Final Project Submission

Please fill out:

- Student name: Andrew Levinton
- Student pace: part time
- Scheduled project review date/time: 11/28/2022
- Instructor name: Joe Comeaux
- Blog post URL: https://github.com/andrewkoji/Phase-1-Project---Movie-Analysis.git

Phase 1 Project

Business Problem

This project aims at finding the best movies to produce for Microsoft.

Overview

In this analysis, the following will be analyzed and used as measurements of success:

- Gross Profit
- Gross Revenue
- Net Profit
- Overalll rating
- Overall reviews

To observe these measurements and make conclusions, an exploratory data analysis will be done on the datasets imported below. The analysis will help to provide key insight on the most essential aspects that make a successful movie.

Importing libraries

In [49]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
%matplotlib inline
```

In [50]:
```
cd zippedData
```

```
C:\Users\alevi\Documents\Flatiron\dsc-data-science-env-config\Course_Folder\Phase_1\Phase_1_Project\Phase-1-Project---Movie-Analysis\zippedData
```

In [51]:
```
ls
```

```
 Volume in drive C is Windows
 Volume Serial Number is A24A-7E70

 Directory of C:\Users\alevi\Documents\Flatiron\dsc-data-science-env-config\Course_Folder\Phase_1\Phase_1_Project\Phase-1-Project---Movie-Analysis\zippedData
```

```
11/28/2022  04:42 PM    <DIR>          .
11/28/2022  07:30 PM    <DIR>          ..
11/22/2022  11:31 PM    <DIR>          .ipynb_checkpoints
11/28/2022  07:26 PM            34,071 Bar Chart Rev vs Rating.jpeg
11/28/2022  07:26 PM            50,148 Bar_chart_month_profit.jpeg
11/22/2022  11:28 PM            53,544 bom.movie_gross.csv.gz
11/28/2022  04:42 PM                 0 im.db
11/28/2022  07:26 PM            78,914 production_budget_vs_net_profit.jpeg
11/23/2022  03:57 PM            68,866 Profit_by_Genre.jpeg
11/28/2022  07:26 PM            80,086 Revenue by Genre.jpeg
11/28/2022  07:26 PM            55,692 Revenue by Month.jpeg
11/22/2022  11:28 PM           498,202 rt.movie_info.tsv.gz
11/22/2022  11:28 PM         3,402,194 rt.reviews.tsv.gz
11/22/2022  11:28 PM           827,840 tmdb.movies.csv.gz
11/22/2022  11:28 PM           153,218 tn.movie_budgets.csv.gz
              12 File(s)      5,302,775 bytes
               3 Dir(s)  67,778,834,432 bytes free
```

The Data

In [52]:
```
#The Movie DataBase
tmdb = pd.read_csv('tmdb.movies.csv.gz')

#Box Office Movies
bom = pd.read_csv('bom.movie_gross.csv.gz')

#Rotten Tomatoes Reviews
rt_reviews = pd.read_csv('rt.reviews.tsv.gz', sep='\t',encoding=('ISO-8859-1'),low_memo

#Rotten Tomatoes Movie Info
rt_info = pd.read_csv('rt.movie_info.tsv.gz', sep='\t')

#The Numbers Movie Budgets
budgets = pd.read_csv('tn.movie_budgets.csv.gz')
```

In [53]:
```
print(('Length of The Movie Database: {}'.format(len(tmdb))))
print('Length of Box Office Movies: {}'.format(len(bom)))
print('Length of Rotten Tomatoes Reviews: {}'.format(len(rt_reviews)))
print('Length of Rotten Tomatoes Movie Info: {}'.format(len(rt_info)))
print('Length of The Numbers Movie Budgets: {}'.format(len(budgets)))
```

```
Length of The Movie Database: 26517
Length of Box Office Movies: 3387
Length of Rotten Tomatoes Reviews: 54432
Length of Rotten Tomatoes Movie Info: 1560
Length of The Numbers Movie Budgets: 5782
```

The libraries above are the datasets that will be cleaned and analyzed for the analysis.

Getting Rating Data From Rotten Tomatoes

Cleaning the Review Data

Merging Tomato Data

In [54]:
```
rt = pd.merge(rt_reviews,rt_info,on='id')
```

In [55]:
```
print(len(rt_reviews))
print(len(rt_info))
print(len(rt))
```

```
54432
1560
54432
```

Getting Genre Data

In [56]:
```
# Dropping nulls from ratings and Genre
rt = rt[rt['rating_x'].notnull()]
rt = rt[rt['box_office'].notnull()]
#Changing box office revenue so it can be read numerically
rt['box_office'] = rt['box_office'].str.replace(',','').apply(lambda x: int(x))
#split the genre(eg. Action|Drama become -> [Action, Drama])
rt['genre'] = rt['genre'].str.split('|')
```

In [57]:
```
#explode genre column so each value within the list has its own row. this will make it
genre = rt.explode('genre')
#rename columns
genre = genre.rename(columns={'box_office':'box_office_revenue'})
genre = genre.rename(columns={'rating_x':'rating'})
```

In [58]:
```
len(genre)
```

Out[58]:
```
54672
```

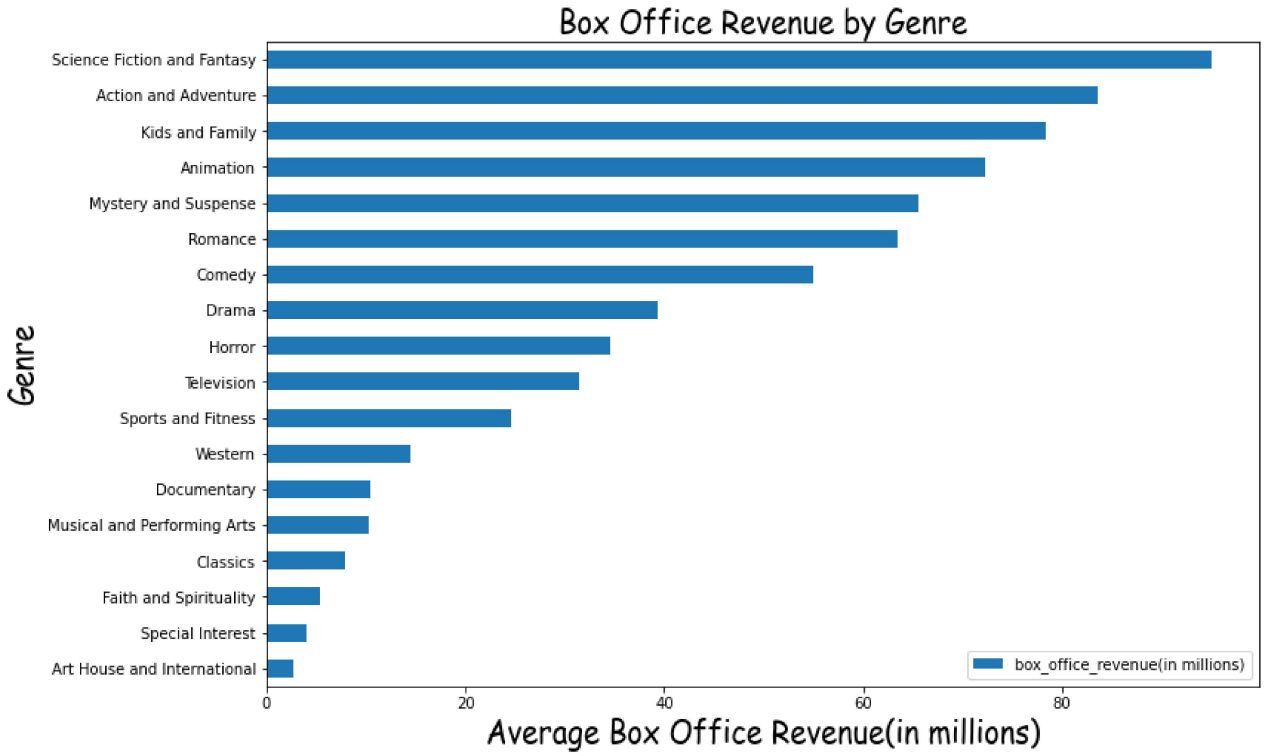
In [59]:
```
genre['year'] = genre['theater_date'].astype(str).apply(lambda x: x[-4:]).astype(float)
```

In [60]:
```
min(genre['year']), max(genre['year'])
```

Out[60]:
```
(1958.0, 2018.0)
```

Box Office Revenue by Genre

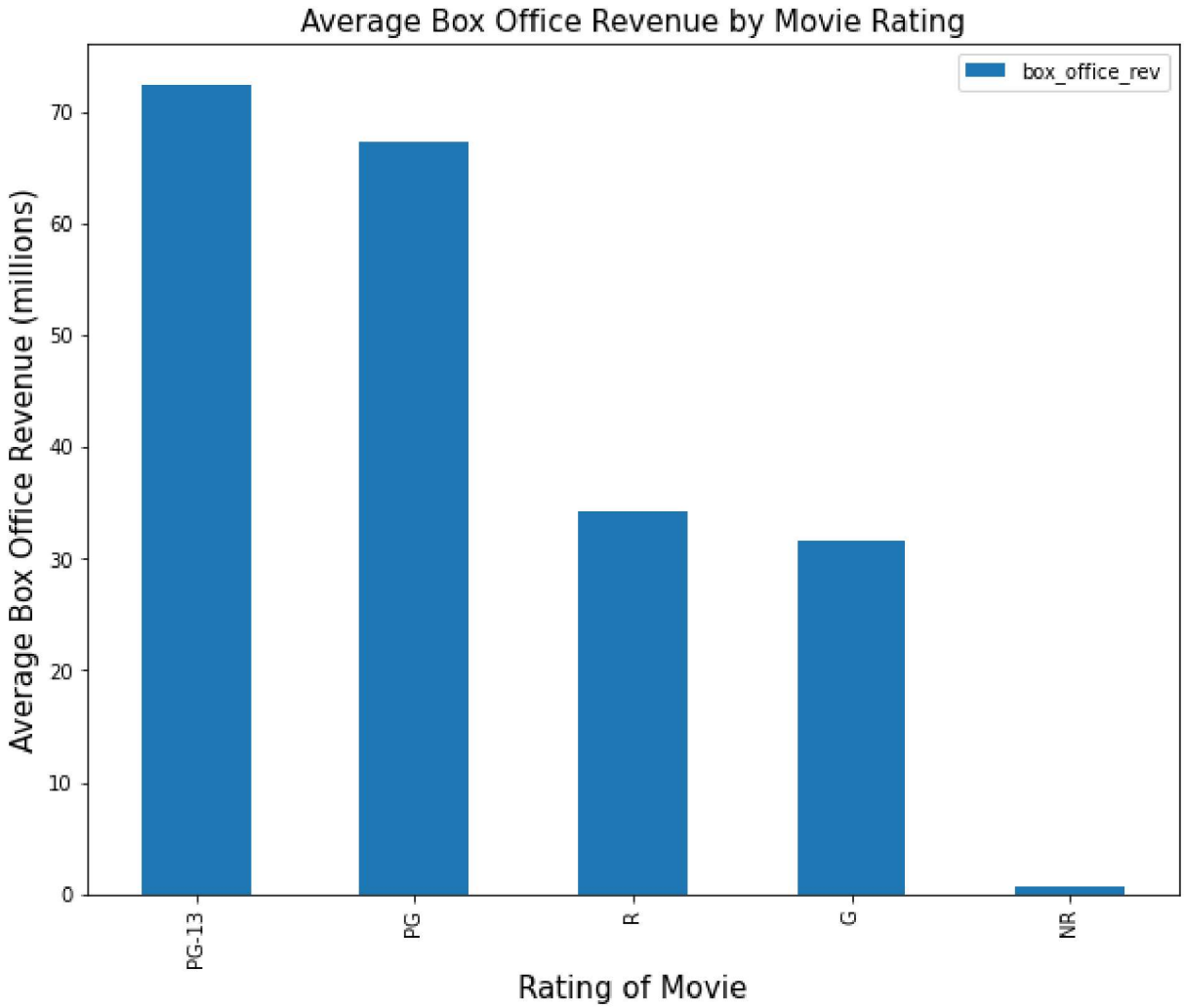
In [61]:
```
#format x-values
pd.set_option('display.float_format', lambda x: '%.3f' % x)
#define fonts that can be used for all the graphs
csfont = {'fontname':'Comic Sans MS'}
hfont = {'fontname':'Helvetica'}


#group by genre
genre_revenue = genre.groupby('genre')['box_office_revenue'].mean().reset_index()
#convert to millions
genre_revenue['box_office_revenue(in millions)'] = genre_revenue['box_office_revenue']

genre_revenue = genre_revenue.sort_values('box_office_revenue(in millions)')
#create bar graph of box office revenue by genre
genre_revenue.plot(x='genre',y='box_office_revenue(in millions)',kind='barh',figsize=(1
plt.title('Box Office Revenue by Genre', size=20, **csfont)
plt.xlabel('Average Box Office Revenue(in millions)',size=20, **csfont)
plt.ylabel('Genre',size=20,**csfont)
# plt.show()
plt.savefig("Revenue by Genre.jpeg",bbox_inches='tight') #save as jpg
```



In the graph above, it is shown that Science Fiction and Fantasy along with Action and Adventure appear to yield the highest average box office revenue, with Animation, Mystery/Suspense and Romance being the next top 3 performers. As animation improves with innovative technology, it is clear that the more popular movies does lead to a higher turnout at the box office as they are the genres that apply the most to the masses.

Which Movie Rating Attracts the Most Revenue?

In [62]:
```
#getting average revenue by rating
rating_movie = rt.groupby('rating_y')['box_office'].mean().reset_index()

#converting to millions
rating_movie['box_office_rev'] = rating_movie['box_office'] / 1000000

rating_movie = rating_movie.sort_values('box_office_rev', ascending=False)
#bar graph of movie rating vs the box office revenue
rating_movie.plot(x='rating_y',y='box_office_rev',kind='bar',figsize=(10,8))
plt.ylabel('Average Box Office Revenue (millions)',size=15)
plt.xlabel('Rating of Movie',size=15)
plt.title('Average Box Office Revenue by Movie Rating',size=15)
# plt.savefig('Bar Chart Rev vs Rating.jpeg')
plt.show()
```



In [ ]:

What are the top 10 directors in terms of box office revenue?

In [16]:
```
#using same method for genres to develop average revenue by director
directors = rt[['director','box_office']].drop_duplicates()

directors['director'] = directors['director'].str.split('|')
directors = directors.explode('director')
```

In [17]:
```
#top 10 directors by box office revenue
directors.sort_values('box_office', ascending=False).head(10)
```

Out[17]:

	director	box_office
26581	Mel Gibson	368000000
28440	Peter Jackson	303001229
39981	Sam Mendes	299300000
21985	Jay Roach	279167575
36952	Chris Columbus	261835892

	director	box_office
16183	Joel Zwick	241250669
20799	Steven Spielberg	234141872
50317	Peter Berg	227946274
45878	Justin Lin	209805005
41852	Andy Tennant	177575142

Average Rating by Genre

In [18]:
```
#import review data
rt_reviews = pd.read_csv('rt.reviews.tsv.gz', sep='\t',encoding=('ISO-8859-1'),low_memo

#filter by top critics
rt_reviews = rt_reviews[rt_reviews['top_critic'] == 1]

#change all "Letter Grade" ratings to a %
rt_reviews['rating'] = rt_reviews['rating'].astype(str)
rt_reviews['rating'] = rt_reviews['rating'].apply(lambda x:\
                                                  '100' if 'A+' in x\
                                                  else '98' if 'A' in x\
                                                  else '95' if 'A-' in x\
                                                  else '88' if 'B+' in x\
                                                  else '85' if 'B' in x\
                                                  else '80' if 'B-' in x\
                                                  else '78' if 'C+' in x\
                                                  else '75' if 'C' in x\
                                                  else '70' if 'C-' in x\
                                                  else '68' if 'D+' in x\
                                                  else '65' if 'D' in x\
                                                  else '60' if 'D-' in x\
                                                  else '50' if 'F' in x\
                                                  else '45' if 'N' in x\
                                                  else '40' if 'R' in x else x)
#change all "fractional" reviews to %
rt_reviews['rating'] = rt_reviews['rating'].str.split('/').apply(lambda x: (float(x[0])
                                                  if (len(x) > 1 and float(x[1]) != 0)\
                                                  else float(x[0]))
#some reviews were over 100% because te reviews had improper fractions(eg. 2.1/2). They
rt_reviews['rating'] = rt_reviews['rating'].apply(lambda x: 100 if x > 100 else x)
rt_reviews = rt_reviews.sort_values('rating', ascending=False)
```

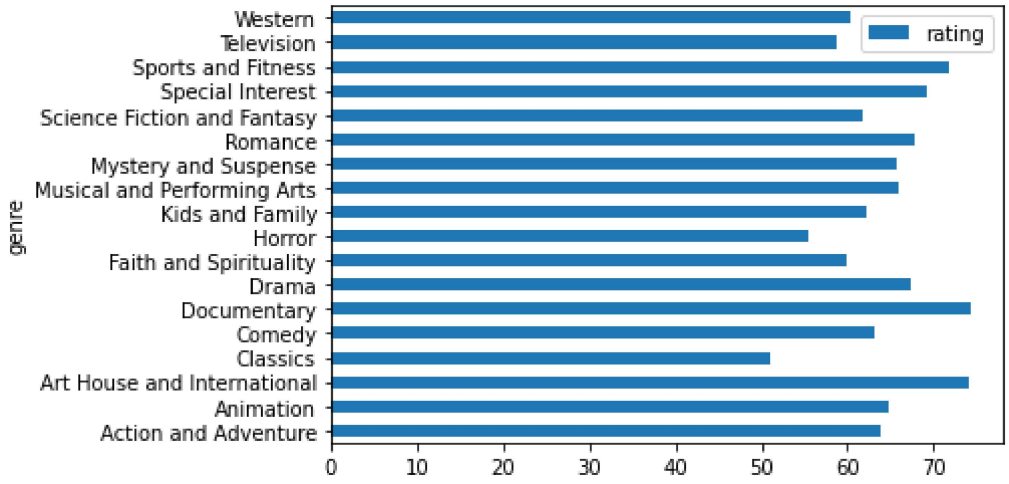
In [19]:
```
merged = pd.merge(rt_reviews,rt_info,on='id')
```

In [20]:
```
# Dropping nulls from ratings and Genre
merged = merged[merged['rating_x'].notnull()]
merged = merged[merged['box_office'].notnull()]
#Changing box office revenue so it can be read numerically
merged['box_office'] = merged['box_office'].str.replace(',','').apply(lambda x: int(x))
#split the genre(eg. Action|Drama become -> [Action, Drama])
merged['genre'] = merged['genre'].str.split('|')
```

In [21]:
```
#explode genre column so each value within the list has its own row. this will make it
genre = merged.explode('genre')
```

```
#rename columns
genre = genre.rename(columns={'box_office':'box_office_revenue'})
genre = genre.rename(columns={'rating_x':'rating'})
```

In [22]:
```
genre_rating = genre.groupby('genre')['rating'].mean().reset_index()
ax = genre_rating.plot(x='genre',y='rating',kind='barh')
plt.show()
```



As shown above, there is no conclusive genre that yields a significantly higher rating. My advice on this front would be to simply not consider reviews when picking a genre.

Box Office Revenue by month

In [23]:
```
#stripping month number from dates
rt['release_month'] = rt['theater_date'].astype(str).apply(lambda x: x[0:3])
```

In [24]:
```
#group by month
monthly = rt.groupby('release_month')['box_office'].mean().reset_index()
```

In [25]:
```
monthly = monthly[0:12]
```

In [26]:
```
#function to format month name
monthly['release_month'] = monthly['release_month'].apply(lambda x: 'January' if x=='Ja
                                                          else 'February' if x=='Feb'\
                                                          else 'March' if x=='Mar'\
                                                          else 'April' if x=='Apr'\
                                                          else 'May' if x=='May'\
                                                          else 'June' if x=='Jun'\
                                                          else 'July' if x=='Jul'\
                                                          else 'August' if x=='Aug'\
                                                          else 'September' if x=='Sep'\
                                                          else 'October' if x=='Oct'\
                                                          else 'November' if x=='Nov'\
                                                          else 'December' if x=='Dec'\
                                                          else x)
```

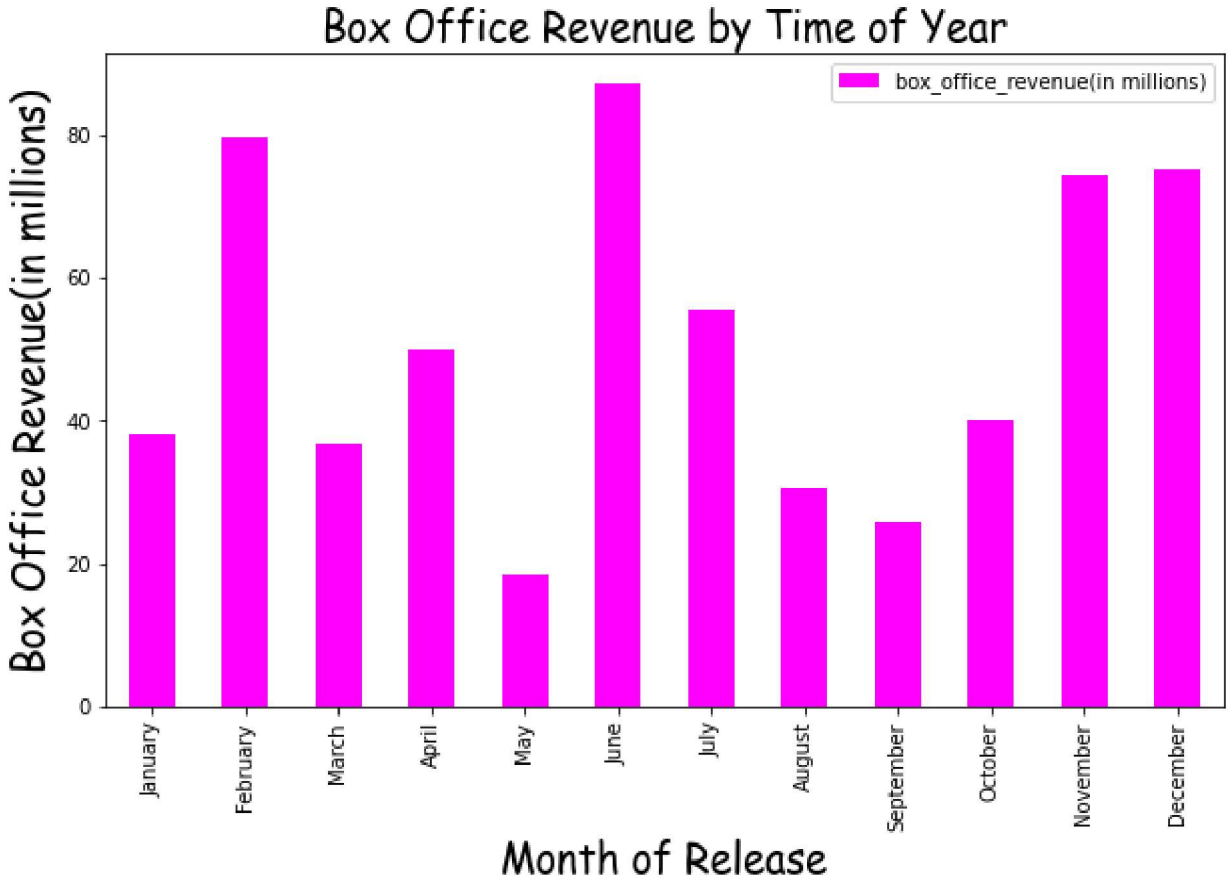
In [27]:
```
#assigning number to each month to order them
monthly['month_no'] = monthly['release_month'].apply(lambda x: 1 if x=='January'\
                                                          else 2 if x=='February'\
                                                          else 3 if x=='March'\
                                                          else 4 if x=='April'\
```

```
                                                    else 5 if x=='May'\
                                                    else 6 if x=='June'\
                                                    else 7 if x=='July'\
                                                    else 8 if x=='August'\
                                                    else 9 if x=='September'\
                                                    else 10 if x=='October'\
                                                    else 11 if x=='November'\
                                                    else 12 if x=='December'\
                                                    else x)
```

In [28]:

```
#sort dataframe by month
monthly = monthly.sort_values('month_no')
#convert to millions
monthly['box_office_revenue(in millions)'] = monthly['box_office'] / 1000000


#create graph of box office revenue by month
monthly.plot(x='release_month',y='box_office_revenue(in millions)',kind='bar',color='ma

plt.title('Box Office Revenue by Time of Year', size=20, **csfont)
plt.ylabel('Box Office Revenue(in millions)',size=20, **csfont)
plt.xlabel('Month of Release',size=20,**csfont)
# plt.show()
plt.savefig("Revenue by Month.jpeg",bbox_inches='tight') #save as jpg


print('The chart shows more significant revenue during the months of November and Decem
```

```
The chart shows more significant revenue during the months of November and December, as
well as June and also February. What is surprising is the revenue during May, which is e
xpected to be higher due to "Star Wars Day" on May 4th.
```



The chart shows more significant revenue during the months of November and December, as well as June and also February. What is surprising is the revenue during May, which is expected to be higher due to "Star Wars Day" on May 4th.

Using Budgets Dataframe to check profit

In [29]:
```
budgets['year'] = budgets['release_date'].astype(str).apply(lambda x: x[-4:]).astype(in
```

In [30]:
```
min(budgets['year']), max(budgets['year'])
```

Out[30]:
```
(1915, 2020)
```

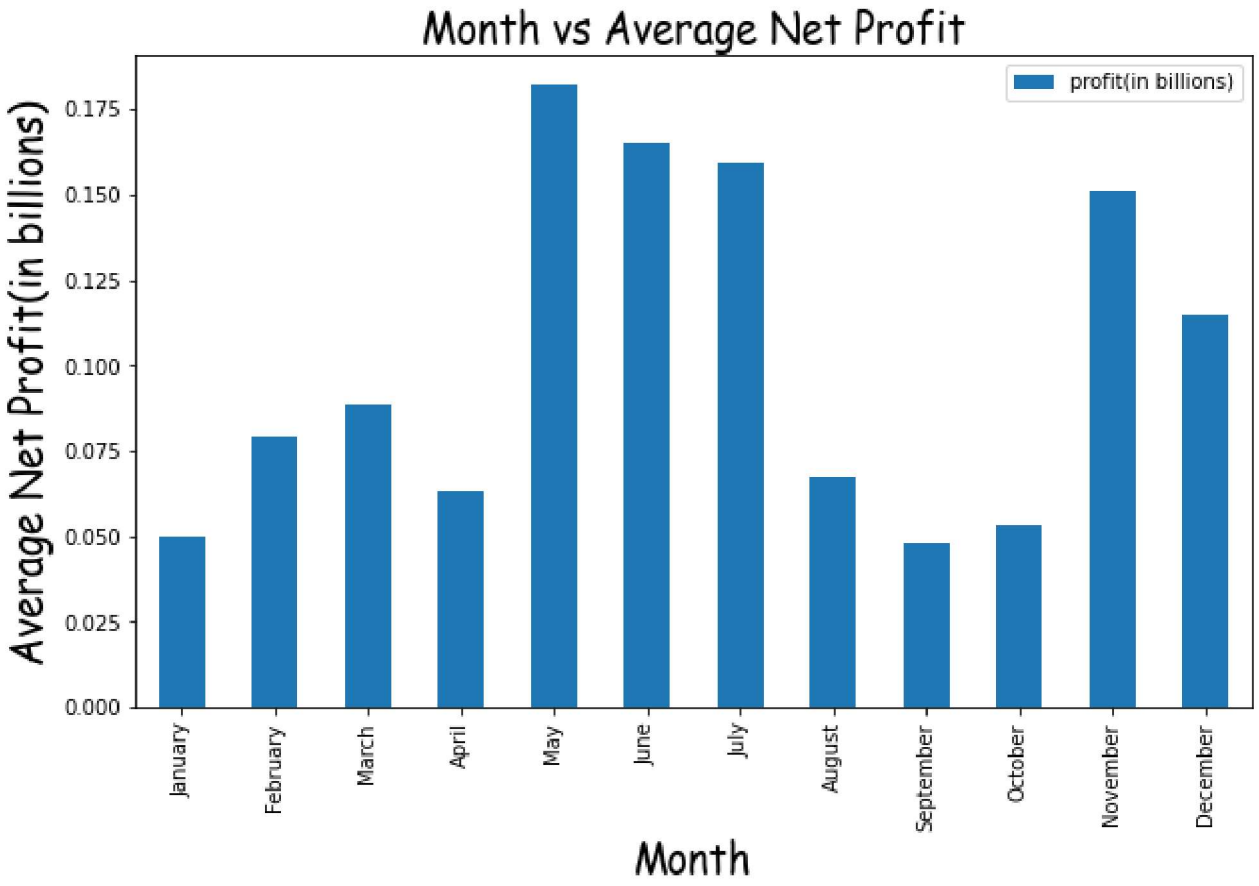
In [31]:
```
budgets = pd.read_csv('tn.movie_budgets.csv.gz')

#formatting 'gross' strings and the production budget so they can be converted to numer
budgets['domestic_gross'] = budgets['domestic_gross'].str.replace("$","").str.replace("
budgets['worldwide_gross'] = budgets['worldwide_gross'].str.replace("$","").str.replace
budgets['production_budget'] = budgets['production_budget'].str.replace("$","").str.rep

#calculating the total gross
budgets['total_gross'] = budgets['domestic_gross'] + budgets['worldwide_gross']

#converting to billions
budgets['profit(in billions)'] = (budgets['total_gross'] - budgets['production_budget']

#slicing month number
budgets['month'] = budgets['release_date'].apply(lambda x: x[0:3])
#slicing year number
budgets['year'] = budgets['release_date'].apply(lambda x: x[-4:])


#formatting month names
budgets['month'] = budgets['month'].apply(lambda x: 'January' if x=='Jan'\
                                                  else 'February' if x=='Feb'\
                                                  else 'March' if x=='Mar'\
                                                  else 'April' if x=='Apr'\
                                                  else 'May' if x=='May'\
                                                  else 'June' if x=='Jun'\
                                                  else 'July' if x=='Jul'\
                                                  else 'August' if x=='Aug'\
                                                  else 'September' if x=='Sep'\
                                                  else 'October' if x=='Oct'\
                                                  else 'November' if x=='Nov'\
                                                  else 'December' if x=='Dec'\
                                                  else x)

#quick reformat to make nicer names to plot
budgets['budget'] = budgets['production_budget'] / 1000000000
budgets['profit'] = budgets['profit(in billions)']
budgets['total_gross(in billions)'] = budgets['total_gross']  / 1000000000
budgets['% of budget'] = (budgets['profit'] / budgets['budget'])*100
```

In [32]:
```
#grouping dataframe by month and average profit per month
monthly = budgets.groupby('month')['profit(in billions)'].mean().reset_index()

#assigning month number to sort the months
```

```
monthly['month_no'] = monthly['month'].apply(lambda x: 1 if x=='January'\
                                                    else 2 if x=='February'\
                                                    else 3 if x=='March'\
                                                    else 4 if x=='April'\
                                                    else 5 if x=='May'\
                                                    else 6 if x=='June'\
                                                    else 7 if x=='July'\
                                                    else 8 if x=='August'\
                                                    else 9 if x=='September'\
                                                    else 10 if x=='October'\
                                                    else 11 if x=='November'\
                                                    else 12 if x=='December'\
                                                    else x)

#sort by month number
monthly = monthly.sort_values('month_no')
```

In [33]:

```
#create bar chart for average profit by month
monthly.plot(x='month',y='profit(in billions)', kind='bar',figsize=(10,6))
plt.title('Month vs Average Net Profit', size=20, **csfont)
plt.ylabel('Average Net Profit(in billions)',size=20, **csfont)
plt.xlabel('Month',size=20,**csfont)
plt.savefig("Bar_chart_month_profit.jpeg",bbox_inches='tight') #save as jpg
```

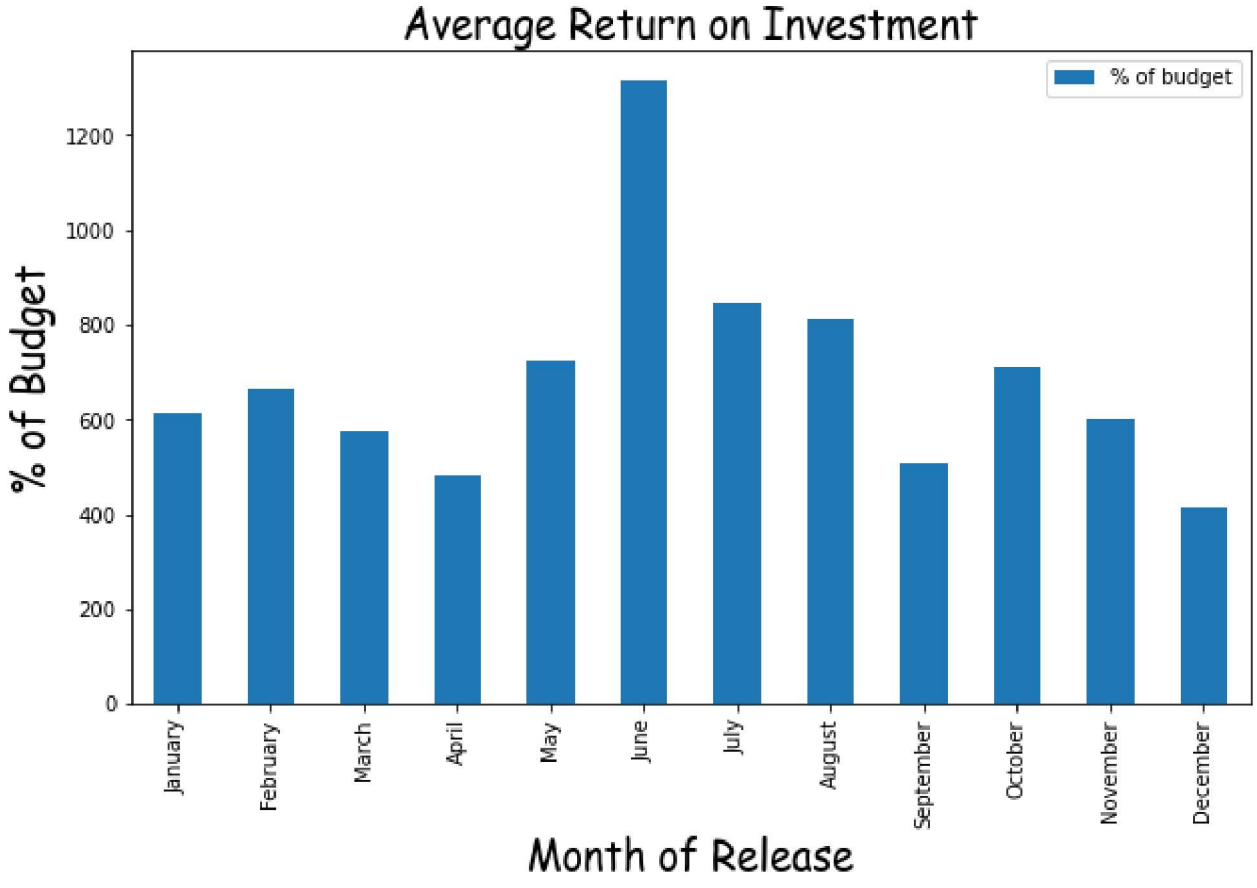


In [34]:

```
#create bar chart for average profit by month
#assigning month number to sort the months
monthly_per = budgets.groupby('month')['% of budget'].mean().reset_index()

monthly_per['month_no'] = monthly_per['month'].apply(lambda x: 1 if x=='January'\
                                                    else 2 if x=='February'\
                                                    else 3 if x=='March'\
```

```
                                                    else 4 if x=='April'\
                                                    else 5 if x=='May'\
                                                    else 6 if x=='June'\
                                                    else 7 if x=='July'\
                                                    else 8 if x=='August'\
                                                    else 9 if x=='September'\
                                                    else 10 if x=='October'\
                                                    else 11 if x=='November'\
                                                    else 12 if x=='December'\
                                                    else x)
monthly_per = monthly_per.sort_values('month_no')

monthly_per.plot(x='month',y='% of budget', kind='bar',figsize=(10,6))
plt.title('Average Return on Investment', size=20, **csfont)
plt.ylabel('% of Budget',size=20, **csfont)
plt.xlabel('Month of Release',size=20,**csfont)
plt.savefig("Bar_chart_month_profit.jpeg",bbox_inches='tight') #save as jpg

print('As shown in the chart below, the average return on the movies budget by month te
```

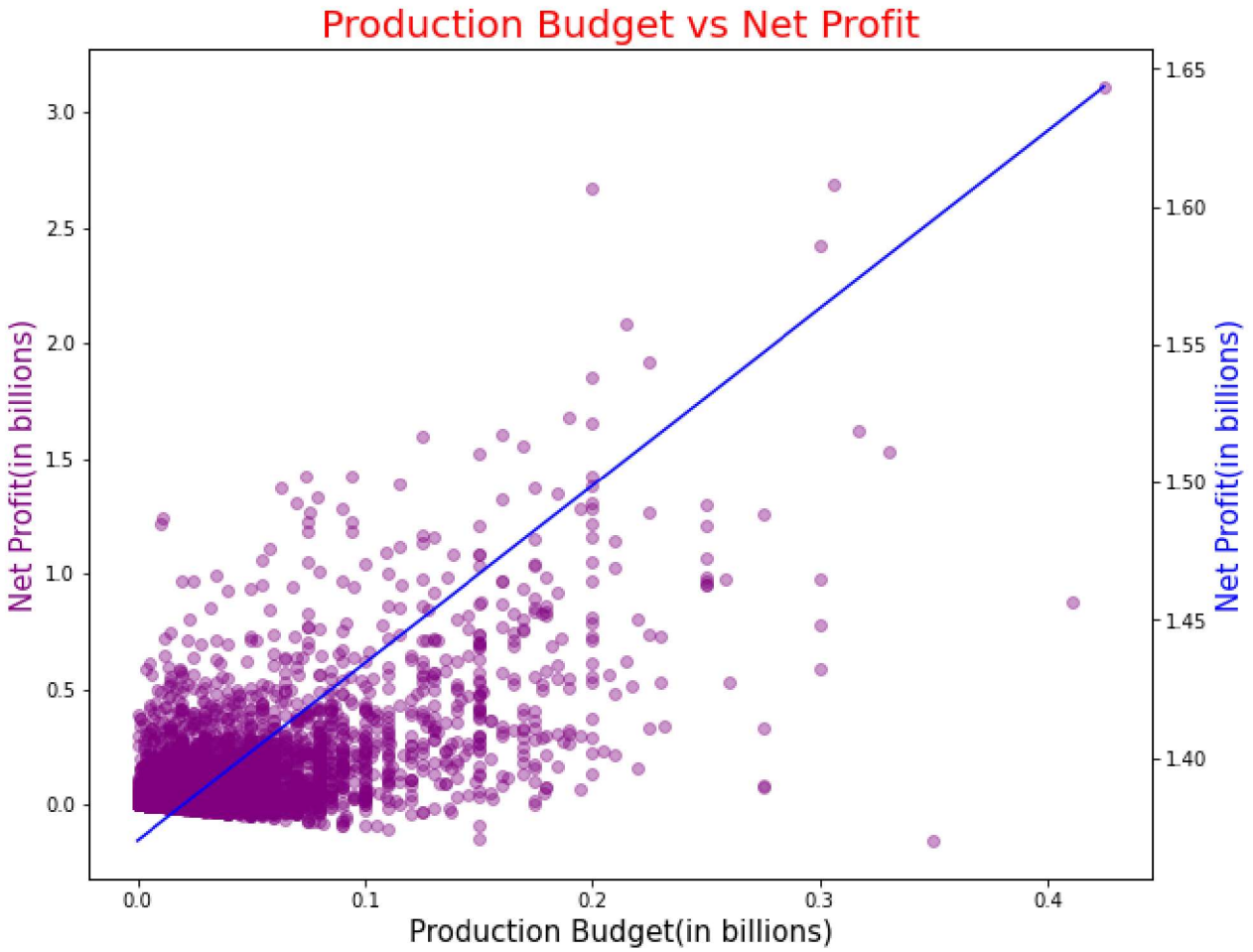
```
As shown in the chart below, the average return on the movies budget by month tells a di
fferent story compared to the       average profit. This metric is a normalized way to l
ook at success of the movie. The return on budget is shown to be fairly consistent by mo
nth other than the month of June, which is a summer month(historically a good season for
movies).
```



In [ ]:

If you have a larger budget, will that lead to a higher profit?

In [35]:
```
#scatter plot of budget vs net profit

m = budgets['budget'].corr(budgets['profit'])
b = 1.37
net_profit_reg = m * budgets['budget'] + b
fig, ax1 = plt.subplots(figsize=(10,8))

ax2 = ax1.twinx()
ax1.scatter(x=budgets['budget'], y=budgets['profit'], color='purple',alpha=0.4)
ax2.plot(budgets['budget'], net_profit_reg, 'b-')
ax1.set_title('Production Budget vs Net Profit',size=20,color='r')
ax1.set_xlabel('Production Budget(in billions)',size=15)
ax1.set_ylabel('Net Profit(in billions)', color='purple',size=15)
ax2.set_ylabel('Net Profit(in billions)', color='b',size=15)

## Correlation coefficient - line of regression
budget_profit_corr = budgets['budget'].corr(budgets['profit'])


plt.show()

print("The Correlation Coefficient is: {}.This is a sign that the budget has a positive
 weak correlation to     profit of the film. With a weak correlation, it makes sense to
 keeping the budget low as it is where the highest \
          concentration of the data is.".format(budget_profit_corr))
```




```
The Correlation Coefficient is: 0.643579874967001.This is a sign that the budget has a p
ositive, but weak correlation to     profit of the film. With a weak correlation, it mak
es sense to try keeping the budget low as it is where the highest           concentrati
on of the data is.
```

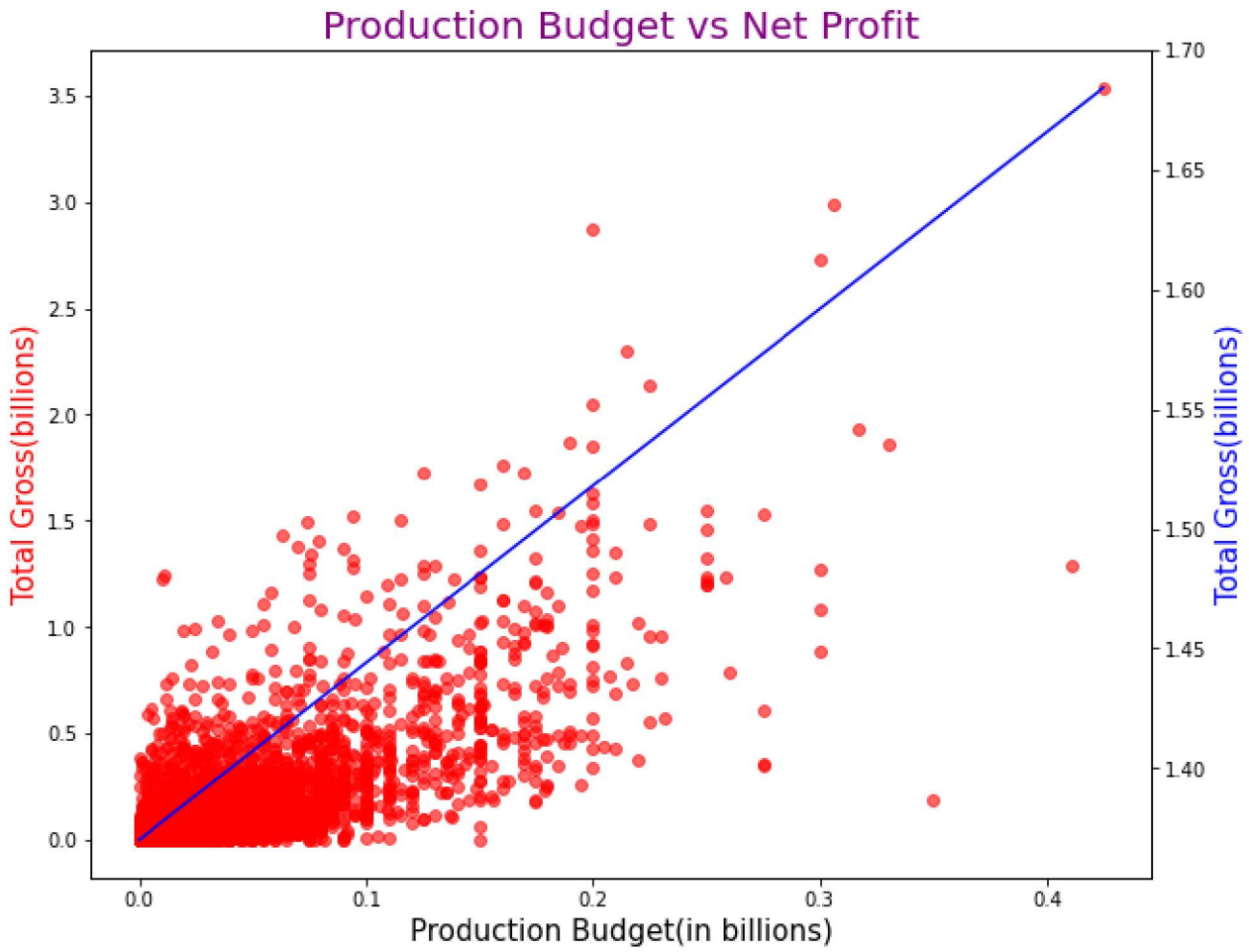
In [36]:
```
budgets['total gross(billions)'] = budgets['total_gross'] / 1000000000
```

In [37]:
```
budget_gross_corr = budgets['total gross(billions)'].corr(budgets['budget'])
budget_gross_corr
```

Out[37]:
```
0.7399121495609374
```

In [38]:
```
# Making a regression line based on the correlation

# correlation coefficient
m = budgets['total gross(billions)'].corr(budgets['budget'])

# estimated y-intercept
b = 1.37

# regression equation
net_profit_reg = m * budgets['budget'] + b

#plot
fig, ax1 = plt.subplots(figsize=(10,8))

#create a double y-axis
ax2 = ax1.twinx()


ax1.scatter(x=budgets['budget'], y=budgets['total gross(billions)'], color='r',alpha=0.
ax2.plot(budgets['budget'], net_profit_reg, 'b-')
ax1.set_title('Production Budget vs Net Profit',size=20,color='purple')
ax1.set_xlabel('Production Budget(in billions)',size=15)
ax1.set_ylabel('Total Gross(billions)', color='r',size=15)
ax2.set_ylabel('Total Gross(billions)', color='b',size=15)

# plt.show()
plt.savefig('production_budget_vs_net_profit.jpeg',bbox_inches='tight')


print("The Correlation Coefficient is: {}.This is a sign that the budget has a positive
 weak-medium           correlation to gross revenue of the film. With a medium correlat
 keeping the budget low as it is  where the highest concentration of the data is. The r
 budget does appear to be too high as it grows.".format(budget_gross_corr))
```

```
The Correlation Coefficient is: 0.7399121495609374.This is a sign that the budget has a
positive, but weak-medium           correlation to gross revenue of the film. With a med
ium correlation, it makes sense to try keeping the budget low as it is  where the highes
t concentration of the data is. The risk with a higher budget does appear to be too high
as it grows.
```



In [39]:
```
cd ..
```

```
C:\Users\alevi\Documents\Flatiron\dsc-data-science-env-config\Course_Folder\Phase_1\Phase_1_Project\Phase-1-Project---Movie-Analysis
```

IMDB data analysis based on genre

Querying the movie_basics and movie_ratings

In [40]:
```
import sqlite3 as sql

conn = sql.connect('im.db')
df = pd.read_sql('''SELECT *
                FROM movie_basics
                JOIN movie_ratings
                USING(movie_id)
                JOIN movie_akas
                USING(movie_id)
                ORDER BY numvotes DESC
                ''', conn)
```

Merge with budgets dataframe

In [41]:
```
imdb_budgets = pd.merge(df,budgets,left_on='original_title',right_on='movie',how='inner
len(imdb_budgets)
```

Out[41]: 43969

Checking Profit by Genre

In [42]:
```
imdb_budgets['genres'] = imdb_budgets['genres'].str.split(',')
imdb_budgets_genres = imdb_budgets.explode('genres')
imdb_budgets_genres
```

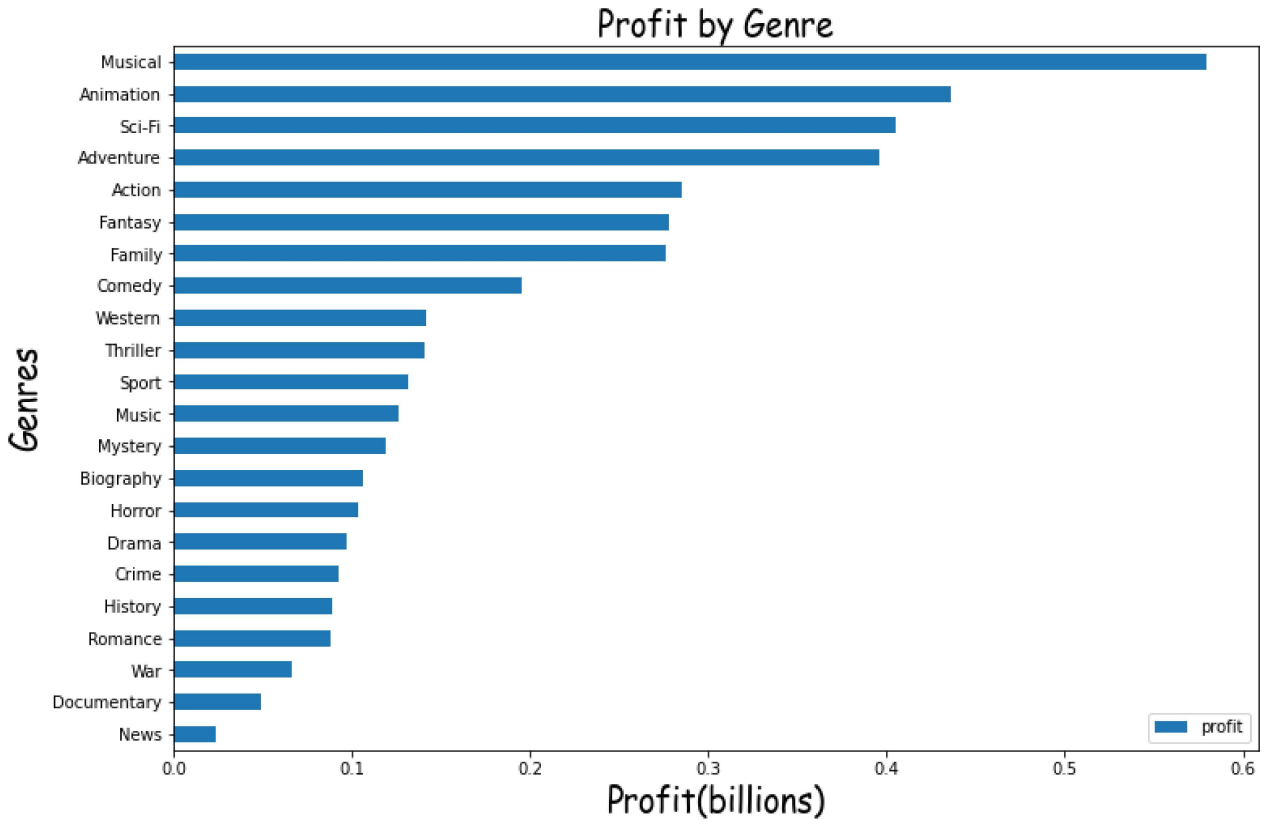
Out[42]:

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres	averagerating
0	tt1375666	Inception	Inception	2010	148.000	Action	8.800
0	tt1375666	Inception	Inception	2010	148.000	Adventure	8.800
0	tt1375666	Inception	Inception	2010	148.000	Sci-Fi	8.800
1	tt1375666	Inception	Inception	2010	148.000	Action	8.800
1	tt1375666	Inception	Inception	2010	148.000	Adventure	8.800
...	...	...	...	...	...	...	...
43964	tt3105014	Hybrid	Hybrid	2013	104.000	Sport	7.200
43965	tt3570720	Heaven's Gate	Heaven's Gate	2013	47.000	Documentary	6.800
43966	tt3570720	Heaven's Gate	Heaven's Gate	2013	47.000	Documentary	6.800
43967	tt3570720	Heaven's Gate	Heaven's Gate	2013	47.000	Documentary	6.800
43968	tt6971106	The Black Hole	The Black Hole	2017	nan	Comedy	4.200

115302 rows × 30 columns

In [43]:
```
imdb_budgets_genres_by_profit = imdb_budgets_genres.groupby('genres')['profit'].mean().
imdb_budgets_genres_by_profit = imdb_budgets_genres_by_profit.sort_values('profit')

imdb_budgets_genres_by_profit.plot(x='genres',y='profit',kind='barh',figsize=(12,8))
plt.xlabel('Profit(billions)',size=20,**csfont)
plt.ylabel('Genres',size=20,**csfont)
plt.title('Profit by Genre',size=20,**csfont)
plt.savefig('Profit_by_Genre.jpeg')



print('Earlier in the analysis, it was shown that the box office revenue was heavily fa
However, when looking at the data for profit the spread is slightly different. Musicals
 performing at a high rate. While not as strong as at the box office, action, fantasy,
```

```
Earlier in the analysis, it was shown that the box office revenue was heavily favored to
wards science fiction and fantasy as well as action and adventure.However, when looking
at the data for profit the spread is slightly different. Musicals appear to be the most
profitable genres along with Scifi and animation performing at a high rate. While not as
strong as at the box office, action, fantasy, family and adventure also appear to be ver
y profitable genres as well.
```



Advice for Microsoft

1) Keep the budget low! For the budget, all the data points to a more reliable profit and return on investment. The correlation for budget vs profit appears to be on the weaker side, so a larger budget doesn't necessarily mean a direct return on invesment.

2) Best Genres for revenue: Action and Adventure, Science Fiction and Fantasy Best Genres for profit: Musicals, SciFi, Animation, Adventure examples - Avatar, Avengers,

3) Summer time! With consideration of the summer months being the most profitable, and June showing to be the highest month for return on investment, it makes sense to try and maxmimize movies released during that time.

In [ ]: