Recommender System

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create a recommender system that allows users to input a movie they like (in the data set) and recommends ten other movies for them to watch.

Outline

- Building a simple Movie Recommendation System using the MovieLens dataset
- Download the dataset from https://grouplens.org/datasets/movielens/ (https://grouplens.org/datasets/movielens/)
- Copy the codes from https://analyticsindiamag.com/how-to-build-your-first-recommender-system-using-python-movielens-dataset/ (https://analyticsindiamag.com/how-to-build-your-first-recommender-system-using-python-movielens-dataset/)

The data consists of the following datasets:

- UserId: ID for the user who rates the movies
- movieId: the ID of Movies that is rated
- rating: the rating given by the user of that particular movies
- timesteps: time at which the rating was recorded
- title: corresponding title
- genres: genre of each movie

Import and clean data

In [1]:
```
#Loading the data
import numpy as np
import pandas as pd
```

In [2]:
```
data = pd.read_csv('ratings.csv')
data.head(10)
```

Out[2]:

	userId	movieId	rating	timestamp
0	1	1	4.0	964982703
1	1	3	4.0	964981247
2	1	6	4.0	964982224
3	1	47	5.0	964983815
4	1	50	5.0	964982931
5	1	70	3.0	964982400
6	1	101	5.0	964980868
7	1	110	4.0	964982176
8	1	151	5.0	964984041
9	1	157	5.0	964984100

In [3]:
```
movie_titles_genre = pd.read_csv("movies.csv")
movie_titles_genre.head(10)
```

Out[3]:

	movieId	title	genres
0	1	Toy Story (1995)	Adventure|Animation|Children|Comedy|Fantasy
1	2	Jumanji (1995)	Adventure|Children|Fantasy
2	3	Grumpier Old Men (1995)	Comedy|Romance
3	4	Waiting to Exhale (1995)	Comedy|Drama|Romance
4	5	Father of the Bride Part II (1995)	Comedy
5	6	Heat (1995)	Action|Crime|Thriller
6	7	Sabrina (1995)	Comedy|Romance
7	8	Tom and Huck (1995)	Adventure|Children
8	9	Sudden Death (1995)	Action
9	10	GoldenEye (1995)	Action|Adventure|Thriller

In [4]:
```
data = data.merge(movie_titles_genre,on='movieId', how='left')
data.head(10)
```

Out[4]:

	userId	movieId	rating	timestamp	title	genres
0	1	1	4.0	964982703	Toy Story (1995)	Adventure|Animation|Children|Comedy|Fantasy
1	1	3	4.0	964981247	Grumpier Old Men (1995)	Comedy|Romance
2	1	6	4.0	964982224	Heat (1995)	Action|Crime|Thriller
3	1	47	5.0	964983815	Seven (a.k.a. Se7en) (1995)	Mystery|Thriller
4	1	50	5.0	964982931	Usual Suspects, The (1995)	Crime|Mystery|Thriller
5	1	70	3.0	964982400	From Dusk Till Dawn (1996)	Action|Comedy|Horror|Thriller
6	1	101	5.0	964980868	Bottle Rocket (1996)	Adventure|Comedy|Crime|Romance
7	1	110	4.0	964982176	Braveheart (1995)	Action|Drama|War
8	1	151	5.0	964984041	Rob Roy (1995)	Action|Drama|Romance|War
9	1	157	5.0	964984100	Canadian Bacon (1995)	Comedy|War

In [5]:
```
# find out the average rating for each and every movie in the dataset
Average_ratings = pd.DataFrame(data.groupby('title')['rating'].mean())
Average_ratings.head(10)
```

Out[5]:

title	rating
'71 (2014)	4.000000
'Hellboy': The Seeds of Creation (2004)	4.000000
'Round Midnight (1986)	3.500000
'Salem's Lot (2004)	5.000000
'Til There Was You (1997)	4.000000
'Tis the Season for Love (2015)	1.500000
'burbs, The (1989)	3.176471
'night Mother (1986)	3.000000
(500) Days of Summer (2009)	3.666667
***batteries not included (1987)**	3.285714

In [6]:
```
#Find out the total ratings cast for each movie
Average_ratings['Total Ratings'] = pd.DataFrame(data.groupby('title')['rating
Average_ratings.head(10)
```

Out[6]:

title	rating	Total Ratings
'71 (2014)	4.000000	1
'Hellboy': The Seeds of Creation (2004)	4.000000	1
'Round Midnight (1986)	3.500000	2
'Salem's Lot (2004)	5.000000	1
'Til There Was You (1997)	4.000000	2
'Tis the Season for Love (2015)	1.500000	1
'burbs, The (1989)	3.176471	17
'night Mother (1986)	3.000000	1
(500) Days of Summer (2009)	3.666667	42
***batteries not included (1987)**	3.285714	7

In [7]:
```
# Sorting values according to the 'Total Ratings'
moviemat = data.pivot_table(index ='userId',
              columns ='title', values ='rating')

moviemat.head()

Average_ratings.sort_values('Total Ratings', ascending = False).head(10)
```

Out[7]:

title	rating	Total Ratings
Forrest Gump (1994)	4.164134	329
Shawshank Redemption, The (1994)	4.429022	317
Pulp Fiction (1994)	4.197068	307
Silence of the Lambs, The (1991)	4.161290	279
Matrix, The (1999)	4.192446	278
Star Wars: Episode IV - A New Hope (1977)	4.231076	251
Jurassic Park (1993)	3.750000	238
Braveheart (1995)	4.031646	237
Terminator 2: Judgment Day (1991)	3.970982	224
Schindler's List (1993)	4.225000	220

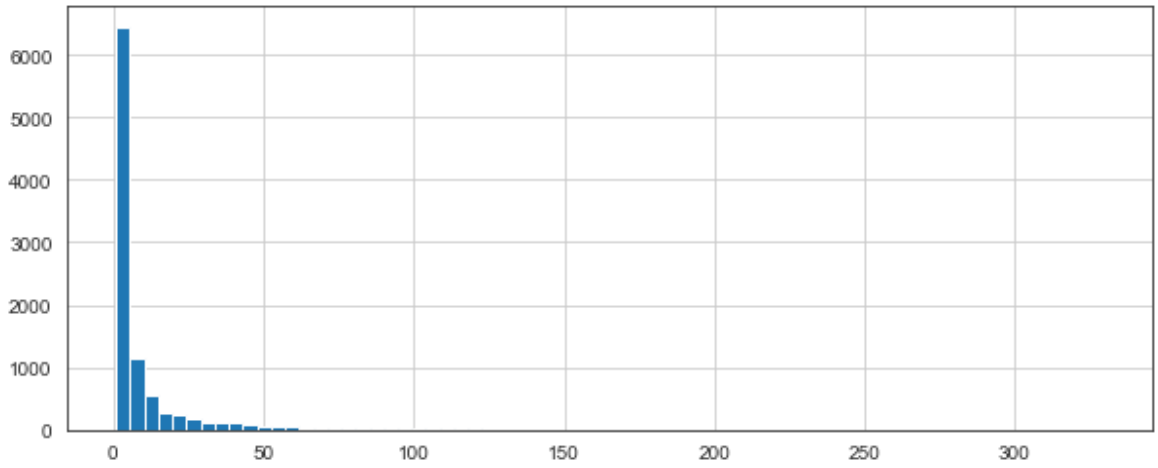
In [8]:
```
import matplotlib.pyplot as plt
import seaborn as sns

sns.set_style('white')
%matplotlib inline
```

In [9]:
```
# plot graph of 'Total Ratings column'
plt.figure(figsize =(10, 4))

Average_ratings['Total Ratings'].hist(bins = 70)
```

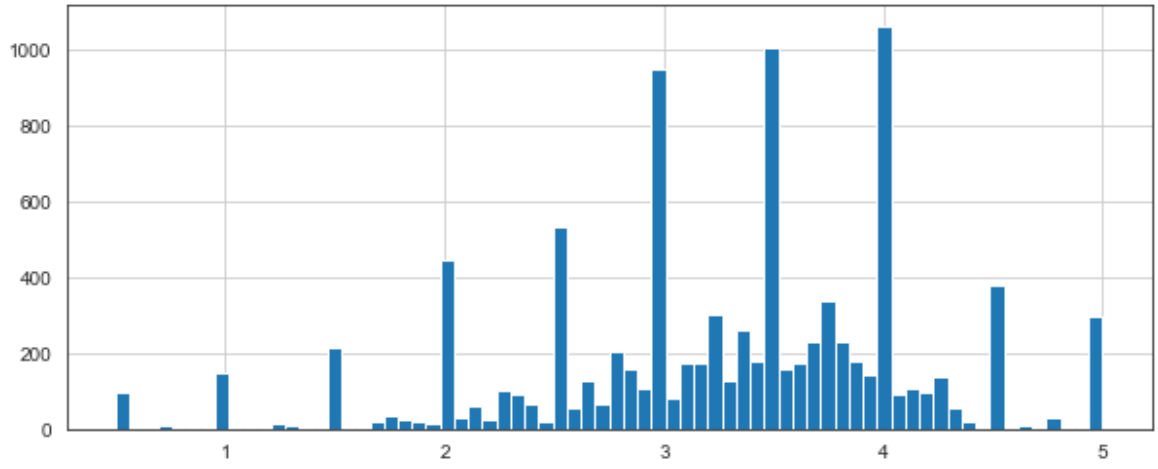
Out[9]: <AxesSubplot:>



In [10]:
```
# plot graph of 'ratings' column
plt.figure(figsize =(10, 4))

Average_ratings['rating'].hist(bins = 70)
```

Out[10]: <AxesSubplot:>



Building The Recommender

- will create a table where the rows are 'userIds' and the columns represent the 'movies'.
- The values of the matrix represent the rating for each movie by each user.

In [11]:
```
#Calculating The Correlation
movie_user = data.pivot_table(index='userId',columns='title',values='rating')
movie_user.head(10)
```

Out[11]:

title	'71 (2014)	'Hellboy': The Seeds of Creation (2004)	'Round Midnight (1986)	'Salem's Lot (2004)	'Til There Was You (1997)	'Tis the Season for Love (2015)	'burbs, The (1989)	'night Mother (1986)	(500) Days of Summer (2009)	*batte inclu (19
userId										
1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N

10 rows × 9719 columns

In [12]:
```
movie_user.columns
```

Out[12]:
```
Index([''71 (2014)', ''Hellboy': The Seeds of Creation (2004)',
       ''Round Midnight (1986)', ''Salem's Lot (2004)',
       ''Til There Was You (1997)', ''Tis the Season for Love (2015)',
       ''burbs, The (1989)', ''night Mother (1986)',
       '(500) Days of Summer (2009)', '*batteries not included (1987)',
       ...
       'Zulu (2013)', '[REC] (2007)', '[REC]² (2009)',
       '[REC]³ 3 Génesis (2012)',
       'anohana: The Flower We Saw That Day - The Movie (2013)',
       'eXistenZ (1999)', 'xXx (2002)', 'xXx: State of the Union (2005)',
       '¡Three Amigos! (1986)', 'À nous la liberté (Freedom for Us) (193
1)'],
      dtype='object', name='title', length=9719)
```

In [13]:
```
#Disable warnings
import warnings
warnings.filterwarnings('ignore')
```

In [14]:
```
#Select a movie to test our recommender system
#Select 'GoldenEye (1995)' movie to test the recommender system
correlations = movie_user.corrwith(movie_user['GoldenEye (1995)'])
correlations.head(10)
```

Out[14]:
```
title
'71 (2014)                                        NaN
'Hellboy': The Seeds of Creation (2004)           NaN
'Round Midnight (1986)                            NaN
'Salem's Lot (2004)                               NaN
'Til There Was You (1997)                         NaN
'Tis the Season for Love (2015)                   NaN
'burbs, The (1989)                           0.395944
'night Mother (1986)                              NaN
(500) Days of Summer (2009)                 -0.345238
*batteries not included (1987)              -0.755929
dtype: float64
```

In [15]:
```
#Remove all the empty values and merge the total ratings to the correlation t
recommendation = pd.DataFrame(correlations,columns=['Correlation'])
recommendation.dropna(inplace=True)
recommendation = recommendation.join(Average_ratings['Total Ratings'])
recommendation.head()
```

Out[15]:

title	Correlation	Total Ratings
'burbs, The (1989)	0.395944	17
(500) Days of Summer (2009)	-0.345238	42
***batteries not included (1987)**	-0.755929	7
10 Cent Pistol (2015)	-1.000000	2
10 Cloverfield Lane (2016)	1.000000	14

Testing The Recommendation System

In [16]:
```
#Filter all the movies with a correlation value to 'GoldenEye (1995)' and wit
recc = recommendation[recommendation['Total Ratings']>100].sort_values('Corre
```

In [17]:
```
#merge the movies dataset for verifying the recommendations
recc = recc.merge(movie_titles_genre,on='title', how='left')
recc.head(10)
```

Out[17]:

	title	Correlation	Total Ratings	movieId	genres
0	GoldenEye (1995)	1.000000	132	10	Action|Adventure|Thriller
1	Ocean's Eleven (2001)	0.607612	119	4963	Crime|Thriller
2	Good Will Hunting (1997)	0.538349	141	1704	Drama|Romance
3	Men in Black (a.k.a. MIB) (1997)	0.500313	165	1580	Action|Comedy|Sci-Fi
4	Pirates of the Caribbean: The Curse of the Bla...	0.497200	149	6539	Action|Adventure|Comedy|Fantasy
5	Clear and Present Danger (1994)	0.478668	110	349	Action|Crime|Drama|Thriller
6	Mission: Impossible (1996)	0.467352	162	648	Action|Adventure|Mystery|Thriller
7	Crimson Tide (1995)	0.464266	103	161	Drama|Thriller|War
8	X-Men (2000)	0.441027	133	3793	Action|Adventure|Sci-Fi
9	Heat (1995)	0.420222	102	6	Action|Crime|Thriller

- The highest correlation to GoldenEye is GoldenEye itself
- The movies such as The Oceans Eleven (2001), Good Will Hunting (1997), and Men in Black (a.k.a. MIB) (1997) show high correlation with GoldenEye

In [ ]: