IMDB_notebook

November 24, 2024

1 IMDB exploratory data analysis to isolate factors which contribute most to movie profitability or popularity

[1]:
```
#need to make a table that has the top 33% of movies by popularity, with␣
 ↪ratings over 7.0, and actors/actresses in the cast
#need to include the actor/actress name, movie name, rating, profit, and␣
 ↪popularity
#adjust as needed
cte_mega_string = """
WITH FilteredRatings AS (
    SELECT tconst, averageRating, numVotes
    FROM dbo.ratings
    WHERE averageRating > 7.0
),
FilteredPopularity AS (
    Select
        imdb_id,
        popularity,
        -- 1 = top 33%, 2 = middle 33%, 3 = bottom 33%
        NTILE(3) OVER (ORDER BY popularity DESC) AS popularity_percentile
    from dbo.meta
),FilteredBasics AS (
    SELECT tconst, primaryTitle, startYear
    FROM dbo.basics
    WHERE startYear >= 2000
), -- calculate profit not always available
CalculatedProfit AS (
    SELECT imdb_id, (revenue - budget) AS profit
    FROM dbo.meta
)
SELECT
    cast.tconst, -- movie number unique id
    base.primaryTitle, --movie name
    cast.category,
    rates.averageRating, -- ratings
    nam.primaryName AS actor_name,
    CalculatedProfit.profit,
```

```
    pop.popularity
FROM dbo.principals AS cast
JOIN FilteredBasics AS base ON base.tconst = cast.tconst
JOIN FilteredRatings AS rates ON rates.tconst = cast.tconst
JOIN CalculatedProfit on CalculatedProfit.imdb_id = cast.tconst
JOIN dbo.name AS nam ON nam.nconst = cast.nconst
JOIN FilteredPopularity AS pop ON pop.imdb_id = cast.tconst
WHERE cast.category IN ('actor', 'actress')
    AND pop.popularity_percentile = 1
ORDER BY pop.popularity DESC;
"""
```

[2]:
```
import pyodbc
import pandas as pd
from sqlalchemy import create_engine
# connection details
server = 'sourcetoshare.database.windows.net'
database = 'imdb'
username = 'jeffrey'
password = 'JAw1BcMunBB7JGgKoWDNRwnUvNxDvW5yUClzwlomuIY8='
driver = 'ODBC Driver 17 for SQL Server'


# Create the connection string in SQLAlchemy format
conn_string = f'mssql+pyodbc://{username}:{password}@{server}/{database}?
 ↪driver={driver.replace(" ", "+")}'

# Create the SQLAlchemy engine
engine = create_engine(conn_string)
# Execute the query and load the data into a pandas DataFrame
cte_df = pd.read_sql(cte_mega_string, conn_string)

# Display the first few rows of the dataframe
print(cte_df.head())
```

```
      tconst     primaryTitle category  averageRating      actor_name  \
0  tt0468569  The Dark Knight    actor            9.0  Morgan Freeman
1  tt0468569  The Dark Knight    actor            9.0     Gary Oldman
2  tt0468569  The Dark Knight    actor            9.0  Christian Bale
3  tt0468569  The Dark Knight    actor            9.0  Christian Bale
4  tt0468569  The Dark Knight    actor            9.0   Michael Caine

      profit  popularity
0  819558444  123.167259
1  819558444  123.167259
2  819558444  123.167259
3  819558444  123.167259
4  819558444  123.167259
```

[3]:
```
# first we need to clean up the data
# 1. remove empties
cte_df = cte_df.dropna()
#Creates a new binary column for each unique actor name.
cte_df = pd.get_dummies(cte_df, columns=['actor_name'])
cte_df.head(n=5)
```

[3]:

	tconst	primaryTitle	category	averageRating	profit	popularity	actor_name_Aamir Khan	actor_name_Aankha Neal	actor_name_Aaron Eckhart	actor_name_Aaron Murphy	…	actor_name_Zsolt Nagy	actor_name_Zuhal Gencer	actor_name_Zuleikha Robinson	actor_name_Álex Angulo	actor_name_Álvaro Guerrero	actor_name_Élodie Navarre	actor_name_Émile Vallée	actor_name_Éva Darlan
0	tt0468569	The Dark Knight	actor	9.0	819558444	123.167259	False	False	False	False	…	False	False	False	False	False	False	False	False
1	tt0468569	The Dark Knight	actor	9.0	819558444	123.167259	False	False	False	False	…	False	False	False	False	False	False	False	False
2	tt0468569	The Dark Knight	actor	9.0	819558444	123.167259	False	False	False	False	…	False	False	False	False	False	False	False	False
3	tt0468569	The Dark Knight	actor	9.0	819558444	123.167259	False	False	False	False	…	False	False	False	False	False	False	False	False
4	tt0468569	The Dark Knight	actor	9.0	819558444	123.167259	False	False	False	False	…	False	False	False	False	False	False	False	False

```
4                      False                      False                      False

   actor_name_Özge Özberk  actor_name_Özkan Ugur
0                   False                  False
1                   False                  False
2                   False                  False
3                   False                  False
4                   False                  False

[5 rows x 2606 columns]
```

[4]:
```
# We'll start easy by just using the profit and popularity columns
correlation = cte_df[['profit', 'popularity']].corr()
print(correlation)
```

```
              profit  popularity
profit      1.00000     0.64804
popularity  0.64804     1.00000
```

[16]:
```
# Now we'll use all the actor columns and the popularity column, since we're␣
 ↪interested in the relationship between the actors and the popularity of the␣
 ↪movie
# We'll select all columns that start with 'actor_'
#since there are a ton of names we'll use a loop to create a bunch of columns
selected_columns = ['popularity'] + [col for col in cte_df.columns if col.
 ↪startswith('actor_')]
print(selected_columns[0:100])
```

```
['popularity', 'actor_name_Aamir Khan', 'actor_name_Aankha Neal',
'actor_name_Aaron Eckhart', 'actor_name_Aaron Murphy', 'actor_name_Aaron Taylor-
Johnson', 'actor_name_Abby Mukiibi Nkaaga', 'actor_name_Abdol Rahman Karim',
'actor_name_Abigail Breslin', 'actor_name_Adam Baldwin', 'actor_name_Adam
Goldberg', 'actor_name_Adam Kaufman', 'actor_name_Adam Kotz', 'actor_name_Adam
LeFevre', 'actor_name_Ade', 'actor_name_Adewale Akinnuoye-Agbaje',
'actor_name_Adil Hussain', 'actor_name_Adrian Alonso', 'actor_name_Adrian
Rawlins', 'actor_name_Adriana Asti', 'actor_name_Adriano Giannini',
'actor_name_Adrien Brody', 'actor_name_Ahmad Khan Mahmoodzada',
'actor_name_Ahmed Khan', 'actor_name_Ahmedov Ayder', 'actor_name_Ahn Kil-kang',
'actor_name_Ahn Nae-sang', 'actor_name_Aida Leiner', 'actor_name_Aiden Lithgow',
'actor_name_Ailing Xu', 'actor_name_Ailton Graça', 'actor_name_Aino-Maija
Tikkanen', 'actor_name_Aishwarya Rai Bachchan', 'actor_name_Aitana Sánchez-
Gijón', 'actor_name_Ajil Zibari', 'actor_name_Akashi Takei', 'actor_name_Aki
Maeda', 'actor_name_Akihiro Miwa', 'actor_name_Akiko Takeshita',
'actor_name_Akio Ôtsuka', 'actor_name_Akira Yamaguchi', 'actor_name_Akshay
Kumar', 'actor_name_Akshaye Khanna', 'actor_name_Al Pacino', 'actor_name_Alain
Eloy', 'actor_name_Alakina Mann', 'actor_name_Alan Alda', 'actor_name_Alan
Arkin', 'actor_name_Alan Howard', 'actor_name_Alan King', 'actor_name_Alan Oke',
'actor_name_Alan Rickman', 'actor_name_Alan Tudyk', 'actor_name_Albert Brooks',
```

```
'actor_name_Albert Delpy', 'actor_name_Albert Finney', 'actor_name_Alberta
Watson', 'actor_name_Alberto Jiménez', 'actor_name_Alec Baldwin',
'actor_name_Aleksandar Bercek', 'actor_name_Aleksander Bednarz',
'actor_name_Aleksandr Kuykka', 'actor_name_Aleksandr Zubkin',
'actor_name_Aleksei Panzheyev', 'actor_name_Aleksey Kashnikov',
'actor_name_Aleksey Suknovalov', 'actor_name_Alessio Boni', 'actor_name_Alex
Borstein', 'actor_name_Alex Fernandez', 'actor_name_Alex Ferns',
'actor_name_Alex Gravel', 'actor_name_Alex Kelly', 'actor_name_Alex Palmer',
'actor_name_Alex Rice', 'actor_name_Alexander Armstrong', 'actor_name_Alexander
Beyer', 'actor_name_Alexander Gould', 'actor_name_Alexander Held',
'actor_name_Alexandra Maria Lara', 'actor_name_Alexandre Rodrigues',
'actor_name_Alexei Anikine', 'actor_name_Alexei Sayle', 'actor_name_Alexis
Bledel', 'actor_name_Alfred Molina', 'actor_name_Ali Astin', 'actor_name_Ali
Kazim', 'actor_name_Alice Braga', 'actor_name_Alice Patten', 'actor_name_Alicia
Vikander', 'actor_name_Alina Berzunteanu', 'actor_name_Alison Garland',
'actor_name_Alison Lohman', 'actor_name_Alison Pill', 'actor_name_Allan Gildea',
'actor_name_Allison Janney', 'actor_name_Alysia Reiner', 'actor_name_Amancay
Espíndola', 'actor_name_Amaneh Ekhtiar-dini', 'actor_name_Ambrosia Kelley',
'actor_name_Ames Asbell']
```

[6]:
```python
# Create a new dataframe with only the selected columns
new_df = cte_df[selected_columns]

# Calculate the correlation matrix
pop_matrix = new_df.corr()

# remove the 100 correlation with itself
pop_matrix = pop_matrix.drop('popularity')

# Remove the 'actor_' prefix from the index
pop_matrix.index = pop_matrix.index.str.replace('actor_name_', '')

# Display the correlation matrix
pop_matrix= pop_matrix['popularity'].sort_values(ascending=False)

print(pop_matrix)
```

```
Monique Gabriela Curnen    0.205554
Ron Dean                   0.205554
Christian Bale             0.187308
Maggie Gyllenhaal          0.155185
Heath Ledger               0.146762
                              …
Terrence 'T.C.' Carson    -0.023496
Boman Irani               -0.023730
Cem Yilmaz                -0.025236
Phil LaMarr               -0.028679
John DiMaggio             -0.036440
```

```
Name: popularity, Length: 2600, dtype: float64
```

2 Correlation results for popularity and actors

3 Those are not high correlations values. The presence of any actor does not seem to have a significant impact on the popularity of the movie.

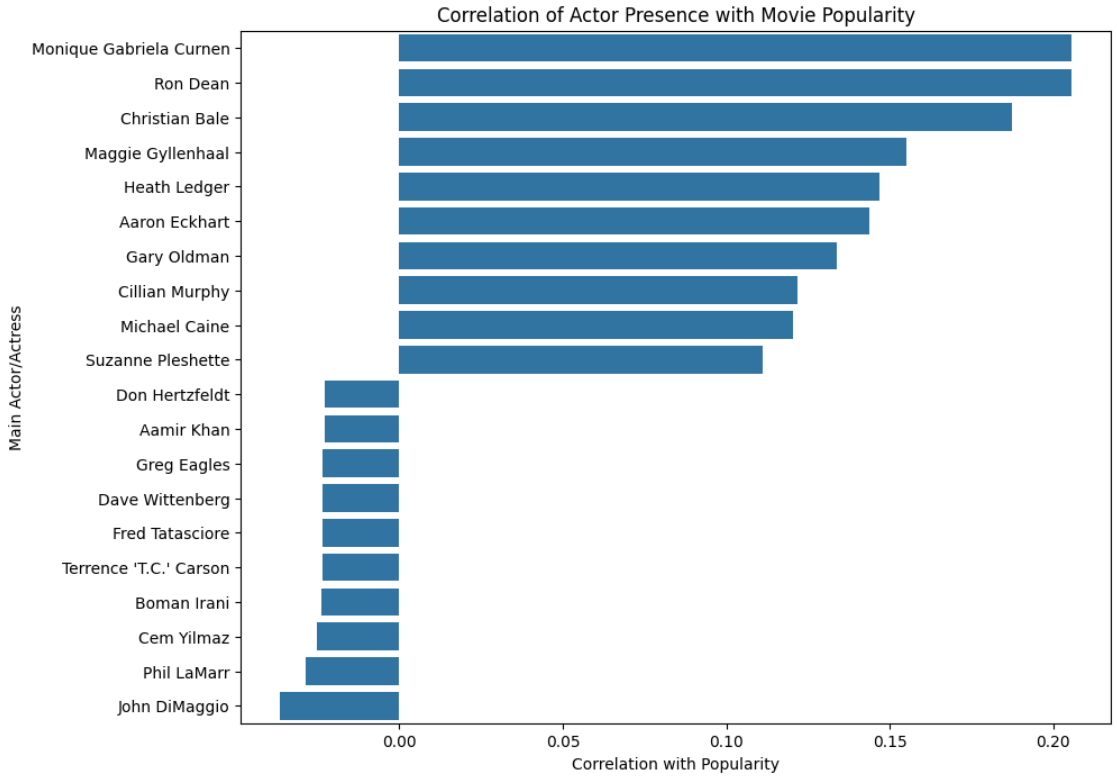
[7]:
```
# Now we'll use all the actor columns and the profit column, since we're␣
 ↪interested in the relationship between the actors and the profit of the movie
selected_columns = ['profit'] + [col for col in cte_df.columns if col.
 ↪startswith('actor_')]

# Create a new dataframe with only the selected columns
new_df = cte_df[selected_columns]

# Calculate the correlation matrix
profit_matrix = new_df.corr()

# remove the 100 correlation with itself
profit_matrix = profit_matrix.drop('profit')


# Remove the 'actor_' prefix from the index
profit_matrix = profit_matrix['profit'].sort_values(ascending=False)
profit_matrix.index = profit_matrix.index.str.replace('actor_name_', '')

# Display the correlation matrix
print(profit_matrix)
```

```
Emma Watson           0.141520
Rupert Grint          0.141520
Daniel Radcliffe      0.141520
Sala Baker            0.136110
Orlando Bloom         0.135302
                         ...
Meryl Streep         -0.026073
John DiMaggio        -0.026430
Martin McCann        -0.028098
Toby Leonard Moore   -0.028098
Joseph Mazzello      -0.034418
Name: profit, Length: 2600, dtype: float64
```

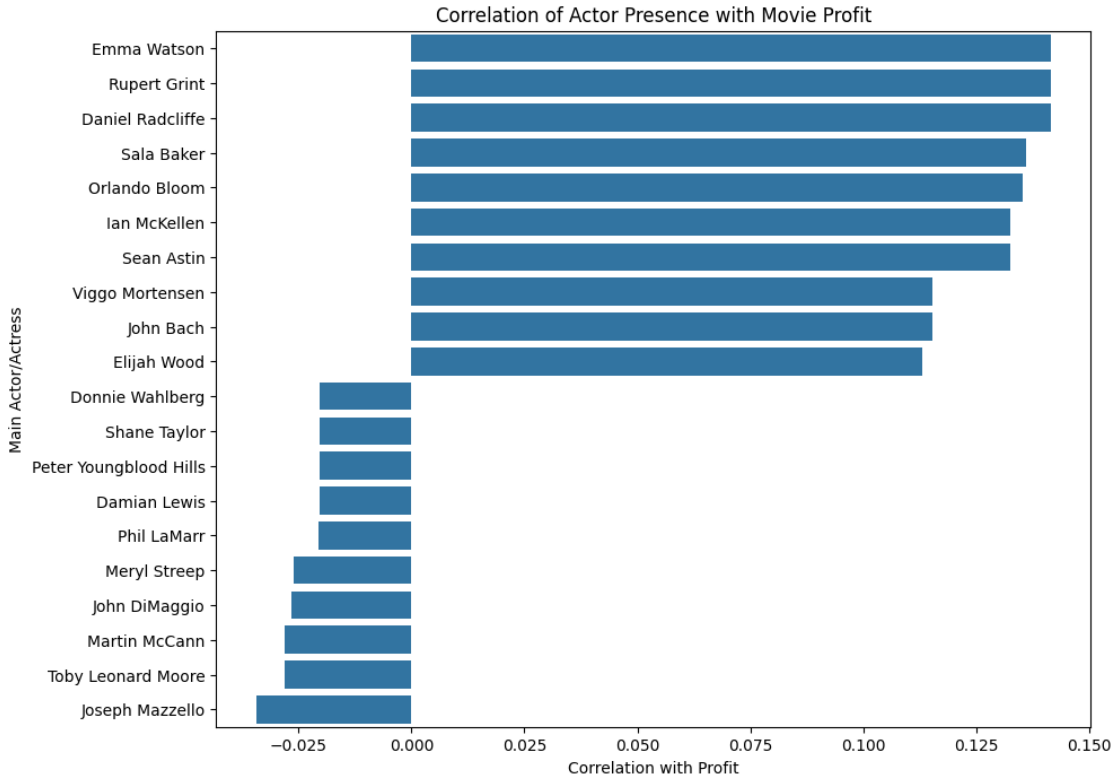
4 Correlation result for profit and actors:

5 Those are not high correlations values. The presence of any actor does not seem to have a significant impact on the profit of the movie.

[11]:
```
import matplotlib.pyplot as plt
import seaborn as sns


# Calculate the correlation matrixa Keep only the top 10 and bottom 10␣
 ↪correlations
top_10 = pop_matrix.head(10)
bottom_10 = pop_matrix.tail(10)
top_bottom_20 = pd.concat([top_10, bottom_10])

# Display the modified correlation series
# Plot the correlations

plt.figure(figsize=(10, 8))
sns.barplot(x=top_bottom_20.values, y=top_bottom_20.index)
plt.xlabel('Correlation with Popularity')
plt.ylabel('Main Actor/Actress')
plt.title('Correlation of Actor Presence with Movie Popularity')
plt.show()
```



[13]:
```
# Calculate the correlation  Keep only the top 10 and bottom 10 correlations
top_10 = profit_matrix.head(10)
bottom_10 = profit_matrix.tail(10)
top_bottom_20 = pd.concat([top_10, bottom_10])

# Display the modified correlation series
# Plot the correlations

plt.figure(figsize=(10, 8))
sns.barplot(x=top_bottom_20.values, y=top_bottom_20.index)
plt.xlabel('Correlation with Profit')
plt.ylabel('Main Actor/Actress')
plt.title('Correlation of Actor Presence with Movie Profit')
plt.show()
```



I found this odd. Anyone see something I am doing wrong? I will do a random forrest now to see which factor contributes the most to popularity and profit. That will also to rank them. I thought for sure this star-power would matter more than this, but perhaps when I compare it to the other variables which may influence popularity or profit, star-power may yet be at the top.

[ ]: