Project 2: Analyzing IMDb Data

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For project two, you will complete a series of exercises exploring movie rating data from IMDb.

For these exercises, you will be conducting basic exploratory data analysis on IMDB's movie data, looking to answer such questions as:

What is the average rating per genre? How many different actors are in a movie?

This process will help you practice your data analysis skills while becoming comfortable with Pandas.

Basic level

In [2]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np

%matplotlib inline
```

Read in 'imdb_1000.csv' and store it in a DataFrame named movies.

In [3]:
```
movies = pd.read_csv('/Users/swllms/DAT-10-14-SW/projects/required/project-eda-options/data/imdb_1000.csv')
movies.head()
```

Out[3]:

	star_rating	title	content_rating	genre	duration	actors_list
0	9.3	The Shawshank Redemption	R	Crime	142	[u'Tim Robbins', u'Morgan Freeman', u'Bob Gunt...
1	9.2	The Godfather	R	Crime	175	[u'Marlon Brando', u'Al Pacino', u'James Caan']
2	9.1	The Godfather: Part II	R	Crime	200	[u'Al Pacino', u'Robert De Niro', u'Robert Duv...
3	9.0	The Dark Knight	PG-13	Action	152	[u'Christian Bale', u'Heath Ledger', u'Aaron E...
4	8.9	Pulp Fiction	R	Crime	154	[u'John Travolta', u'Uma Thurman', u'Samuel L....

Check the number of rows and columns.

In [4]:
```
# Answer:
movies.shape
```

Out[4]:
```
(979, 6)
```

Check the data type of each column.

In [5]:
```
# Answer:
movies.dtypes
```

Out[5]:
```
star_rating       float64
title              object
content_rating     object
genre              object
duration            int64
actors_list        object
dtype: object
```

Calculate the average movie duration.

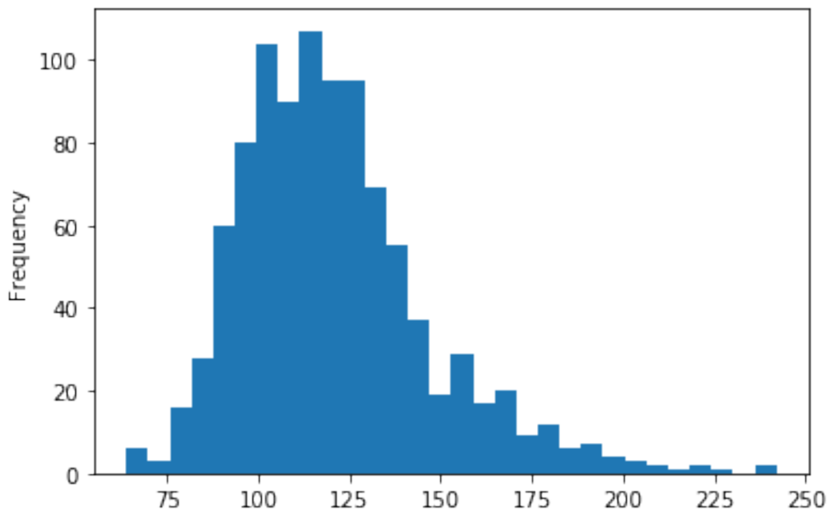
```
In [6]: # Answer:
        movies['duration'].mean()

Out[6]: 120.97957099080695
```

Sort the DataFrame by duration to find the shortest and longest movies.

```
In [7]: # Answer: could have also used nsmallest and nlargest
        movies['duration'].nsmallest(1)

Out[7]: 389    64
        Name: duration, dtype: int64

In [8]: movies['duration'].nlargest(1)

Out[8]: 476    242
        Name: duration, dtype: int64
```

Create a histogram of duration, choosing an "appropriate" number of bins.

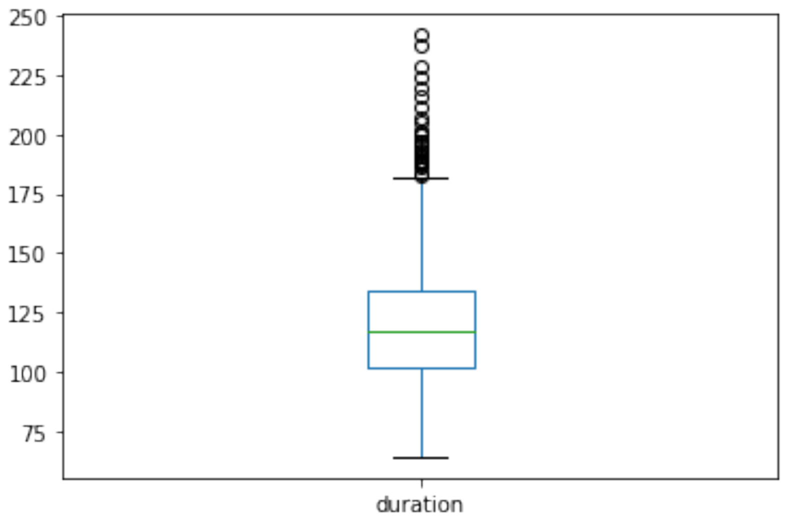
```
In [11]: # Answer:
         movies['duration'].plot(kind='Hist', bins=30)

Out[11]: <matplotlib.axes._subplots.AxesSubplot at 0x1a19f3f7f0>
```



Use a box plot to display that same data.

In [12]:
```
# Answer:
movies['duration'].plot(kind='box')
```

Out[12]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a19f6cfd0>
```



Intermediate level

Count how many movies have each of the content ratings.

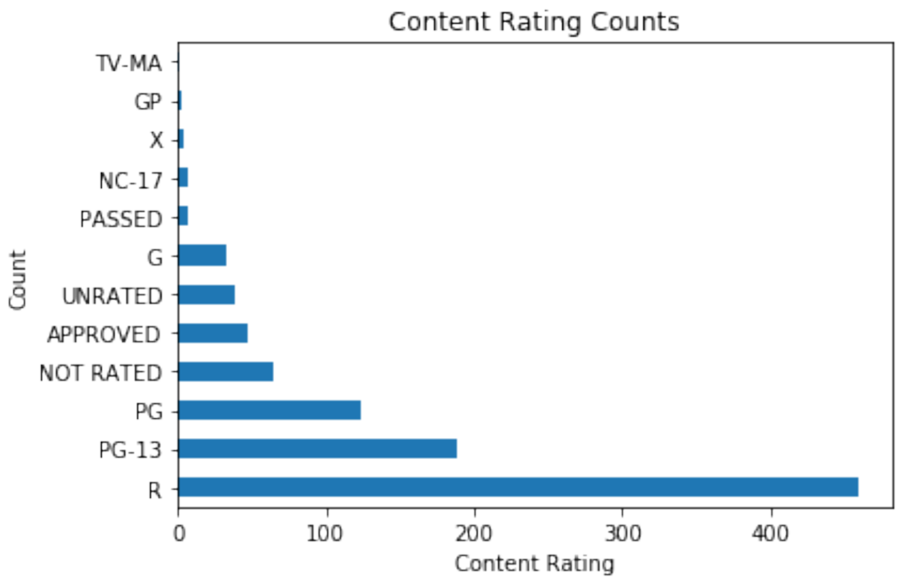
In [13]:
```
# Answer:
movies['content_rating'].value_counts()
```

Out[13]:
```
R            460
PG-13        189
PG           123
NOT RATED     65
APPROVED      47
UNRATED       38
G             32
PASSED         7
NC-17          7
X              4
GP             3
TV-MA          1
Name: content_rating, dtype: int64
```

Use a visualization to display that same data, including a title and x and y labels.

In [14]:
```
# Answer:
movies.content_rating.value_counts().plot(kind='barh', title='Content
Rating Counts')
plt.xlabel('Content Rating')
plt.ylabel('Count')
```

Out[14]:
```
Text(0, 0.5, 'Count')
```



Convert the following content ratings to "UNRATED": NOT RATED, APPROVED, PASSED, GP.

In [15]:
```
# Answer: Condition and result logic
movies['content_rating'] = movies['content_rating'].replace({'NOT RATE
D':'UNRATED', 'APPROVED':'UNRATED', 'PASSED':'UNRATED', 'GP':'UNRATED'
})
```

In [16]:
```
movies['content_rating'].value_counts()
```

Out[16]:
```
R            460
PG-13        189
UNRATED      160
PG           123
G             32
NC-17          7
X              4
TV-MA          1
Name: content_rating, dtype: int64
```

Convert the following content ratings to "NC-17": X, TV-MA.

In [17]:
```
# Answer: Condition and result logic
movies['content_rating'] = movies['content_rating'].replace({'X':'NC-1
7', 'TV-MA':'NC-17'})
```

In [18]:
```
movies['content_rating'].value_counts()
```

Out[18]:
```
R          460
PG-13      189
UNRATED    160
PG         123
G           32
NC-17       12
Name: content_rating, dtype: int64
```

Count the number of missing values in each column.

In [19]:
```
# Answer:
movies.isnull().sum()
```

Out[19]:
```
star_rating       0
title             0
content_rating    3
genre             0
duration          0
actors_list       0
dtype: int64
```

If there are missing values: examine them, then fill them in with "reasonable" values.

In [20]:
```
# Answer: 3 missing values;
movies.content_rating.fillna(value='UNRATED', inplace=True)
```

In [21]:
```
movies.isnull().sum()
```

Out[21]:
```
star_rating       0
title             0
content_rating    0
genre             0
duration          0
actors_list       0
dtype: int64
```

Calculate the average star rating for movies 2 hours or longer, and compare that with the average star rating for movies shorter than 2 hours.

In [22]:
```
# Answer:
movies[movies['duration'] >=120]['star_rating'].mean()
```

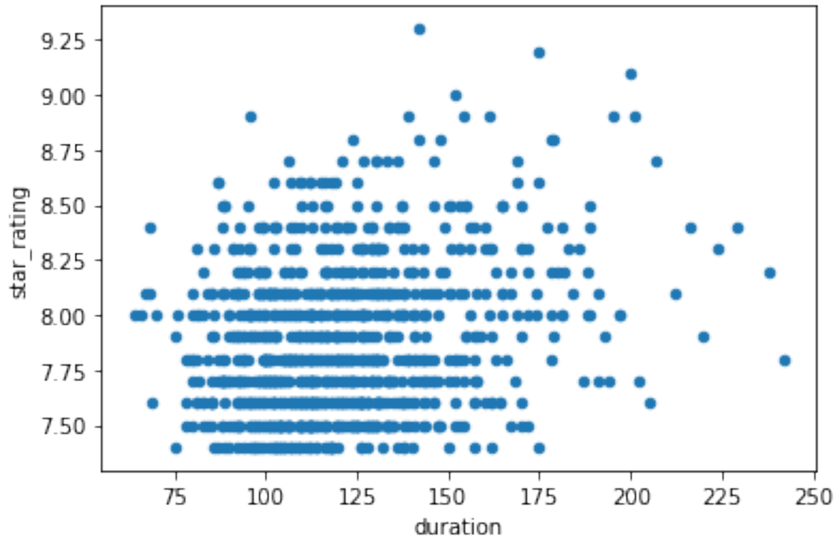
Out[22]:
```
7.948898678414082
```

In [23]:
```
movies[movies['duration'] <120]['star_rating'].mean()
```

Out[23]:
```
7.838666666666657
```

Use a visualization to detect whether there is a relationship between duration and star rating.

In [24]:
```
# Answer:
movies.plot('duration', 'star_rating', kind='scatter');
```



Calculate the average duration for each genre.

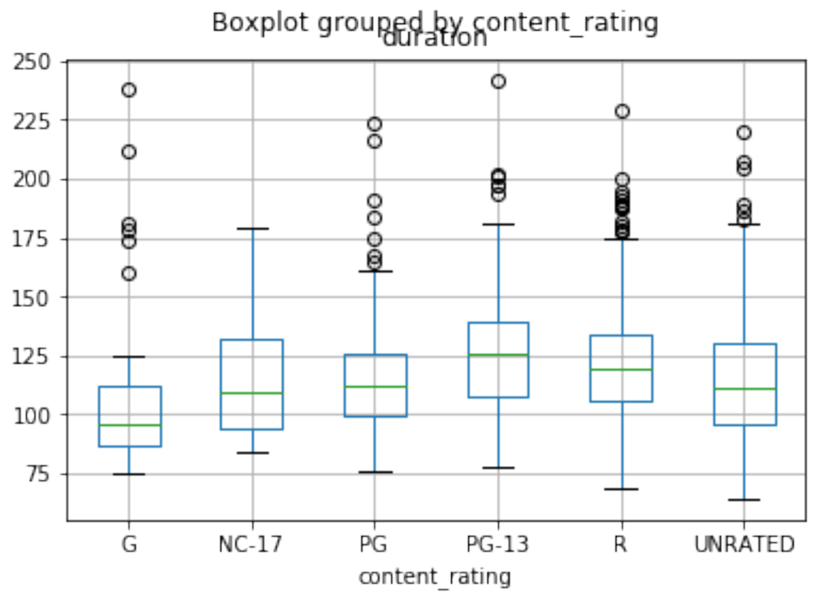
```
In [25]: # Answer: Use groupby for genre and duration and take the mean
         movies.groupby('genre')['duration'].mean()
```

```
Out[25]: genre
         Action       126.485294
         Adventure    134.840000
         Animation     96.596774
         Biography    131.844156
         Comedy       107.602564
         Crime        122.298387
         Drama        126.539568
         Family       107.500000
         Fantasy      112.000000
         Film-Noir     97.333333
         History       66.000000
         Horror       102.517241
         Mystery      115.625000
         Sci-Fi       109.000000
         Thriller     114.200000
         Western      136.666667
         Name: duration, dtype: float64
```

Advanced level

Visualize the relationship between content rating and duration.

In [26]:
```
# Answer:
movies.boxplot(column='duration', by='content_rating');
```



Determine the top rated movie (by star rating) for each genre.

In [27]:
```
# Answer:
movies.groupby('genre')['title', 'star_rating'].first()
```

Out[27]:

genre	title	star_rating
Action	The Dark Knight	9.0
Adventure	The Lord of the Rings: The Return of the King	8.9
Animation	Spirited Away	8.6
Biography	Schindler's List	8.9
Comedy	Life Is Beautiful	8.6
Crime	The Shawshank Redemption	9.3
Drama	12 Angry Men	8.9
Family	E.T. the Extra-Terrestrial	7.9
Fantasy	The City of Lost Children	7.7
Film-Noir	The Third Man	8.3
History	Battleship Potemkin	8.0
Horror	Psycho	8.6
Mystery	Rear Window	8.6
Sci-Fi	Blade Runner	8.2
Thriller	Shadow of a Doubt	8.0
Western	The Good, the Bad and the Ugly	8.9

Check if there are multiple movies with the same title, and if so, determine if they are actually duplicates.

In [28]:
```
# Answer: same title but different actors and movie durations.
movies.duplicated(['title']).sum()
```

Out[28]:
```
4
```

In [29]:
```
dups = movies[movies.title.duplicated()].title
dups
```

Out[29]:
```
482    The Girl with the Dragon Tattoo
905                            Dracula
924                     Les Miserables
936                          True Grit
Name: title, dtype: object
```

In [30]:
```
movies[movies.title.isin(dups)]#different duration and different actor
list.
```

Out[30]:

	star_rating	title	content_rating	genre	duration	actors_list
466	7.9	The Girl with the Dragon Tattoo	R	Crime	158	[u'Daniel Craig', u'Rooney Mara', u'Christophe...
482	7.8	The Girl with the Dragon Tattoo	R	Crime	152	[u'Michael Nyqvist', u'Noomi Rapace', u'Ewa Fr...
662	7.7	True Grit	PG-13	Adventure	110	[u'Jeff Bridges', u'Matt Damon', u'Hailee Stei...
678	7.7	Les Miserables	PG-13	Drama	158	[u'Hugh Jackman', u'Russell Crowe', u'Anne Hat...
703	7.6	Dracula	UNRATED	Horror	85	[u'Bela Lugosi', u'Helen Chandler', u'David Ma...
905	7.5	Dracula	R	Horror	128	[u'Gary Oldman', u'Winona Ryder', u'Anthony Ho...
924	7.5	Les Miserables	PG-13	Crime	134	[u'Liam Neeson', u'Geoffrey Rush', u'Uma Thurm...
936	7.4	True Grit	UNRATED	Adventure	128	[u'John Wayne', u'Kim Darby', u'Glen Campbell']

Calculate the average star rating for each genre, but only include genres with at least 10 movies

Option 1: manually create a list of relevant genres, then filter using that list

In [9]:
```
# Answer:
```

Option 2: automatically create a list of relevant genres by saving the value_counts and then filtering

In [31]:
```
# Answer:
rel_genres = movies['genre'].value_counts()
rel_genres
```

Out[31]:
```
Drama        278
Comedy       156
Action       136
Crime        124
Biography     77
Adventure     75
Animation     62
Horror        29
Mystery       16
Western        9
Thriller       5
Sci-Fi         5
Film-Noir      3
Family         2
Fantasy        1
History        1
Name: genre, dtype: int64
```

Option 3: calculate the average star rating for all genres, then filter using a boolean Series

In [32]:
```
# Answer:
movies.groupby('genre').star_rating.mean()[movies.genre.value_counts()
>= 10]
```

Out[32]:
```
genre
Action       7.884559
Adventure    7.933333
Animation    7.914516
Biography    7.862338
Comedy       7.822436
Crime        7.916935
Drama        7.902518
Horror       7.806897
Mystery      7.975000
Name: star_rating, dtype: float64
```

Option 4: aggregate by count and mean, then filter using the count

In [38]:
```
# Answer:
grs = movies.groupby('genre')['star_rating'].agg(['count', 'mean'])
grs[grs['count'] >= 10]
```

Out[38]:

genre	count	mean
Action	136	7.884559
Adventure	75	7.933333
Animation	62	7.914516
Biography	77	7.862338
Comedy	156	7.822436
Crime	124	7.916935
Drama	278	7.902518
Horror	29	7.806897
Mystery	16	7.975000

Bonus

Figure out something "interesting" using the actors data!

In [45]:
```
movies.actors_list.value_counts() ##Order counts and may not count mov
ies with the same cast
###Harry Potter Cast had 6 Movies together, followed by Star Wars, Bac
k to the Future and Toy Stroy
```

Out[45]:
```
[u'Daniel Radcliffe', u'Emma Watson', u'Rupert Grint']
6
[u'Mark Hamill', u'Harrison Ford', u'Carrie Fisher']
3
[u'Michael J. Fox', u'Christopher Lloyd', u'Lea Thompson']
2
[u'Tom Hanks', u'Tim Allen', u'Joan Cusack']
2
[u'Ian McKellen', u'Martin Freeman', u'Richard Armitage']
2
[u'Robert Downey Jr.', u'Jude Law', u'Rachel McAdams']
1
[u'Heather Langenkamp', u'Johnny Depp', u'Robert Englund']
```

```
1
[u'Matthew McConaughey', u'Tye Sheridan', u'Jacob Lofland']
1
[u'Ryan Potter', u'Scott Adsit', u'Jamie Chung']
1
[u'Daniel Day-Lewis', u'Madeleine Stowe', u'Russell Means']
1
[u'Gregory Peck', u'Lee Remick', u'Harvey Stephens']
1
[u'Shah Rukh Khan', u'Kajol', u'Amrish Puri']
1
[u'Will Ferrell', u'Emma Thompson', u'Dustin Hoffman']
1
[u'Tom Hanks', u'Tyler Hoechlin', u'Rob Maxey']
1
[u'Patrick Stewart', u'Hugh Jackman', u'Ian McKellen']
1
[u'Richard E. Grant', u'Paul McGann', u'Richard Griffiths']
1
[u'Brad Davis', u'Irene Miracle', u'Bo Hopkins']
1
[u'Patrick Stewart', u'Ian McKellen', u'Hugh Jackman']
1
[u'Catalina Sandino Moreno', u'Guilied Lopez', u'Orlando Tob\xf3n']
1
[u'Edward Norton', u'Edward Furlong', u"Beverly D'Angelo"]
1
[u'Vladimir Garin', u'Ivan Dobronravov', u'Konstantin Lavronenko']
1
[u'Brad Pitt', u'Robin Wright', u'Jonah Hill']
1
[u'Ulrich M\xfche', u'Martina Gedeck', u'Sebastian Koch']
1
[u'Sterling Hayden', u'Coleen Gray', u'Vince Edwards']
1
[u'Robert De Niro', u'Charles Grodin', u'Yaphet Kotto']
1
[u'William Holden', u'Gloria Swanson', u'Erich von Stroheim']
1
[u'Jake Gyllenhaal', u'Chris Cooper', u'Laura Dern']
1
[u'Jon Voight', u'Burt Reynolds', u'Ned Beatty']
1
[u'Mel Gibson', u'Danny Glover', u'Gary Busey']
1
[u'Harrison Ford', u'Tommy Lee Jones', u'Sela Ward']
1

..
[u'Sh\xfbichir\xf4 Moriyama', u'Tokiko Kat\xf4', u'Sanshi Katsura']
```

```
1
[u'Hayden Christensen', u'Natalie Portman', u'Ewan McGregor']
1
[u'Pam Grier', u'Samuel L. Jackson', u'Robert Forster']
1
[u'Ryan Gosling', u'Michelle Williams', u'John Doman']
1
[u'Paul Giamatti', u'Shari Springer Berman', u'Harvey Pekar']
1
[u'Christian Bale', u'Jennifer Jason Leigh', u'Aitana S\xe1nchez-Gij
\xf3n']    1
[u'Susan Sarandon', u'Sean Penn', u'Robert Prosky']
1
[u'Liza Minnelli', u'Michael York', u'Helmut Griem']
1
[u'Joe Pesci', u'Marisa Tomei', u'Ralph Macchio']
1
[u'Tatsuya Fujiwara', u'Aki Maeda', u'Tar\xf4 Yamamoto']
1
[u'Graham Chapman', u'John Cleese', u'Eric Idle']
1
[u'Logan Lerman', u'Emma Watson', u'Ezra Miller']
1
[u'Tom Hardy', u'Nick Nolte', u'Joel Edgerton']
1
[u'Paul Newman', u'George Kennedy', u'Strother Martin']
1
[u'Denzel Washington', u'Angela Bassett', u'Delroy Lindo']
1
[u'Mickey Rourke', u'Clive Owen', u'Bruce Willis']
1
[u'Ben Affleck', u'Bryan Cranston', u'John Goodman']
1
[u'Nicole Kidman', u'Paul Bettany', u'Lauren Bacall']
1
[u'Anna Paquin', u'James Van Der Beek', u'Cloris Leachman']
1
[u'Brigitte Helm', u'Alfred Abel', u'Gustav Fr\xf6hlich']
1
[u'Ellen Page', u'Michael Cera', u'Jennifer Garner']
1
[u'Sean Connery', u'Michael Caine', u'Christopher Plummer']
1
[u'Nicolas Cage', u'Holly Hunter', u'Trey Wilson']
1
[u'Eric Bana', u'Daniel Craig', u'Marie-Jos\xe9e Croze']
1
[u'Richard Burton', u'Clint Eastwood', u'Mary Ure']
1
[u'Al Pacino', u'Sean Penn', u'Penelope Ann Miller']
```

```
1
[u'Cary Grant', u'Ingrid Bergman', u'Claude Rains']
1
[u'Daniel Day-Lewis', u'Sally Field', u'David Strathairn']
1
[u'Charlton Heston', u'Orson Welles', u'Janet Leigh']
1
[u'Leonardo DiCaprio', u'Djimon Hounsou', u'Jennifer Connelly']
1
Name: actors_list, Length: 969, dtype: int64
```

In [55]:
```
hanks = movies.actors_list.str.contains("Tom Hanks")
```

In [58]:
```
hanks.value_counts() ###Tom Hanks has been in 14 of the 1000 movies li
sted
```

Out[58]:
```
False    965
True      14
Name: actors_list, dtype: int64
```

In [61]:
```
DH = movies.actors_list.str.contains("Patrick Stewart")
```

In [62]:
```
DH.value_counts()
```

Out[62]:
```
False    975
True       4
Name: actors_list, dtype: int64
```

In [14]:
```
movies.star_rating.nsmallest(1)
```

Out[14]:
```
930    7.4
Name: star_rating, dtype: float64
```

In [ ]: