Part I ¶

In [1]:
```
%%info
```

Current session configs: `{'conf': {'spark.pyspark.python': 'python3', 'spark.pyspark.virtualenv.enabled': 'true', 'spark.pyspark.virtualenv.type': 'native', 'spark.pyspark.virtualenv.bin.path': '/usr/bin/virtualenv'}, 'kind': 'pyspark'}`

No active sessions.

In [2]:
```
sc.install_pypi_package("pandas==1.0.3")
sc.install_pypi_package("matplotlib==3.2.1")
```

```
VBox()

Starting Spark application
```

ID	YARN Application ID	Kind	State	
1	application_1682871444365_0002	pyspark	idle	Link (http://ip-172-31-45-2.compute.internal:20888/proxy/application_168287144

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

SparkSession available as 'spark'.

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

```
Collecting pandas==1.0.3
  Using cached https://files.pythonhosted.org/packages/4a/6a/94b219b8ea0f
2d580169e85ed1edc0163743f55aaeca8a44c2e8fc1e344e/pandas-1.0.3-cp37-cp37m-
manylinux1_x86_64.whl (https://files.pythonhosted.org/packages/4a/6a/94b2
19b8ea0f2d580169e85ed1edc0163743f55aaeca8a44c2e8fc1e344e/pandas-1.0.3-cp3
7-cp37m-manylinux1_x86_64.whl)
Requirement already satisfied: numpy>=1.13.3 in /usr/local/lib64/python3.
7/site-packages (from pandas==1.0.3)
Collecting python-dateutil>=2.6.1 (from pandas==1.0.3)
  Using cached https://files.pythonhosted.org/packages/36/7a/87837f39d029
6e723bb9b62bbb257d0355c7f6128853c78955f57342a56d/python_dateutil-2.8.2-py
2.py3-none-any.whl (https://files.pythonhosted.org/packages/36/7a/87837f3
9d0296e723bb9b62bbb257d0355c7f6128853c78955f57342a56d/python_dateutil-2.
8.2-py2.py3-none-any.whl)
Requirement already satisfied: pytz>=2017.2 in /usr/local/lib/python3.7/s
ite-packages (from pandas==1.0.3)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/site-
packages (from python-dateutil>=2.6.1->pandas==1.0.3)
Installing collected packages: python-dateutil, pandas
Successfully installed pandas-1.0.3 python-dateutil-2.8.2

Collecting matplotlib==3.2.1
  Using cached https://files.pythonhosted.org/packages/b2/c2/71fcf957710f
3ba1f09088b35776a799ba7dd95f7c2b195ec800933b276b/matplotlib-3.2.1-cp37-cp
37m-manylinux1_x86_64.whl (https://files.pythonhosted.org/packages/b2/c2/
71fcf957710f3ba1f09088b35776a799ba7dd95f7c2b195ec800933b276b/matplotlib-
3.2.1-cp37-cp37m-manylinux1_x86_64.whl)
Collecting pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 (from matplotlib==3.
2.1)
  Using cached https://files.pythonhosted.org/packages/6c/10/a7d0fa5baea8
fe7b50f448ab742f26f52b80bfca85ac2be9d35cdd9a3246/pyparsing-3.0.9-py3-none
-any.whl (https://files.pythonhosted.org/packages/6c/10/a7d0fa5baea8fe7b5
0f448ab742f26f52b80bfca85ac2be9d35cdd9a3246/pyparsing-3.0.9-py3-none-any.
whl)
Requirement already satisfied: python-dateutil>=2.1 in /mnt/tmp/168287198
7303-0/lib/python3.7/site-packages (from matplotlib==3.2.1)
Requirement already satisfied: numpy>=1.11 in /usr/local/lib64/python3.7/
site-packages (from matplotlib==3.2.1)
Collecting cycler>=0.10 (from matplotlib==3.2.1)
  Using cached https://files.pythonhosted.org/packages/5c/f9/695d6bedebd7
47e5eb0fe8fad57b72fdf25411273a39791cde838d5a8f51/cycler-0.11.0-py3-none-a
ny.whl (https://files.pythonhosted.org/packages/5c/f9/695d6bedebd747e5eb0
fe8fad57b72fdf25411273a39791cde838d5a8f51/cycler-0.11.0-py3-none-any.whl)
Collecting kiwisolver>=1.0.1 (from matplotlib==3.2.1)
  Using cached https://files.pythonhosted.org/packages/ab/8f/8dbe2d4efc4c
0b08ec67d6efb7cc31fbfd688c80afad85f65980633b0d37/kiwisolver-1.4.4-cp37-cp
37m-manylinux_2_5_x86_64.manylinux1_x86_64.whl (https://files.pythonhoste
d.org/packages/ab/8f/8dbe2d4efc4c0b08ec67d6efb7cc31fbfd688c80afad85f65980
633b0d37/kiwisolver-1.4.4-cp37-cp37m-manylinux_2_5_x86_64.manylinux1_x86_
64.whl)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/site-
packages (from python-dateutil>=2.1->matplotlib==3.2.1)
Collecting typing-extensions; python_version < "3.8" (from kiwisolver>=1.
0.1->matplotlib==3.2.1)
  Using cached https://files.pythonhosted.org/packages/31/25/5abcd82372d3
d4a3932e1fa8c3dbf9efac10cc7c0d16e78467460571b404/typing_extensions-4.5.0-
py3-none-any.whl (https://files.pythonhosted.org/packages/31/25/5abcd8237
```

```
2d3d4a3932e1fa8c3dbf9efac10cc7c0d16e78467460571b404/typing_extensions-4.
5.0-py3-none-any.whl)
Installing collected packages: pyparsing, cycler, typing-extensions, kiwi
solver, matplotlib
Successfully installed cycler-0.11.0 kiwisolver-1.4.4 matplotlib-3.2.1 py
parsing-3.0.9 typing-extensions-4.5.0
```

In [3]:
```
#Load all necessary libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from pyspark.sql.functions import split, col, explode, count, desc, mean
from pyspark.sql.types import DoubleType, IntegerType, FloatType
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

Loading Data

In [4]:
```
#load all necessary data from s3
actors = spark.read.csv('s3://cis9760-lecture9-movieanalysis/name.basics.ts
genres = spark.read.csv('s3://cis9760-lecture9-movieanalysis/title.basics.t
movie_actors = spark.read.csv('s3://cis9760-lecture9-movieanalysis/title.pr
movie_ratings = spark.read.csv('s3://cis9760-lecture9-movieanalysis/title.r
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

Actors

In [5]:
```
#Show actors schema
actors.printSchema()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

root
 |-- nconst: string (nullable = true)
 |-- primaryName: string (nullable = true)
 |-- birthYear: string (nullable = true)
 |-- deathYear: string (nullable = true)
 |-- primaryProfession: string (nullable = true)
 |-- knownForTitles: string (nullable = true)
```

In [6]:
```
#Display the first 5 rows
actors.select("primaryName", "birthYear", "deathYear","knownForTitles").sho
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------------+---------+---------+--------------------+
|    primaryName|birthYear|deathYear|      knownForTitles|
+---------------+---------+---------+--------------------+
|   Fred Astaire|     1899|     1987|tt0050419,tt00531...|
|  Lauren Bacall|     1924|     2014|tt0071877,tt01170...|
|Brigitte Bardot|     1934|       \N|tt0054452,tt00491...|
|   John Belushi|     1949|     1982|tt0077975,tt00725...|
| Ingmar Bergman|     1918|     2007|tt0069467,tt00509...|
+---------------+---------+---------+--------------------+
only showing top 5 rows
```

Genres

In [7]:
```
#Display the first 15 rows with the following columns
genres.select("titleType","primaryTitle","genres").show(15)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+--------------------+--------------------+
|titleType|        primaryTitle|              genres|
+---------+--------------------+--------------------+
|    short|           Carmencita|   Documentary,Short|
|    short|Le clown et ses c...|     Animation,Short|
|    short|      Pauvre Pierrot|Animation,Comedy,...|
|    short|         Un bon bock|     Animation,Short|
|    short|    Blacksmith Scene|        Comedy,Short|
|    short|   Chinese Opium Den|               Short|
|    short|Corbett and Court...|         Short,Sport|
|    short|Edison Kinetoscop...|   Documentary,Short|
|    movie|          Miss Jerry|             Romance|
|    short| Exiting the Factory|   Documentary,Short|
|    short|Akrobatisches Pot...|   Documentary,Short|
|    short|The Arrival of a ...|Action,Documentar...|
|    short|The Photographica...|   Documentary,Short|
|    short|The Sprinkler Spr...|        Comedy,Short|
|    short| Autour d'une cabine|     Animation,Short|
+---------+--------------------+--------------------+
only showing top 15 rows
```

In [8]:
```
#Display the unique titles
(genres.select("titleType").distinct()).show()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+------------+
|   titleType|
+------------+
|    tvSeries|
|tvMiniSeries|
|       movie|
|   videoGame|
|   tvSpecial|
|       video|
|     tvMovie|
|   tvEpisode|
|     tvShort|
|       short|
+------------+
```

In [9]:
```
#Display the schema
genres.printSchema()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

root
 |-- tconst: string (nullable = true)
 |-- titleType: string (nullable = true)
 |-- primaryTitle: string (nullable = true)
 |-- originalTitle: string (nullable = true)
 |-- isAdult: string (nullable = true)
 |-- startYear: string (nullable = true)
 |-- endYear: string (nullable = true)
 |-- runtimeMinutes: string (nullable = true)
 |-- genres: string (nullable = true)
```

Movie Actors

In [10]:
```
#Display the schema
movie_actors.printSchema()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

root
 |-- tconst: string (nullable = true)
 |-- ordering: string (nullable = true)
 |-- nconst: string (nullable = true)
 |-- category: string (nullable = true)
 |-- job: string (nullable = true)
 |-- characters: string (nullable = true)
```

In [11]:
```
#Display the first 15 rows where the "category" column is "self"
(movie_actors.filter(movie_actors.category == "self")).show(15)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+--------+---------+--------+---+--------------------+
|   tconst|ordering|   nconst|category|job|          characters|
+---------+--------+---------+--------+---+--------------------+
|tt0000001|       1|nm1588970|    self| \N|         ["Herself"]|
|tt0000012|       1|nm2880396|    self| \N|         ["Herself"]|
|tt0000012|       2|nm9735580|    self| \N|         ["Himself"]|
|tt0000012|       3|nm0525900|    self| \N|         ["Herself"]|
|tt0000012|       4|nm9735581|    self| \N|         ["Herself"]|
|tt0000012|       7|nm9735579|    self| \N|         ["Herself"]|
|tt0000012|       8|nm9653419|    self| \N|         ["Herself"]|
|tt0000013|       1|nm0525908|    self| \N|         ["Himself"]|
|tt0000013|       2|nm1715062|    self| \N|         ["Himself"]|
|tt0000016|       1|nm0525900|    self| \N|["Herself (on the...|
|tt0000016|       2|nm9735581|    self| \N|["Herself (on the...|
|tt0000024|       1|nm0256651|    self| \N|["Herself - Empre...|
|tt0000024|       2|nm0435118|    self| \N|["Himself - Emper...|
|tt0000028|       1|nm2350838|    self| \N|         ["Himself"]|
|tt0000028|       2|nm0525908|    self| \N|         ["Himself"]|
+---------+--------+---------+--------+---+--------------------+
only showing top 15 rows
```

Movie Ratings

In [12]:
```
#Display the schema
movie_ratings.printSchema()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

root
 |-- tconst: string (nullable = true)
 |-- averageRating: string (nullable = true)
 |-- numVotes: string (nullable = true)
```

In [13]:
```
#Display the first 10 rows in a descending order by the number of votes
movie_ratings = movie_ratings.withColumn("Numvotes", movie_ratings["Numvote
movie_ratings.orderBy(desc("Numvotes")).show(15)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+-------------+---------+
|   tconst|averageRating| Numvotes|
+---------+-------------+---------+
|tt0111161|          9.3|2159745.0|
|tt0468569|          9.0|2134602.0|
|tt1375666|          8.8|1892958.0|
|tt0137523|          8.8|1725444.0|
|tt0110912|          8.9|1695159.0|
|tt0109830|          8.8|1662609.0|
|tt0944947|          9.4|1606096.0|
|tt0133093|          8.7|1554345.0|
|tt0120737|          8.8|1548920.0|
|tt0167260|          8.9|1533632.0|
|tt0068646|          9.2|1482225.0|
|tt1345836|          8.4|1421506.0|
```

Overview of Data

In [14]:
```
#Display the number of rows and columns in each dataFrame object.
num_cols_actors = len(actors.columns)
num_rows_actors = actors.count()
print(f"Number of columns in Actors table: {num_cols_actors}")
print(f"Number of rows in Actors table: {num_rows_actors}")
print()
num_cols_genres = len(genres.columns)
num_rows_genres = genres.count()
print(f"Number of columns in Genres table: {num_cols_genres}")
print(f"Number of rows in Genres table: {num_rows_genres}")
print()
num_cols_movie_actors = len(movie_actors.columns)
num_rows_movie_actors = movie_actors.count()
print(f"Number of columns in Movie Actors table: {num_cols_movie_actors}")
print(f"Number of rows in Movie Actors table: {num_rows_movie_actors}")
print()
num_cols_movie_ratings = len(movie_ratings.columns)
num_rows_movie_ratings = movie_ratings.count()
print(f"Number of columns in Movie Ratings table: {num_cols_movie_ratings}"
print(f"Number of rows in Movie Ratings table: {num_rows_movie_ratings}")
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

Number of columns in Actors table: 6
Number of rows in Actors table: 9706922

Number of columns in Genres table: 9
Number of rows in Genres table: 6321302

Number of columns in Movie Actors table: 6
Number of rows in Movie Actors table: 36468817

Number of columns in Movie Ratings table: 3
Number of rows in Movie Ratings table: 993153
```

PART 2 - Analyzing Genres

In [15]:
```
#Select colums
genres1 = genres.select("tconst","titleType","genres")
genres1.show(5)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+---------+--------------------+
|   tconst|titleType|              genres|
+---------+---------+--------------------+
|tt0000001|    short|   Documentary,Short|
|tt0000002|    short|     Animation,Short|
|tt0000003|    short|Animation,Comedy,...|
|tt0000004|    short|     Animation,Short|
|tt0000005|    short|        Comedy,Short|
+---------+---------+--------------------+
only showing top 5 rows
```

In [16]:
```
#explode genres
seperated_genres = genres.select("tconst", "titleType", explode(split("genr
seperated_genres.show(10)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+---------+-----------+
|   tconst|titleType|     genres|
+---------+---------+-----------+
|tt0000001|    short|Documentary|
|tt0000001|    short|      Short|
|tt0000002|    short|  Animation|
|tt0000002|    short|      Short|
|tt0000003|    short|  Animation|
|tt0000003|    short|     Comedy|
|tt0000003|    short|    Romance|
|tt0000004|    short|  Animation|
|tt0000004|    short|      Short|
|tt0000005|    short|     Comedy|
+---------+---------+-----------+
only showing top 10 rows
```

Unique Genre

In [17]:
```
#finding amount of unique genres
unique_genres = seperated_genres.select("genres").distinct()
unique_genres_count = seperated_genres.select("genres").distinct().count()
print(unique_genres_count)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

29
```

In [18]:
```
#listing unique genres
seperated_genres.select("genres").distinct().show(unique_genres_count)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+-----------+
|     genres|
+-----------+
|    Mystery|
|    Musical|
|      Sport|
|     Action|
|  Talk-Show|
|    Romance|
|   Thriller|
|         \N|
| Reality-TV|
|     Family|
|    Fantasy|
|    History|
|  Animation|
|      Short|
|  Film-Noir|
|     Sci-Fi|
|       News|
|      Drama|
|Documentary|
|    Western|
|     Comedy|
|      Crime|
|        War|
|  Game-Show|
|      Adult|
|      Music|
|  Biography|
|  Adventure|
|     Horror|
+-----------+
```

In [19]:
```
#Removing Null

nll = '\\N'
seperated_genres_filtered = seperated_genres.select("genres") \
    .filter(col("genres") != nll)
seperated_genres_filtered_count = seperated_genres_filtered.distinct().coun
seperated_genres_filtered.distinct().show(seperated_genres_filtered_count)
```

```
VBox()
```

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

```
+-----------+
|     genres|
+-----------+
|    Mystery|
|    Musical|
|      Sport|
|     Action|
|  Talk-Show|
|    Romance|
|   Thriller|
| Reality-TV|
|     Family|
|    Fantasy|
|    History|
|  Animation|
|      Short|
|  Film-Noir|
|     Sci-Fi|
|       News|
|      Drama|
|Documentary|
|    Western|
|     Comedy|
|      Crime|
|        War|
|  Game-Show|
|      Adult|
|      Music|
|  Biography|
|  Adventure|
|     Horror|
+-----------+
```

Top Genres by Movies

In [20]:
```
#removing non-movies
only_movies = genres.filter(genres.titleType == "movie")
separated_movies = only_movies.select("tconst", "titleType", explode(split(
#droping the nulls
separated_movies_filtered = separated_movies.filter(separated_movies.genres
#joining the data
joined_data = movie_ratings.join(separated_movies_filtered, on="tconst", ho
genre_avg_ratings = joined_data.select("genres", "averageRating")
genre_avg_ratings.show(10)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+-------------+
|   genres|averageRating|
+---------+-------------+
|    Drama|          4.2|
|    Drama|          4.2|
|Biography|          4.1|
|    Drama|          4.1|
|  History|          4.1|
|    Drama|          5.7|
|    Drama|          4.6|
|  History|          4.6|
|Biography|          6.3|
|    Drama|          6.3|
+---------+-------------+
only showing top 10 rows
```

In [21]:
```
#displays average rating per genre
genre_avg_ratings_grouped = genre_avg_ratings.groupBy("genres").agg(mean("a
genre_avg_ratings_grouped.show(20)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+-----------+------------------+
|     genres|        avg_rating|
+-----------+------------------+
|    Mystery|5.9404375359815775|
|    Musical|6.2032460545193695|
|     Action|  5.71873406966865|
|      Sport| 6.600145190562614|
|  Talk-Show|               5.8|
|    Romance|6.1257141803973605|
|   Thriller| 5.625967566447332|
| Reality-TV| 6.379310344827585|
|     Family| 6.250560452715202|
|    Fantasy| 5.924820762833381|
|    History| 6.822718115605145|
|  Animation| 6.326203750633556|
|  Film-Noir| 6.636246786632391|
|      Short|              7.26|
|     Sci-Fi| 5.325150008571917|
|       News| 7.200916030534349|
|      Drama| 6.288080210387902|
|Documentary| 7.245469798657718|
|    Western| 5.948970989337962|
|     Comedy| 5.941363108004127|
+-----------+------------------+
only showing top 20 rows
```

Horizontal Bar Chart of Top Genres

In [22]:
```
#putting data in descending order
genre_avg_ratings_grouped_desc = genre_avg_ratings_grouped.orderBy(desc("av
genre_avg_ratings_grouped_desc.show(20)
```

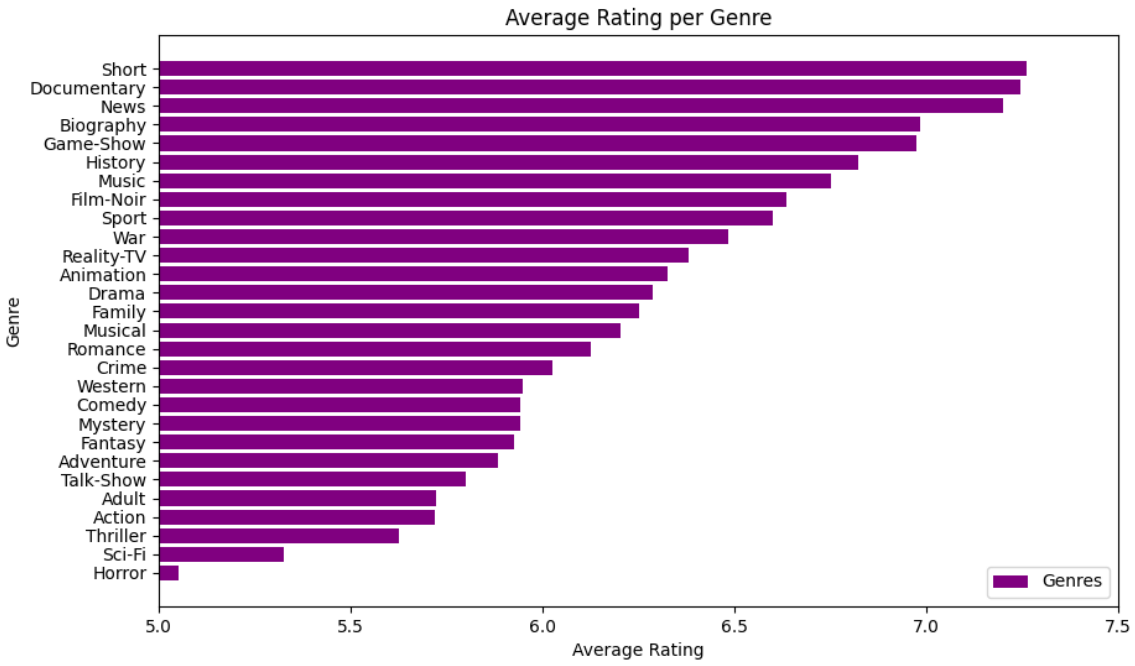
```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+-----------+------------------+
|     genres|        avg_rating|
+-----------+------------------+
|      Short|              7.26|
|Documentary| 7.245469798657718|
|       News|7.2009160305343505|
|  Biography| 6.983637640449438|
|  Game-Show|             6.975|
|    History| 6.822718115605145|
|      Music| 6.752020202020203|
|  Film-Noir| 6.636246786632391|
|      Sport| 6.600145190562614|
|        War| 6.483807030665668|
| Reality-TV| 6.379310344827586|
|  Animation| 6.326203750633553|
|      Drama| 6.288080210387902|
|     Family| 6.250560452715204|
|    Musical|6.2032460545193695|
|    Romance| 6.125714180397362|
|      Crime|  6.02601333268454|
|    Western| 5.948970989337962|
|     Comedy| 5.941363108004129|
|    Mystery|5.9404375359815775|
+-----------+------------------+
only showing top 20 rows
```

In [23]:
```
#Plotting bar chart
genresx = genre_avg_ratings_grouped_desc.rdd.map(lambda x: x.genres).collec
avg_ratingsy = genre_avg_ratings_grouped_desc.rdd.map(lambda x: x.avg_ratin
plt.figure(figsize=(10, 6))
plt.barh(genresx, avg_ratingsy, color='purple',label="Genres")
plt.xlim(5, 7.5)
plt.gca().invert_yaxis()
plt.legend()
plt.legend(loc="lower right")
plt.title("Average Rating per Genre")
plt.xlabel("Average Rating")
plt.ylabel("Genre")
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

Text(0, 0.5, 'Genre')
```

In [24]:
```
%matplot plt
```

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```



PART 3 - Analyzing Job Categories

Total Unique Job Categories

In [25]:
```
#finding unique catagories and amount
seperated_movie_actors = movie_actors.select("tconst","category")
seperated_movie_actors.show(5)
```

```
VBox()
```

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

```
+---------+---------------+
|   tconst|       category|
+---------+---------------+
|tt0000001|           self|
|tt0000001|       director|
|tt0000001|cinematographer|
|tt0000002|       director|
|tt0000002|       composer|
+---------+---------------+
only showing top 5 rows
```

In [26]:
```
#distinct categories / count
unique_movie_actors = seperated_movie_actors.select("category").distinct()
unique_movie_actors_count = seperated_movie_actors.select("category").disti
print(unique_movie_actors_count)
unique_movie_actors.show(unique_movie_actors_count)
```

```
VBox()
```

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

```
12
+------------------+
|          category|
+------------------+
|           actress|
|          producer|
|production_designer|
|            writer|
|             actor|
|   cinematographer|
|     archive_sound|
|   archive_footage|
|              self|
|            editor|
|          composer|
|          director|
+------------------+
```

Top Job Categories

In [27]:
```
#counting amount of categories counted in data
movie_actors_category_count = seperated_movie_actors.groupBy("category").co
movie_actors_category_count.show()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+------------------+-------+
|          category|  count|
+------------------+-------+
|           actress|6325097|
|          producer|2197866|
|production_designer| 285924|
|            writer|4811596|
|             actor|8493701|
|   cinematographer|1300404|
|     archive_sound|   2143|
|   archive_footage| 209035|
|              self|6153089|
|            editor|1197669|
|          composer|1313187|
|          director|4179106|
+------------------+-------+
```

In [28]:
```
#making it in descending order
movie_actors_category_count_desc = movie_actors_category_count.orderBy(desc
movie_actors_category_count_desc.show()
```

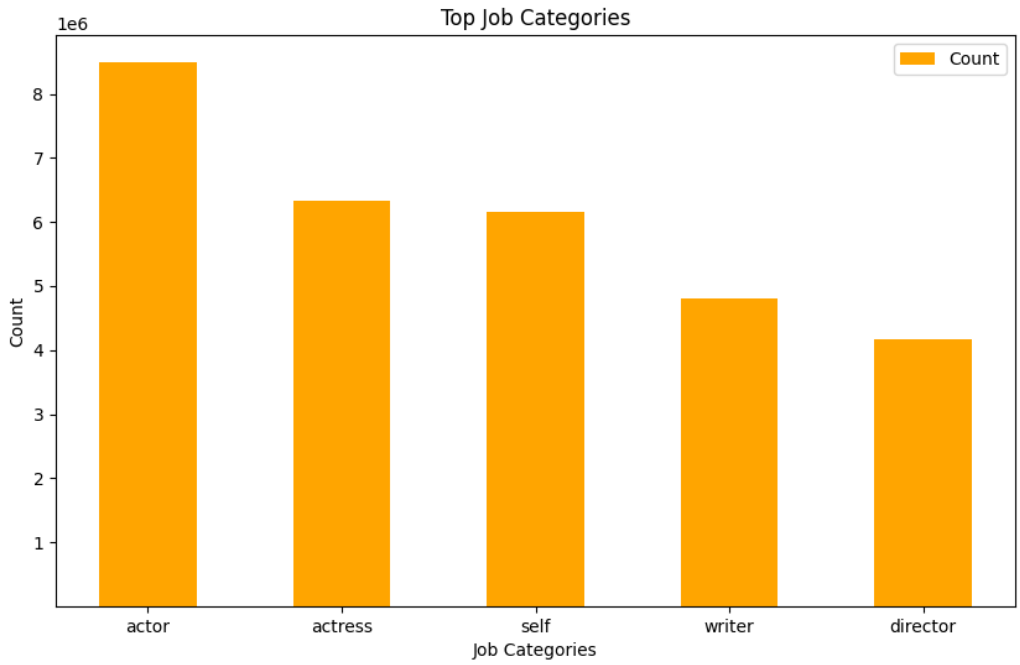
```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+------------------+-------+
|          category|  count|
+------------------+-------+
|             actor|8493701|
|           actress|6325097|
|              self|6153089|
|            writer|4811596|
|          director|4179106|
|          producer|2197866|
|          composer|1313187|
|   cinematographer|1300404|
|            editor|1197669|
|production_designer| 285924|
|   archive_footage| 209035|
|     archive_sound|   2143|
+------------------+-------+
```

In [29]:
```
#graphing Top Job Categories
top_categoryx = movie_actors_category_count_desc.rdd.map(lambda x: x.catego
top_county = movie_actors_category_count_desc.rdd.map(lambda x: x['count'])
plt.figure(figsize=(10, 6))
plt.bar(top_categoryx, top_county, color='orange', label="Count", width=0.5
plt.ylim(bottom=3)
plt.legend(loc="upper right")
plt.title("Top Job Categories")
plt.xlabel("Job Categories")
plt.ylabel("Count")
plt.show()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

In [30]:
```
%matplot plt
```

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```



PART 4 - Answer to the following questions:

1) Find all the movies acted by both Johnny Depp and Helena Bonham Carter

In [31]:
```
#joining  actors, genres, and movie_actors
genres_movies_only = genres.filter(genres.titleType == "movie")
movie_actors_filtered = movie_actors.filter((col("category") == "actor") |
combine_dfs = actors.join(movie_actors_filtered, on='nconst', how='inner')
combine_dfs1 = combine_dfs.join(genres_movies_only, on='tconst', how='inner
combine_dfs_final = combine_dfs1.select("primaryName", "knownForTitles", "p
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

In [32]:
```
#finding Johnny Depp and Helena Bonham Carter movies
johnny_depp_movies = combine_dfs_final.filter(combine_dfs_final.primaryName
helena_bonham_carter_movies = combine_dfs_final.filter(combine_dfs_final.pr

johnny_depp_tc = [row.tconst for row in johnny_depp_movies.collect()]
helena_bonham_carter_tc = [row.tconst for row in helena_bonham_carter_movie

common_tc = list(set(johnny_depp_tc).intersection(helena_bonham_carter_tc))

common_movies = genres_movies_only.filter(genres_movies_only.tconst.isin(co

common_movies.select("primaryTitle").show(truncate=False)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+----------------------------------------------+
|primaryTitle                                  |
+----------------------------------------------+
|Corpse Bride                                  |
|Charlie and the Chocolate Factory             |
|Sweeney Todd: The Demon Barber of Fleet Street|
|Alice in Wonderland                           |
|Dark Shadows                                  |
|Alice Through the Looking Glass               |
+----------------------------------------------+
```

2) Find all the movies acted by Brad Pitt after 2010.

In [33]:
```
#Finding all the movies acted by Brad Pitt after 2010.
combine_dfs_final = combine_dfs_final.withColumn("startYear", combine_dfs_f

brad_pitt_movies = combine_dfs_final.filter((combine_dfs_final.primaryName
                                             (combine_dfs_final.startYear >
                                             col("startYear").isNotNull())
brad_pitt_movies_titles_years = brad_pitt_movies.select("primaryTitle", "st
brad_pitt_movies_titles_years_sorted = brad_pitt_movies_titles_years.orderB
brad_pitt_movies_titles_years_sorted.show(truncate=False)
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+--------------------------------+---------+
|primaryTitle                    |startYear|
+--------------------------------+---------+
|Babylon                         |2021     |
|Ad Astra                        |2019     |
|Once Upon a Time ... in Hollywood|2019     |
|War Machine                     |2017     |
|Allied                          |2016     |
|By the Sea                      |2015     |
|The Big Short                   |2015     |
|Fury                            |2014     |
|World War Z                     |2013     |
|12 Years a Slave                |2013     |
|Killing Them Softly             |2012     |
|Moneyball                       |2011     |
```

What is the number of movies acted by Zendaya per year

In [34]:
```
#Finding number of zendaya movies by year
zendaya_movies = combine_dfs_final.filter((combine_dfs_final.primaryName ==
zendaya_movies_by_year = zendaya_movies.groupBy("startYear").agg(count("tco
zendaya_movies_by_year_sorted = zendaya_movies_by_year.orderBy("startYear")
zendaya_movies_by_year_sorted.show()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+----------+
|startYear|num_movies|
+---------+----------+
|     2017|         1|
|     2018|         2|
|     2020|         1|
+---------+----------+
```

4) What are the movies by average rating greater than 9.7 and released in 2019?

In [35]:
```
#putting movies rated > 9.7 in year 2019 in descending order
movie_ratings = movie_ratings.withColumn("averageRating", movie_ratings["av
genres_movies_only = genres_movies_only.withColumn("startYear", genres_movi
high_rated_movies = movie_ratings.filter(movie_ratings.averageRating > 9.7)
movies_2019 = genres_movies_only.filter(genres_movies_only.startYear == 201
high_rated_movies_2019 = high_rated_movies.join(movies_2019, on='tconst', h
high_rated_movies_2019_titles = high_rated_movies_2019.select("primaryTitle
high_rated_movies_2019_titles_sorted = high_rated_movies_2019_titles.orderB
high_rated_movies_2019_titles_sorted.show(truncate=False)
```

```
VBox()
```

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

```
+--------------------------------------------------+-------------+
|primaryTitle                                      |averageRating|
+--------------------------------------------------+-------------+
|A Grunt's Life                                    |10.0         |
|Our Scripted Life                                 |10.0         |
|The Twilight Zone: A 60th Anniversary Celebration|10.0         |
|The Butcher Baronet                               |10.0         |
|Kirket                                            |10.0         |
|A Medicine for the Mind                           |10.0         |
|Love in Kilnerry                                  |10.0         |
|L'Enfant Terrible                                 |10.0         |
|Bu Can Var Oldugu Sürece                          |10.0         |
|Superhombre                                       |9.9          |
|Puritan: All of Life to The Glory of God          |9.9          |
|The Cardinal                                      |9.9          |
|Randhawa                                          |9.8          |
|Gini Helida Kathe                                 |9.8          |
|We Shall Not Die Now                              |9.8          |
|Kamen Rider Zi-O: Over Quartzer                   |9.8          |
|Square One                                        |9.8          |
|Time and motion                                   |9.8          |
|From Shock to Awe                                 |9.8          |
+--------------------------------------------------+-------------+
```

Extra Credit - Analysis of your choice (3 pts)

What are the top 15 most common birth years for Actors who are alive currently, and how many currently alive actors were born in each of those years?

In [136]:
```
living_actors = actors.filter(col("primaryProfession").isin("actor", "actre
birthyear_count = living_actors.groupBy("birthYear").count()
top_birth_years = birthyear_count.orderBy(col("count").desc()).limit(15)
top_birth_years.show()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

+---------+-----+
|birthYear|count|
+---------+-----+
|     1980| 2818|
|     1979| 2722|
|     1982| 2709|
|     1978| 2661|
|     1981| 2642|
|     1984| 2569|
|     1983| 2554|
|     1985| 2542|
|     1986| 2536|
|     1976| 2504|
|     1977| 2450|
|     1987| 2356|
|     1975| 2281|
|     1974| 2258|
|     1988| 2228|
+---------+-----+
```

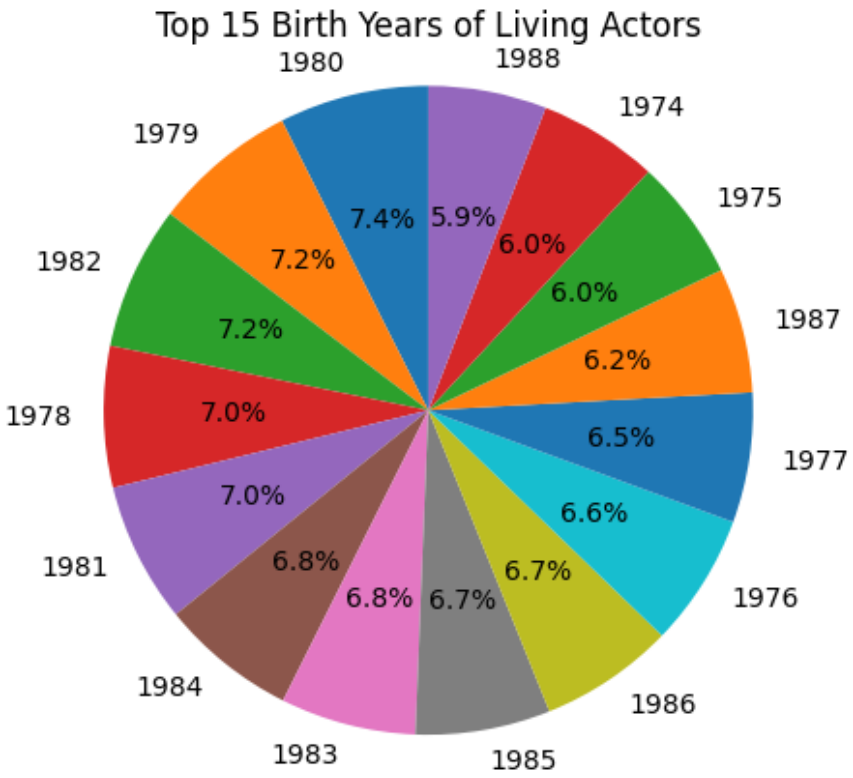
Pie Chart of top birth years of living actors

In [137]:
```
data = top_birth_years.collect()
birth_years = [row['birthYear'] for row in data]
counts = [row['count'] for row in data]

# Creating a pie chart
fig, ax = plt.subplots()
ax.pie(counts, labels=birth_years, autopct='%1.1f%%', startangle=90)

ax.axis('equal')

plt.title('Top 15 Birth Years of Living Actors')
plt.show()
```

```
VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```

In [138]:
```
%matplot plt
```

```
FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…
```



Extra Credit - Answering a question of your choice (3 pts)

Who are the Actors / Actresses with the most movies made on or after the year 2000 (excluding adult movies.) What is the average rating of the films they've feautred in?

In [132]:
```
actors_filtered = actors.filter(col("primaryProfession").contains("actor")

actor_movie_join = actors_filtered.join(movie_actors, "nconst")

only_movies = genres.filter((genres.titleType == "movie") & (genres.startYe
actor_movie_only_movies_join = actor_movie_join.join(only_movies, "tconst")
actor_movie_rating_join = actor_movie_only_movies_join.join(movie_ratings,
actor_avg_rating = actor_movie_rating_join.groupBy("nconst", "primaryName")

top_actors = actor_avg_rating.sort(col("movie_count").desc(), col("avg_rati
top_actors.select("primaryName","avg_rating","movie_count").show()
```

VBox()

FloatProgress(value=0.0, bar_style='info', description='Progress:', layou
t=Layout(height='25px', width='50%'),…

```
+--------------------+------------------+-----------+
|         primaryName|        avg_rating|movie_count|
+--------------------+------------------+-----------+
|        Eric Roberts|  4.61864951339182|        311|
|        Brahmanandam| 5.333333349695392|        306|
|         Prakash Raj| 6.113907283505067|        302|
|            Mohanlal| 5.420982139451163|        224|
|           Mammootty| 5.543601884661127|        211|
|                 Ali| 5.462200946785046|        209|
|      Michael Madsen|  4.58557692857889|        208|
|        Paulo Branco| 5.958937180790924|        207|
|          Jason Blum| 5.788442209138343|        199|
|   Rabiranjan Maitra| 6.468686869650176|        198|
|        Akshay Kumar| 5.691919170244776|        198|
|         Anupam Kher| 5.439086283524024|        197|
|        Tom Sizemore|4.9819148829642765|        188|
|Prithviraj Sukumaran| 6.106989242697275|        186|
|         Danny Trejo|  4.96408837671438|        181|
|    Amitabh Bachchan| 6.001111094156901|        180|
|        Nicolas Cage| 5.846067403139693|        178|
|           Tim Bevan| 6.771428565979004|        175|
|              Dileep| 5.554022965760066|        174|
|        James Franco| 5.891907519687807|        173|
+--------------------+------------------+-----------+
```

In [ ]:

In [ ]: