.5. The recommendation to the customer is to release a movie both domestically and internationally to maximize the return on investment.

- The conclusion is that Thriller movies' budgets should be higher than those of Horror and Mystery movies to generate higher Gross Income. The production of **several** Horror/Mystery movies might cost the same as the production of one Thriller movie to generate the same gross profit amount. However, production of several movies versus production of one might be a smart move because it increases the probability of success overall, "not putting all your eggs in one basket" approach.

Conclusions

The customer is advised:

- To either partner with Universal Studios, Paramount Pictures, The Weinstein Company, and Lions Gate Films Corporation studios (in that order) or invest in investigating their business practices and replicating them in their business.
- To carefully plan the timing of releasing their movies because ROI tends to be higher in the periods when fewer movies are available to the viewers. The only exception is the month of July, an outlier among other months of a year. It seems that no matter how many movies are in the theaters, it will be more profitable than in other months of a year.
- To invest in the three most profitable genres in terms of a return on investment, Horror, Mystery, and Thriller (in that order), both domestically and abroad. Their production budgets tend to be lower than movies in other genres, but the ratio between their gross incomes and the production costs is higher. In other words, it is more profitable to make many movies in these genres than just one movie in a genre

with higher production costs and higher one-movie gross income. These tactics have the additional benefit of minimizing the risk of investment.

Additional analysis suggested:

- Update data available for analysis by either creating APIs with the sources or webscraping their sites
- Investigate the effect of a choice of directors/writers on profitability of a movie using additional tables in the database
- Use Rotten Tomatoes tables to analyze the correlations between the profitability of a movie and its' critics rating and viewers' rating
- Replicate the analysis of this project using Rotten Tomatoes tables to confirm the findings

For More Information

Please review our full analysis in our Jupyter Notebook or our presentation.

For any additional questions, please contact **Elena Kazakova @ e.v.kazakova@gmail.com**

Repository Structure

```
├── README.md                                              <- The top-level README
for reviewers of this project
├── README.pdf                                             <- The top-level README
for reviewers of this project in PDF format
├── dsc_phase1_project_EVK_final.pdf                       <- Final Project
Jupyter notebook as a PDF file
├── dsc_phase1_project_EVK_final.ipynb                     <- Final Project
Jupyter notebook
├── dsc_phase1_project_EVK_final_backup_03282021.ipynb     <- The latest backup of
the notebook
├── DS_Phase1_Project_Presentation.pdf                     <- PDF version of
project presentation
├── Instructions.md                                        <- Flatiron
instructions for this project
├── repo.pdf                                               <- Github repo
structure image
├── data                                                   <- Contains 3
directory: zippedData, unzippedData and sqlite
├── old_files                                              <- Files not in use
├── zippedData                                             <- original zipped
files
└── images                                                 <- Both sourced
externally and generated from code
```