Data Science Part Time 07

Phase one final project submission

Focus: Exploratory Data Analysis

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Overview

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 creating movies. You are charged with exploring what types of films are currently doing the best at the box office. You must then translate those findings into actionable insights that the head of Microsoft's new movie studio can use to help decide what type of films to create.

Goal

To explore the types of films currently doing the best at the box office and translating the findings into actionable insights that the head of Microsoft's new movie studio can use to help decide what type of films to create.

Business understanding

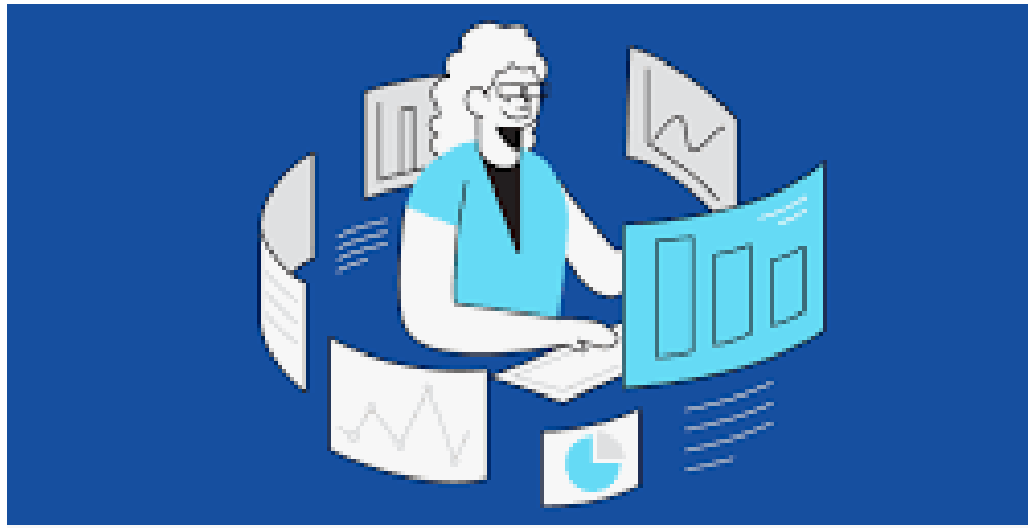
Based on the business problem at hand, the following key tasks are necessary:

- Exploration of the types of films
- Analyzing the data: Key focus on viewership, including most watched movies in terms of genres, titles as well as most loved characters
- Translating the findings of the analysis into actionable insights (recommendations)

Approach:

- Use of Exploratory Data Analysis (EDA) in pandas and SQLite 3

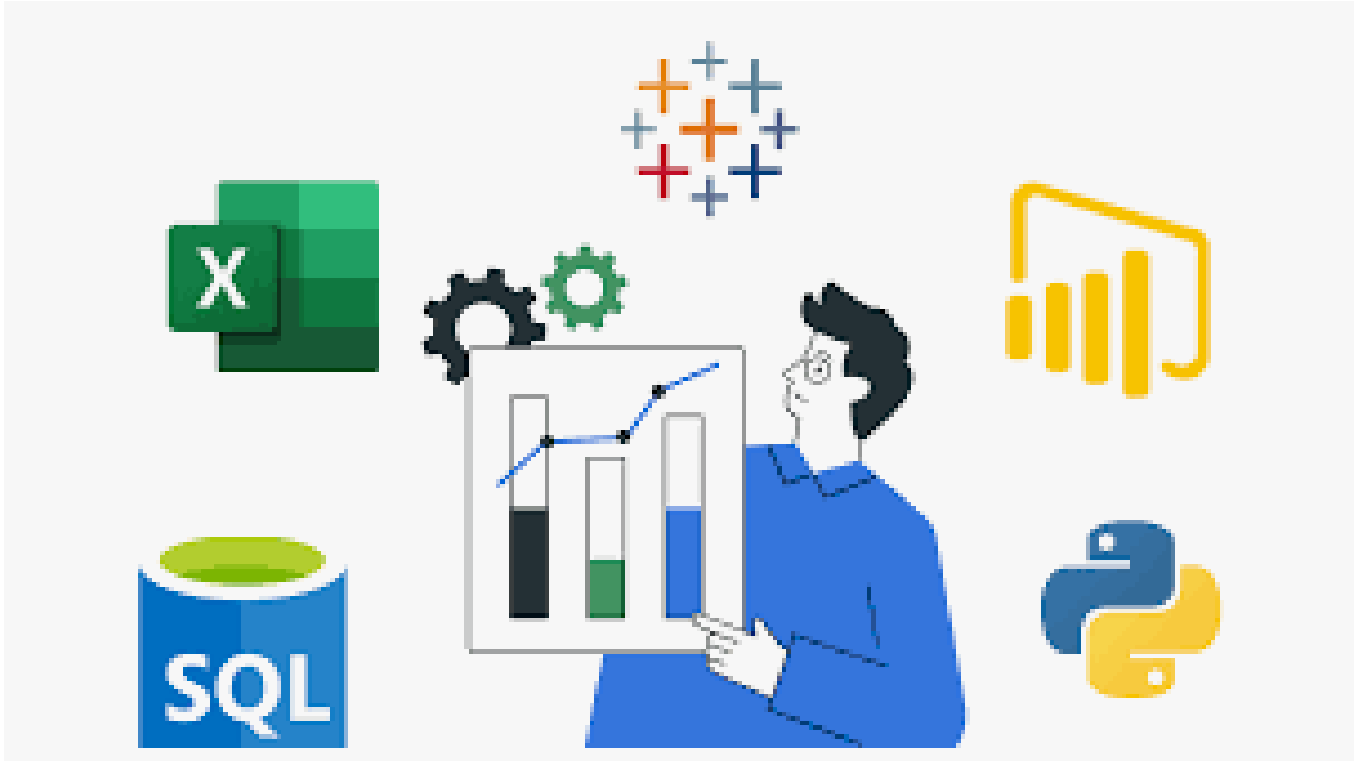
Data understanding



Sets of data:

- 5 movie data sets were provided in zipped file
- The data sets include:
  - Box Office MojoLinks to an external site.
  - IMDBLinks to an external site.
  - Rotten TomatoesLinks to an external site.
  - TheMovieDBLinks to an external site.
  - The Numbers

Data analysis



Step 0: Imports and reading data

- Imported the relevant files to be used in data analysis:
  - Importing pandas as pd
  - Importing numpy as np
  - Importing matplotlib.pyplot as plt
  - Importing seaborn as sns
  - Importing sqlite3
  - %matplotlib inline
  - pd.set_option('max_columns',150)

- Created sqlite 3 connection
- Viewed table names using SQL query
- Used SQL 3 to join the data sets

Step 0: Imports and Reading Data

In [77]:
```
# Your code here - remember to use markdown cells for comments as well!
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import sqlite3
%matplotlib inline
pd.set_option('max_columns',150)
```

In [5]:
```
#connecting to sqlite3
conn = sqlite3.connect('im.db')
```

In [6]:
```
cur = conn.cursor()
```

In [8]:
```
# SQL query to select the names of all tables in the database
cur.execute("""SELECT name FROM sqlite_master WHERE type = 'table';""")
table_names = cur.fetchall()
table_names
```

Step 1: Data understanding

- Viewed different types of rows and columns in the data
- Viewed first & last five columns in the data frame
- Described the data frame

```
Dataframe shape
head and tail
dtypes
describe
```

```
In [74]: combined_df.shape
Out[74]: (4371844, 23)
```

```
In [78]: combined_df.head()
```

Out[78]:

gion	language	types	attributes	is_original_title	averagerating	numvotes	primary_name	birth_yea
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na

```
In [32]: combined_df.describe()
```

Out[32]:

	start_year	runtime_minutes	ordering	is_original_title	averagerating	numvote
count	146144.000000	114405.000000	1.359889e+06	331678.000000	73856.000000	7.385600e+0
mean	2014.621798	86.187247	4.834006e+00	0.134769	6.332729	3.523662e+0
std	2.733583	166.360590	4.087300e+00	0.341477	1.474978	3.029402e+0
min	2010.000000	1.000000	1.000000e+00	0.000000	1.000000	5.000000e+0
25%	2012.000000	70.000000	2.000000e+00	0.000000	5.500000	1.400000e+0
50%	2015.000000	87.000000	4.000000e+00	0.000000	6.500000	4.900000e+0
75%	2017.000000	99.000000	7.000000e+00	0.000000	7.400000	2.820000e+0
max	2115.000000	51420.000000	6.100000e+01	1.000000	10.000000	1.841066e+0

```
In [71]: combined_df.tail()
```

Out[71]:

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres	person_id
4371839	tt8999892	NaN	NaN	NaN	NaN	NaN	nm10122246
4371840	tt8999974	NaN	NaN	NaN	NaN	NaN	nm10122357
4371841	tt9001390	NaN	NaN	NaN	NaN	NaN	nm6711477
4371842	tt9004986	NaN	NaN	NaN	NaN	NaN	nm4993825
4371843	tt9010172	NaN	NaN	NaN	NaN	NaN	nm8352242

5 rows × 23 columns

Step 2: Data preparation

- Key steps followed:
  - Finding missing values
  - Identifying duplicated columns
  - Feature creation

```
In [88]:
#find all the missing values in the dataset.
combined_df.isna().sum()
```

```
Out[88]:
movie_id                606648
primary_title          4225700
original_title         4225721
start_year             4225700
runtime_minutes        4257439
genres                 4231108
person_id               551703
ordering               3011955
title                  4040141
region                 4093434
language               4330129
types                  4203397
attributes             4356919
is_original_title      4040166
averagerating          4297988
numvotes               4297988
primary_name           3765196
birth_year             4289108
death_year             4365061
primary_profession     3816536
category               3343658
job                    4194160
characters             3978484
dtype: int64
```

```
In [90]:
#finding duplicated values
combined_df.duplicated()
```

```
Out[90]:
0          False
1          False
2          False
3          False
4          False
```

```
In [84]:
# change the birth_year to datetime
combined_df['birth_year']= pd.to_datetime(combined_df['birth_year'])
```

```
In [85]:
## change the death_year to datetime
combined_df['death_year']= pd.to_datetime(combined_df['death_year'])
```

```
In [86]:
combined_df.head()
```

Out[86]:

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres	perso
0	tt0063540	Sunghursh	Sunghursh	2013.0	175.0	Action,Crime,Drama	
1	tt0066787	One Day Before the Rainy Season	Ashad Ka Ek Din	2019.0	114.0	Biography,Drama	
2	tt0069049	The Other Side of the Wind	The Other Side of the Wind	2018.0	122.0	Drama	
3	tt0069204	Sabse Bada Sukh	Sabse Bada Sukh	2018.0	NaN	Comedy,Drama	
4	tt0100275	The Wandering Soap Opera	La Telenovela Errante	2017.0	80.0	Comedy,Drama,Fantasy	

Step 3: Feature understanding

- Key steps followed:
  - Plotting feature distribution
  - Histogram
  - KDE
  - Box plot

```
In [95]: #The most watched movie by title
         combined_df['title'].value_counts()
```

```
Out[95]: Robin Hood                      32
         Home                            30
         Alone                           27
         Love                            25
         Thor                            25
                                         ..
         Hashima                          1
         Koinowa: Konkatsu Cruising       1
         Iskušenik                        1
         Любить, пить и петь              1
         O Mensageiro dos Espíritos 2     1
         Name: title, Length: 252781, dtype: int64
```

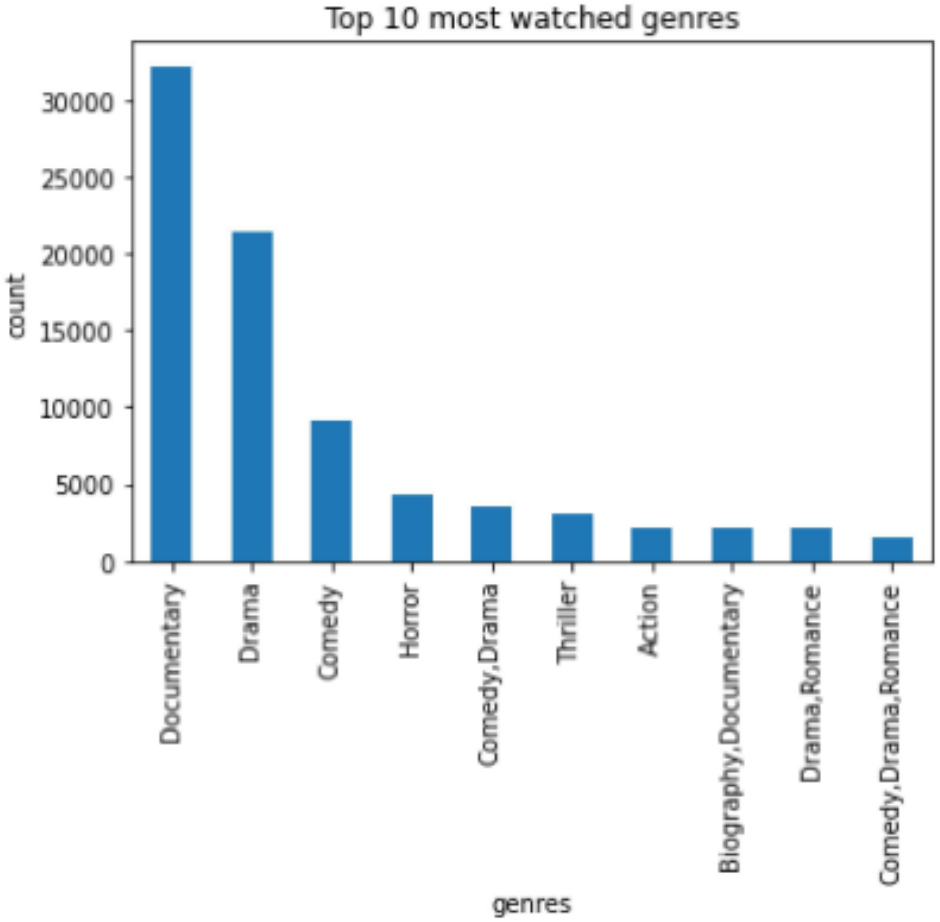
```
In [96]: #Top 10 most watched genres
         combined_df['genres'].value_counts()
```

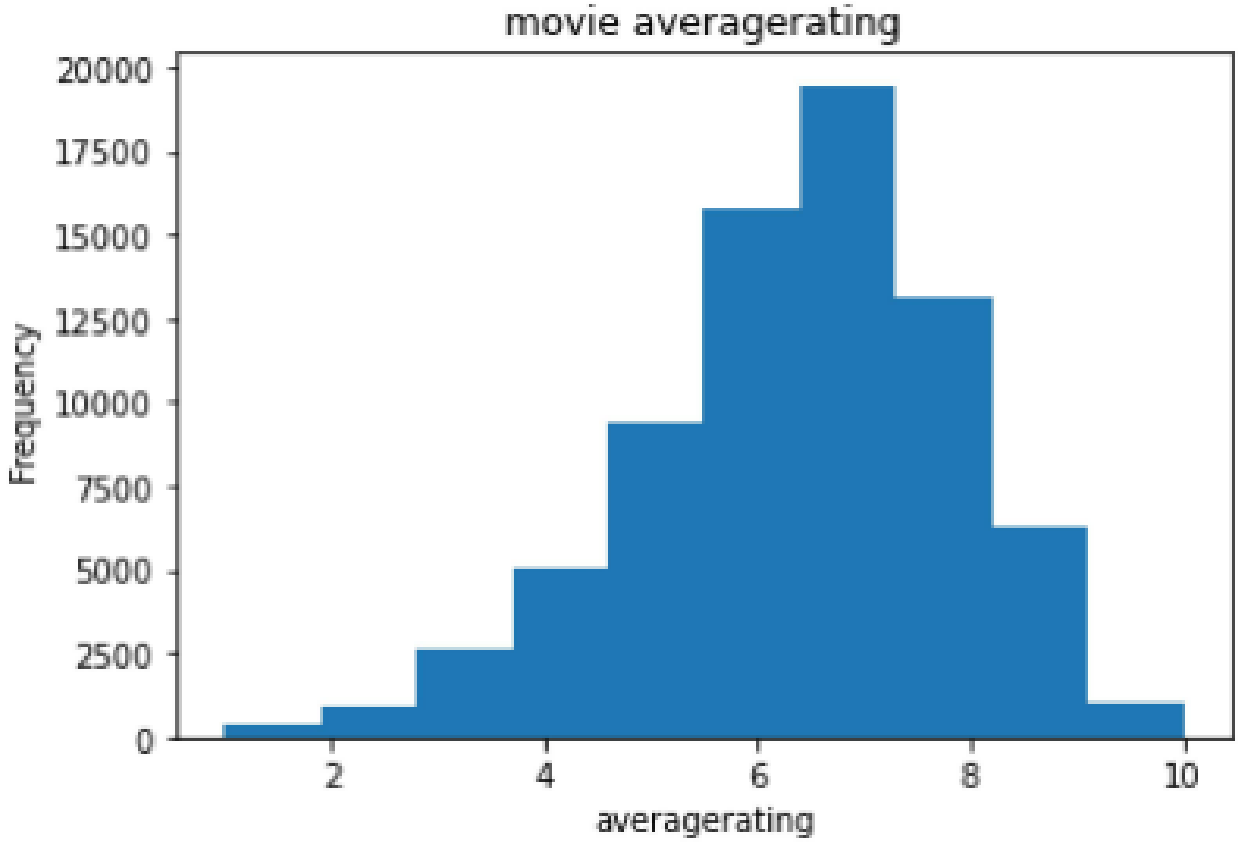
```
Out[96]: Documentary                    32185
         Drama                          21486
         Comedy                          9177
         Horror                          4372
         Comedy,Drama                    3519
                                         ...
         Biography,Family,Fantasy           1
         Sport,Talk-Show                    1
         Animation,Mystery,Thriller         1
         Animation,Music,Mystery            1
         Mystery,Reality-TV,Thriller        1
         Name: genres, Length: 1085, dtype: int64
```

```
In [100]: #visualizing the top 10 most watched genres using a bar plot
          ax= combined_df['genres'].value_counts() \
                      .head(10) \
                      .plot(kind='bar',title='Top 10 most watched genres')
          ax.set_xlabel('genres')
          ax.set_ylabel('count')
```

```
Out[100]: Text(0, 0.5, 'count')
```

Step 3: Feature understanding



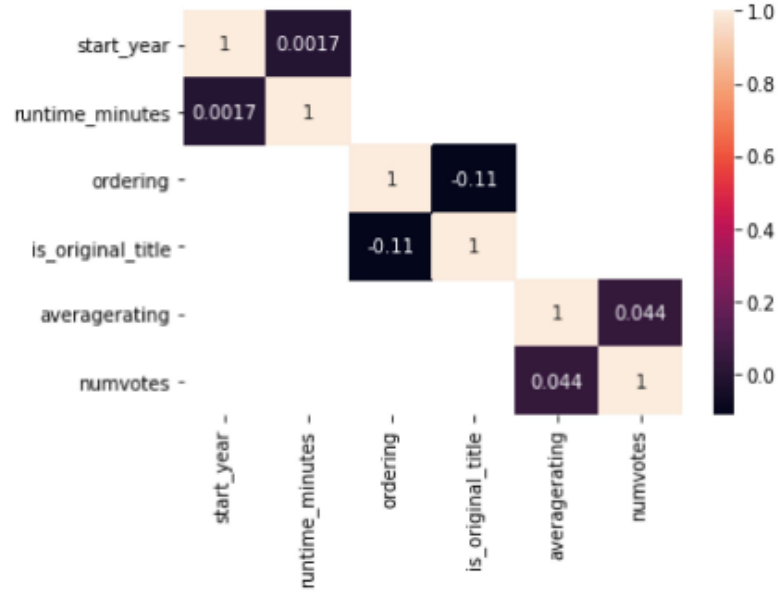


Step 4: Feature relationships

- Key steps followed:
  - Heatmap correlation
  - Groupby comparison

```
In [127]: #visualizing the correlation using heatmap
          sns.heatmap(combined_df.corr(),annot=True)
```

```
Out[127]: <AxesSubplot:>
```




```
In [123]: #check correlation
          combined_df.corr()
```

```
Out[123]:
```

	start_year	runtime_minutes	ordering	is_original_title	averagerating	numvotes
start_year	1.000000	0.001729	NaN	NaN	NaN	NaN
runtime_minutes	0.001729	1.000000	NaN	NaN	NaN	NaN
ordering	NaN	NaN	1.000000	-0.111053	NaN	NaN
is_original_title	NaN	NaN	-0.111053	1.000000	NaN	NaN
averagerating	NaN	NaN	NaN	NaN	1.000000	0.044478
numvotes	NaN	NaN	NaN	NaN	0.044478	1.000000

```
In [128]: #grouping the data by title
          combined_df.groupby('title').mean().sort_values(by="ordering",ascending=False)
```

```
Out[128]:
```

title	start_year	runtime_minutes	ordering	is_original_title	averagerating	numv
Žvaigždžiu karai: galia nubunda	NaN	NaN	61.0	0.0	NaN	
Star Wars: Güç Uyaniyor	NaN	NaN	60.0	0.0	NaN	
Star Wars: Episódio VII - O Despertar da Força	NaN	NaN	59.0	0.0	NaN	
Star Wars: Das Erwachen der Macht	NaN	NaN	57.0	0.0	NaN	
Star Wars: O Despertar da Força	NaN	NaN	56.5	0.0	NaN	
...	...	...	...	...	...	
Diese verfluchten Stunden am Abend - Häftlingsbordelle im KZ	NaN	NaN	1.0	0.0	NaN	
Muodonmuutoksia	NaN	NaN	1.0	1.0	NaN	
Dieser eine gemeinsame Tag	NaN	NaN	1.0	0.0	NaN	
I principi dell'Indeterminazione: Il Boia	NaN	NaN	1.0	0.0	NaN	
Dreckiges Blut - Die Transfusion des Bösen	NaN	NaN	1.0	0.0	NaN	

252781 rows × 6 columns

Step 5: Ask a question about the data

- Key steps: Answer a question about the data using a plot or statistic
- Questions:
  - What is the most watched movie by category?
  - Who is the most loved character?
  - What is the most watched movie by title?

```
In [130]: combined_df['genres'].value_counts()

Out[130]: Documentary                32185
          Drama                      21486
          Comedy                      9177
          Horror                      4372
          Comedy,Drama                3519
                                      ...
          Biography,Family,Fantasy       1
          Sport,Talk-Show                1
          Animation,Mystery,Thriller     1
          Animation,Music,Mystery        1
          Mystery,Reality-TV,Thriller    1
          Name: genres, Length: 1085, dtype: int64
```

```
In [ ]: #The most watched movie by category is Documentaries
```

```
In [131]: combined_df['title'].value_counts()

Out[131]: Robin Hood                   32
          Home                         30
          Alone                        27
          Love                         25
          Thor                         25
                                       ..
          Hashima                       1
          Koinowa: Konkatsu Cruising    1
          Iskušenik                     1
          Любить, пить и петь           1
          O Mensageiro dos Espíritos 2  1
          Name: title, Length: 252781, dtype: int64
```

```
In [ ]: #The most watched movie by title is Robin Hood

In [136]: combined_df['primary_name'].value_counts()

Out[136]: James Brown          16
          Michael Brown        16
          David Brown          15
          Michael Johnson      14
          Dinesh               13
                               ..
          Daniel Vitalis        1
          Nikhil Upreti         1
          Jean Law              1
          Mark Ashton           1
          Yanjia Chen           1
          Name: primary_name, Length: 577203, dtype: int64
```

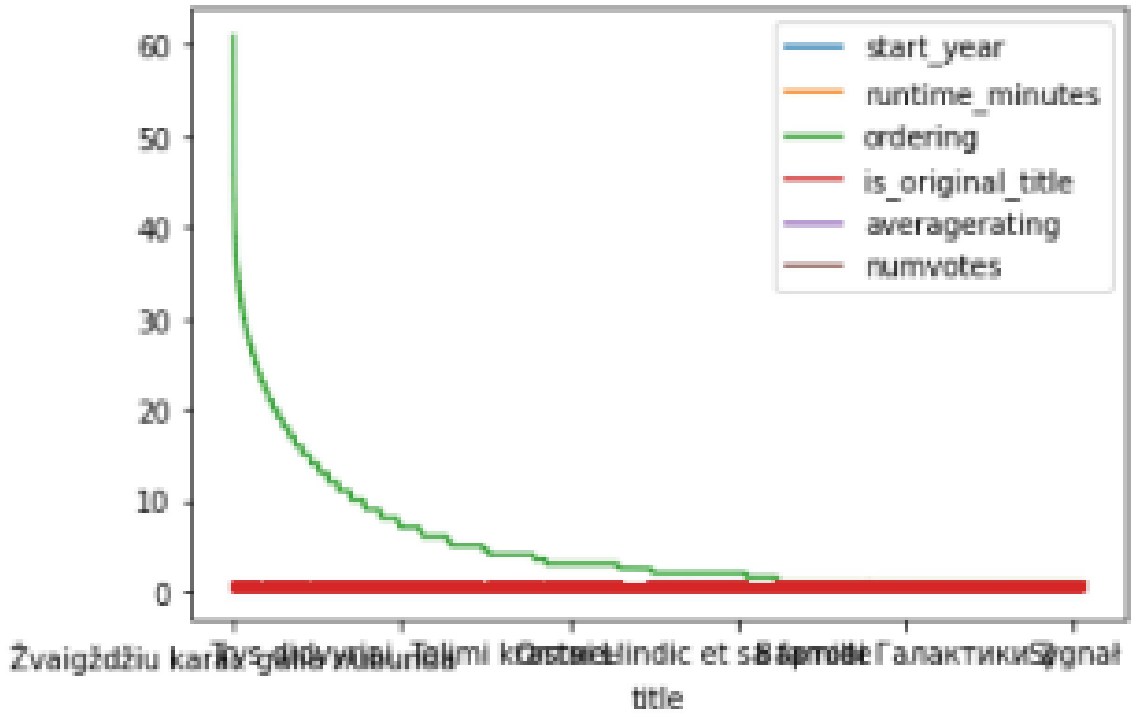
```
In [ ]: #The most loved character is James Brown

In [135]: combined_df.mode()

Out[135]:
```

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres	person_id	or
0	tt4050462	Home	Broken	2017.0	90.0	Documentary	nm6935209	
1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	

Step 5: Ask a question about the data

```
In [143]: #visualizing the most ordered movie
          df2=combined_df.groupby('title').mean().sort_values(by="ordering",ascending=Fal
          df2.plot()
```

```
Out[143]: <AxesSubplot:xlabel='title'>
```



Step 6: Findings & Recommendations

- From the analysis of the movie data sets, below are the ***findings***:

1. Most people preferred watching documentaries as compared to other genres.
2. The most loved movie character was James Brown
3. The most watched movie was Titled Robin Hood.

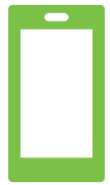
- ***Recommendation*** to Microsoft.

1. Would recommend Microsoft to venture into documentaries as this will bring more profits as they are the most preferred movies.
2. They should incorporate the top three most loved characters who are James Brown, Michael Brown and David Brown to increase the audience of their movies.
3. This is definitely a viable business.

Any questions?

Thank you so much

Cynthiah Atieno



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