Building user-based recommendation model for Amazon

July 18, 2020

PROJECT 3

DESCRIPTION

The dataset provided contains movie reviews given by Amazon customers. Reviews were given between May 1996 and July 2014.

Data Dictionary

UserID – 4848 customers who provided a rating for each movie Movie 1 to Movie 206 – 206 movies for which ratings are provided by 4848 distinct users

Data Considerations

- All the users have not watched all the movies and therefore, all movies are not rated. These missing values are represented by NA.
- Ratings are on a scale of -1 to 10 where -1 is the least rating and 10 is the best.

Analysis Task - Exploratory Data Analysis:

- Which movies have maximum views/ratings?
- What is the average rating for each movie? Define the top 5 movies with the maximum ratings.
- Define the top 5 movies with the least audience.

Recommendation Model: Some of the movies hadn't been watched and therefore, are not rated by the users. Netflix would like to take this as an opportunity and build a machine learning recommendation algorithm which provides the ratings for each of the users.

- Divide the data into training and test data
- Build a recommendation model on training data
- Make predictions on the test data

[1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

[2]:

```
df1=pd.read_csv('Amazon - Movies and TV Ratings.csv')
df1.head()
```

```
[2]:          user_id  Movie1  Movie2  Movie3  Movie4  Movie5  Movie6  Movie7  \
     0  A3R5OBKS7OM2IR     5.0     5.0     NaN     NaN     NaN     NaN     NaN
     1   AH3QC2PC1VTGP     NaN     NaN     2.0     NaN     NaN     NaN     NaN
     2  A3LKP6WPMP9UKX     NaN     NaN     NaN     5.0     NaN     NaN     NaN
     3   AVIY68KEPQ5ZD     NaN     NaN     NaN     5.0     NaN     NaN     NaN
     4  A1CV1WROP5KTTW     NaN     NaN     NaN     NaN     5.0     NaN     NaN

        Movie8  Movie9  …  Movie197  Movie198  Movie199  Movie200  Movie201  \
     0     NaN     NaN  …       NaN       NaN       NaN       NaN       NaN
     1     NaN     NaN  …       NaN       NaN       NaN       NaN       NaN
     2     NaN     NaN  …       NaN       NaN       NaN       NaN       NaN
     3     NaN     NaN  …       NaN       NaN       NaN       NaN       NaN
     4     NaN     NaN  …       NaN       NaN       NaN       NaN       NaN

        Movie202  Movie203  Movie204  Movie205  Movie206
     0       NaN       NaN       NaN       NaN       NaN
     1       NaN       NaN       NaN       NaN       NaN
     2       NaN       NaN       NaN       NaN       NaN
     3       NaN       NaN       NaN       NaN       NaN
     4       NaN       NaN       NaN       NaN       NaN

     [5 rows x 207 columns]
```

```
[3]: idx=['user_id']
     multi_indexed_df = df1.set_index(idx)
     stacked_df = multi_indexed_df.stack(dropna=False)
```

```
[4]: stacked_df.head(10)
```

```
[4]: user_id
     A3R5OBKS7OM2IR  Movie1      5.0
                     Movie2      5.0
                     Movie3      NaN
                     Movie4      NaN
                     Movie5      NaN
                     Movie6      NaN
                     Movie7      NaN
                     Movie8      NaN
                     Movie9      NaN
                     Movie10     NaN
     dtype: float64
```

```
[5]: long_df = stacked_df.reset_index()
     long_df.head(10)
```

```
[5]:          user_id  level_1    0
     0  A3R5OBKS7OM2IR   Movie1  5.0
```

```
1  A3R5OBKS7OM2IR   Movie2  5.0
2  A3R5OBKS7OM2IR   Movie3  NaN
3  A3R5OBKS7OM2IR   Movie4  NaN
4  A3R5OBKS7OM2IR   Movie5  NaN
5  A3R5OBKS7OM2IR   Movie6  NaN
6  A3R5OBKS7OM2IR   Movie7  NaN
7  A3R5OBKS7OM2IR   Movie8  NaN
8  A3R5OBKS7OM2IR   Movie9  NaN
9  A3R5OBKS7OM2IR  Movie10  NaN
```

```
[6]: df3=long_df.rename(columns={'user_id':'UserID','level_1':'Movie',0:'Rating'})
     df3.head()
```

```
[6]:            UserID   Movie  Rating
     0  A3R5OBKS7OM2IR  Movie1     5.0
     1  A3R5OBKS7OM2IR  Movie2     5.0
     2  A3R5OBKS7OM2IR  Movie3     NaN
     3  A3R5OBKS7OM2IR  Movie4     NaN
     4  A3R5OBKS7OM2IR  Movie5     NaN
```

```
[7]: #Dataset without NaN in Rating
     df4=df3[df3.Rating.notnull()]
```

```
[8]: print('No of users :',len(np.unique(df4.UserID)))
     print('No of Movies :',len(np.unique(df4.Movie)))
```

```
No of users : 4848
No of Movies : 206
```

```
[ ]:
```

Which movies have maximum views/ratings?

```
[9]: df4.groupby('Movie')['Rating'].count().sort_values(ascending=False).head()
```

```
[9]: Movie
     Movie127    2313
     Movie140     578
     Movie16      320
     Movie103     272
     Movie29      243
     Name: Rating, dtype: int64
```

```
[ ]:
```

What is the average rating for each movie?

[10]:

```
ratings = pd.DataFrame(df4.groupby('Movie')['Rating'].mean())

ratings['num of ratings'] = pd.DataFrame(df4.groupby('Movie')['Rating'].count())
```

[11]:

```
ratings.sort_values('num of ratings', ascending = False)
```

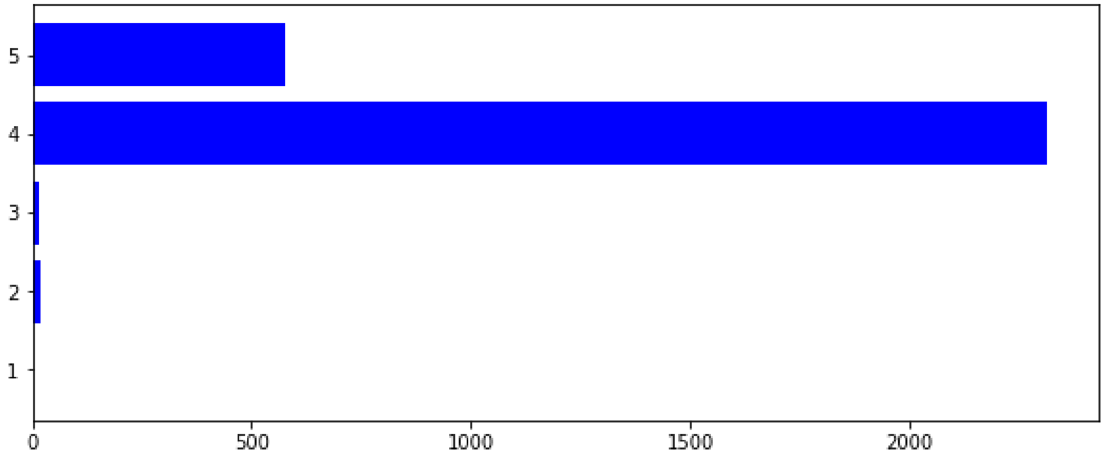
[11]:

```
            Rating  num of ratings
Movie
Movie127  4.111976            2313
Movie140  4.833910             578
Movie16   4.518750             320
Movie103  4.562500             272
Movie29   4.806584             243
…              …               …
Movie38   5.000000               1
Movie37   5.000000               1
Movie36   5.000000               1
Movie35   5.000000               1
Movie1    5.000000               1

[206 rows x 2 columns]
```

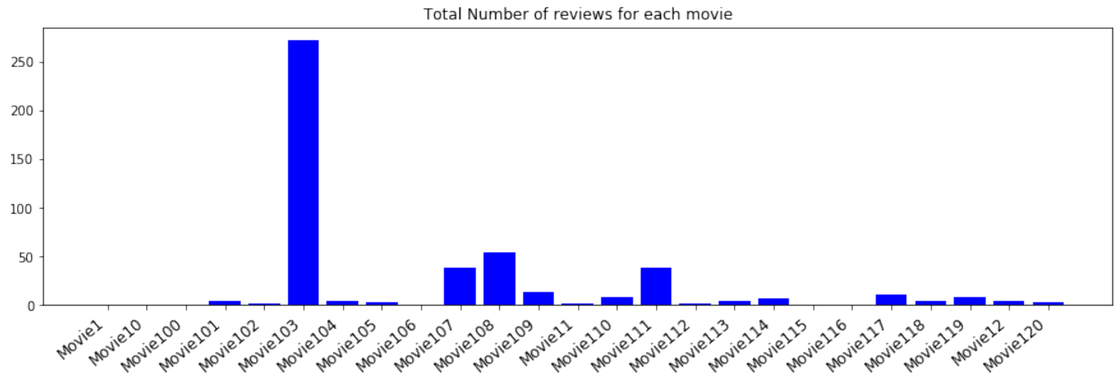
[12]:

```
#plot rounded-up ratings with number of movies
plt.figure(figsize =(10, 4))
ax=plt.barh(ratings['Rating'].round(),ratings['num of ratings'],color='b')
plt.show()
```



[13]:

```
#a bar graph descibibg number of reviews for first 25 movies
plt.figure(figsize =(15, 4))
ax=plt.subplot()
ax.bar(ratings.head(25).index,ratings['num of ratings'].head(25),color='b')
ax.set_xticklabels(ratings.
 ↪index,rotation=40,fontsize='12',horizontalalignment="right")
ax.set_title("Total Number of reviews for each movie")
plt.show()
```



Define the top 5 movies with the maximum ratings

```
[14]: ratings.sort_values(['Rating','num of ratings'], ascending = False).head()
```

```
[14]:           Rating  num of ratings
      Movie
      Movie186     5.0               9
      Movie188     5.0               6
      Movie191     5.0               6
      Movie101     5.0               5
      Movie118     5.0               5
```

Define the top 5 movies with the least audience

```
[15]: ratings.sort_values('num of ratings', ascending = True).head()
```

```
[15]:          Rating  num of ratings
      Movie
      Movie1      5.0               1
      Movie38     5.0               1
      Movie41     5.0               1
      Movie42     5.0               1
      Movie45     1.0               1
```

```
[16]: from sklearn.model_selection import train_test_split
      from sklearn import linear_model
```

```
[17]: X=pd.get_dummies(df4[['UserID','Movie']])
      X.head()
```

```
[17]:      UserID_A0047322388NOTO4N8SKD  UserID_A00473363TJ8YSZ3YAGG9  \
      0                               0                             0   
      1                               0                             0   
      208                             0                             0   
      415                             0                             0   
      621                             0                             0   

           UserID_A1004AX2J2HXGL  UserID_A100CQXJ6D44T9  UserID_A100Z2S0880G9A  \
      0                        0                      0                      0   
      1                        0                      0                      0   
      208                      0                      0                      0   
      415                      0                      0                      0   
      621                      0                      0                      0   

           UserID_A1027BL79BSP5P  UserID_A102Z4PIK7CYD8  UserID_A10367AR7BPFG2  \
      0                        0                      0                      0   
      1                        0                      0                      0   
      208                      0                      0                      0   
      415                      0                      0                      0   
      621                      0                      0                      0   

           UserID_A103HNKB9YAN6P  UserID_A103KNDW8GN92L  …  Movie_Movie90  \
      0                        0                      0  …              0   
      1                        0                      0  …              0   
      208                      0                      0  …              0   
      415                      0                      0  …              0   
      621                      0                      0  …              0   

           Movie_Movie91  Movie_Movie92  Movie_Movie93  Movie_Movie94  \
      0                0              0              0              0   
      1                0              0              0              0   
      208              0              0              0              0   
      415              0              0              0              0   
      621              0              0              0              0   

           Movie_Movie95  Movie_Movie96  Movie_Movie97  Movie_Movie98  Movie_Movie99  
      0                0              0              0              0              0  
      1                0              0              0              0              0  
      208              0              0              0              0              0  
      415              0              0              0              0              0  
      621              0              0              0              0              0  

      [5 rows x 5054 columns]
```

```
[18]: Y=pd.get_dummies(df4[['Rating']])
      Y.head()
```

```
[18]:      Rating
      0       5.0
      1       5.0
      208     2.0
      415     5.0
      621     5.0
```

```
[19]: X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = .20,␣
       ↪random_state = 40)
      regr = linear_model.LinearRegression()
```

```
[20]: regr.fit(X_train, Y_train)
      predicted = regr.predict(X_test)
```

```
[21]: regr.score(X_train,Y_train)*100
```

```
[21]: 99.51569363976719
```

```
[ ]:
```