```
# import the libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

df_user=pd.read_csv('users.dat',sep="::",names=['UserID','Gender','Age
','Occupation','Zip Code'],engine='python')

df_user
```

```
      UserID Gender  Age  Occupation Zip Code
0          1      F    1          10    48067
1          2      M   56          16    70072
2          3      M   25          15    55117
3          4      M   45           7    02460
4          5      M   25          20    55455
...      ...    ...  ...         ...      ...
6035    6036      F   25          15    32603
6036    6037      F   45           1    76006
6037    6038      F   56           1    14706
6038    6039      F   45           0    01060
6039    6040      M   25           6    11106

[6040 rows x 5 columns]
```

```
df_movies=pd.read_csv('movies.dat',sep="::",names=['MovieID','Title','
Genre'],engine='python')

df_movies
```

```
      MovieID                                Title  \
0           1                    Toy Story (1995)
1           2                      Jumanji (1995)
2           3             Grumpier Old Men (1995)
3           4            Waiting to Exhale (1995)
4           5  Father of the Bride Part II (1995)
...       ...                                 ...
3878     3948             Meet the Parents (2000)
3879     3949          Requiem for a Dream (2000)
3880     3950                    Tigerland (2000)
3881     3951             Two Family House (2000)
3882     3952               Contender, The (2000)

                            Genre
0      Animation|Children's|Comedy
1     Adventure|Children's|Fantasy
2                   Comedy|Romance
3                     Comedy|Drama
4                           Comedy
...                            ...
```

```
3878                        Comedy
3879                         Drama
3880                         Drama
3881                         Drama
3882                 Drama|Thriller

[3883 rows x 3 columns]
```

```
df_ratings=pd.read_csv('ratings.dat',sep="::",names=['UserID','MovieID
','Rating','Timestamp'],engine='python')
```

```
df_ratings
```

```
         UserID  MovieID  Rating  Timestamp
0             1     1193       5  978300760
1             1      661       3  978302109
2             1      914       3  978301968
3             1     3408       4  978300275
4             1     2355       5  978824291
...         ...      ...     ...        ...
1000204    6040     1091       1  956716541
1000205    6040     1094       5  956704887
1000206    6040      562       5  956704746
1000207    6040     1096       4  956715648
1000208    6040     1097       4  956715569

[1000209 rows x 4 columns]
```

```
df_ratings.shape
```

```
(1000209, 4)
```

```
df_user.shape
```

```
(6040, 5)
```

```
df_movies.shape
```

```
(3883, 3)
```

Create a new dataset [Master_Data] with the following columns MovieID Title UserID Age Gender Occupation Rating. (Hint: (i) Merge two tables at a time. (ii) Merge the tables using two primary keys MovieID & UserId)

```
dfMovieRatings = df_movies.merge(df_ratings, on = 'MovieID' , how =
'inner')
```

```
dfMovieRatings
```

```
         MovieID                    Title                         Genre
UserID  \
0              1       Toy Story (1995)  Animation|Children's|Comedy
1
```

```
1              1       Toy Story (1995)  Animation|Children's|Comedy
6
2              1       Toy Story (1995)  Animation|Children's|Comedy
8
3              1       Toy Story (1995)  Animation|Children's|Comedy
9
4              1       Toy Story (1995)  Animation|Children's|Comedy
10
...          ...                    ...                         ...
...
1000204     3952  Contender, The (2000)              Drama|Thriller
5812
1000205     3952  Contender, The (2000)              Drama|Thriller
5831
1000206     3952  Contender, The (2000)              Drama|Thriller
5837
1000207     3952  Contender, The (2000)              Drama|Thriller
5927
1000208     3952  Contender, The (2000)              Drama|Thriller
5998

         Rating   Timestamp
0             5   978824268
1             4   978237008
2             4   978233496
3             5   978225952
4             5   978226474
...         ...         ...
1000204       4   992072099
1000205       3   986223125
1000206       4  1011902656
1000207       1   979852537
1000208       4  1001781044

[1000209 rows x 6 columns]
```

```
dfMovieRatings.shape
```

```
(1000209, 6)
```

```
dfMaster = dfMovieRatings.merge(df_user, on = 'UserID' , how =
'inner')
```

```
dfMaster
```

```
         MovieID                                        Title  \
0              1                            Toy Story (1995)
1             48                           Pocahontas (1995)
2            150                            Apollo 13 (1995)
3            260  Star Wars: Episode IV - A New Hope (1977)
4            527                    Schindler's List (1993)
```

```
...          ...                                        ...
1000204     3513                 Rules of Engagement (2000)
1000205     3535                     American Psycho (2000)
1000206     3536                   Keeping the Faith (2000)
1000207     3555                               U-571 (2000)
1000208     3578                           Gladiator (2000)

                                       Genre  UserID  Rating
Timestamp  \
0                  Animation|Children's|Comedy       1       5
978824268
1        Animation|Children's|Musical|Romance       1       5
978824351
2                                      Drama       1       5
978301777
3             Action|Adventure|Fantasy|Sci-Fi       1       4
978300760
4                                  Drama|War       1       5
978824195
...                                      ...     ...     ...        .
..
1000204                       Drama|Thriller    5727       4
958489970
1000205                 Comedy|Horror|Thriller    5727       2
958489970
1000206                       Comedy|Romance    5727       5
958489902
1000207                      Action|Thriller    5727       3
958490699
1000208                         Action|Drama    5727       5
958490171

        Gender  Age  Occupation Zip Code
0            F    1          10    48067
1            F    1          10    48067
2            F    1          10    48067
3            F    1          10    48067
4            F    1          10    48067
...        ...  ...         ...      ...
1000204      M   25           4    92843
1000205      M   25           4    92843
1000206      M   25           4    92843
1000207      M   25           4    92843
1000208      M   25           4    92843

[1000209 rows x 10 columns]
```

```
dfMaster.shape
```

```
(1000209, 10)
```

```
# to csv file
dfMaster.to_csv('Master Data.csv')
```

```
dfMaster.isna().sum().any()
```

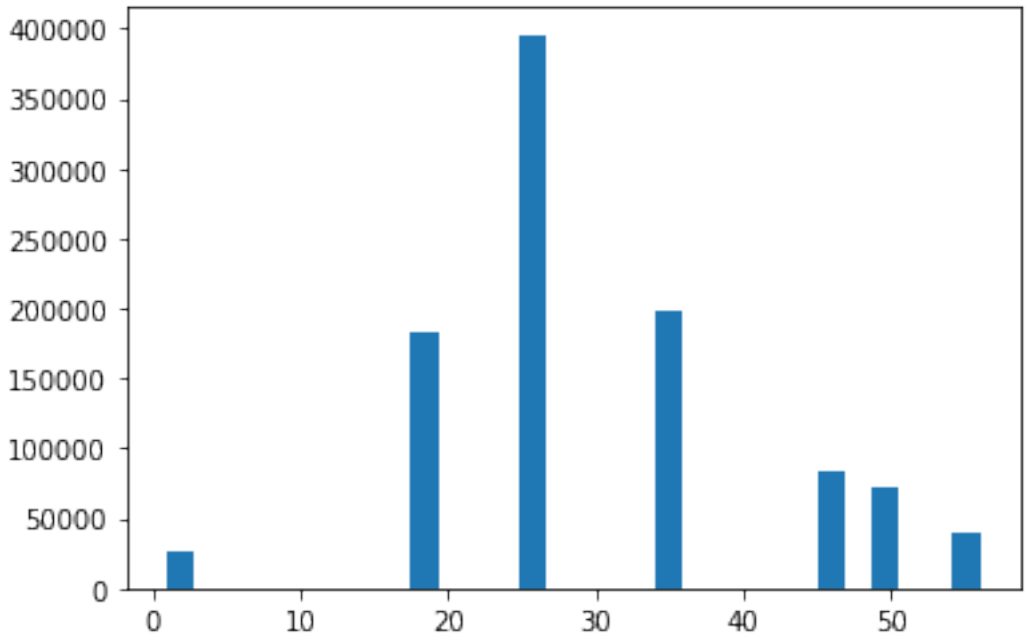
```
False
```

Explore the datasets using visual representations (graphs or tables), also include your comments on the following: 1.User Age Distribution 2.User rating of the movie “Toy Story” 3.Top 25 movies by viewership rating Find the ratings for all the movies reviewed by for a particular user of user id = 2696

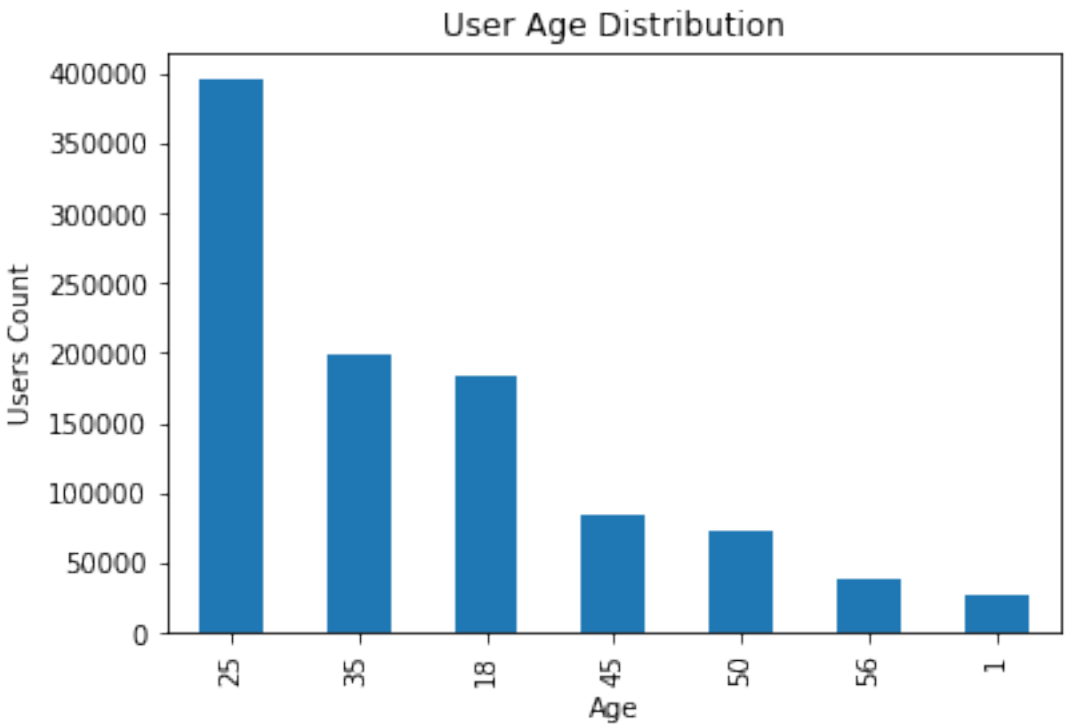
```
dfMaster['Age'].value_counts()
```

```
25    395556
35    199003
18    183536
45     83633
50     72490
56     38780
1      27211
Name: Age, dtype: int64
```

```
plt.hist(dfMaster['Age'],bins = 30)
plt.show()
```

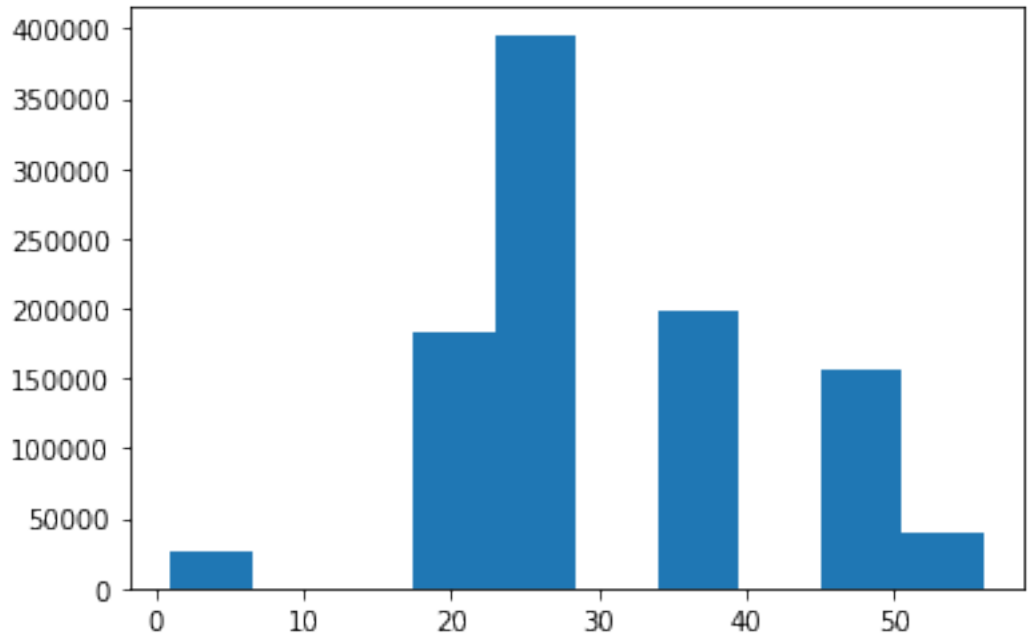



```
dfMaster['Age'].value_counts().plot(kind='bar')
plt.xlabel('Age')
plt.title('User Age Distribution')
plt.ylabel('Users Count')
plt.show()
```




```
dfMaster.Age.hist(grid=False)
```

```
<AxesSubplot:>
```



User rating of the movie "Toy Story"

```
dfMaster.head()
```

```
   MovieID                                        Title  \
0        1                            Toy Story (1995)
1       48                           Pocahontas (1995)
2      150                            Apollo 13 (1995)
3      260  Star Wars: Episode IV - A New Hope (1977)
4      527                    Schindler's List (1993)

                                  Genre  UserID  Rating  Timestamp
Gender  \
0           Animation|Children's|Comedy       1       5  978824268
F
1  Animation|Children's|Musical|Romance       1       5  978824351
F
2                                 Drama       1       5  978301777
F
3       Action|Adventure|Fantasy|Sci-Fi       1       4  978300760
F
4                            Drama|War       1       5  978824195
F

   Age  Occupation Zip Code
0    1          10    48067
1    1          10    48067
2    1          10    48067
3    1          10    48067
4    1          10    48067
```

```
# Extract toy story movies
toystory=dfMaster[dfMaster['Title'].str.contains('Toy Story')==True]
toystory
```

```
         MovieID               Title                        Genre
UserID  \
0              1    Toy Story (1995)  Animation|Children's|Comedy
1
50          3114  Toy Story 2 (1999)  Animation|Children's|Comedy
1
53             1    Toy Story (1995)  Animation|Children's|Comedy
6
124            1    Toy Story (1995)  Animation|Children's|Comedy
8
263            1    Toy Story (1995)  Animation|Children's|Comedy
9
...          ...                 ...                         ...
...
998988      3114  Toy Story 2 (1999)  Animation|Children's|Comedy
3023
999027      3114  Toy Story 2 (1999)  Animation|Children's|Comedy
5800
999486      3114  Toy Story 2 (1999)  Animation|Children's|Comedy
```

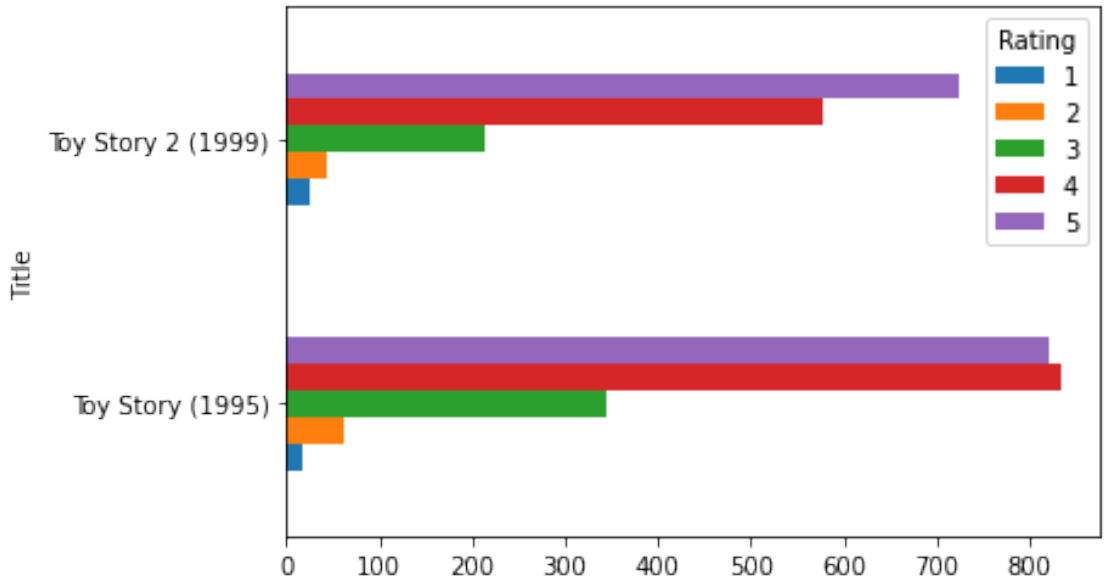
```
2189
999869      3114  Toy Story 2 (1999)  Animation|Children's|Comedy
159
1000192     3114  Toy Story 2 (1999)  Animation|Children's|Comedy
5727

         Rating  Timestamp Gender  Age  Occupation Zip Code
0             5  978824268      F    1          10    48067
50            4  978302174      F    1          10    48067
53            4  978237008      F   50           9    55117
124           4  978233496      M   25          12    11413
263           5  978225952      M   25          17    61614
...         ...        ...    ...  ...         ...      ...
998988        4  970471948      F   25           7    92108
999027        5  958015250      M   35          18    90804
999486        4  974607816      M    1          10    60148
999869        4  989966944      F   45           0    37922
1000192       5  958492554      M   25           4    92843

[3662 rows x 10 columns]
```

```
toystory.groupby(['Title','Rating']).size()
```

```
Title               Rating
Toy Story (1995)    1          16
                    2          61
                    3         345
                    4         835
                    5         820
Toy Story 2 (1999)  1          25
                    2          44
                    3         214
                    4         578
                    5         724
dtype: int64
```

```
toystory.groupby(['Title','Rating']).size().unstack().plot(kind='barh'
,legend=True)
```

```
<AxesSubplot:ylabel='Title'>
```

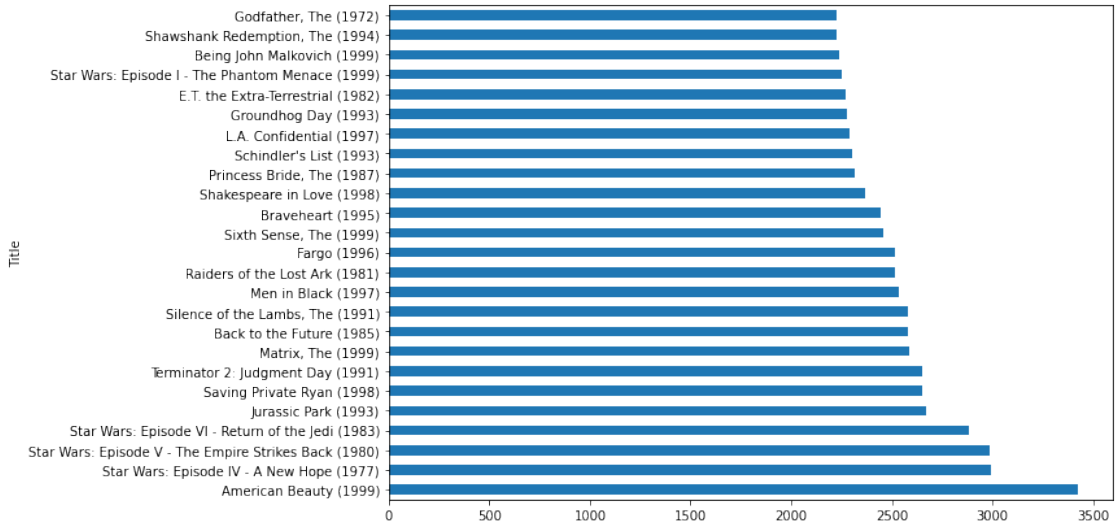



```
# Top 25 movies by viewership rating
dfTop25=dfMaster.groupby('Title').size().sort_values(ascending=False)
[:25]
dfTop25
```

```
Title
American Beauty (1999)                                3428
Star Wars: Episode IV - A New Hope (1977)             2991
Star Wars: Episode V - The Empire Strikes Back (1980) 2990
Star Wars: Episode VI - Return of the Jedi (1983)     2883
Jurassic Park (1993)                                  2672
Saving Private Ryan (1998)                            2653
Terminator 2: Judgment Day (1991)                     2649
Matrix, The (1999)                                    2590
Back to the Future (1985)                             2583
Silence of the Lambs, The (1991)                      2578
Men in Black (1997)                                   2538
Raiders of the Lost Ark (1981)                        2514
Fargo (1996)                                          2513
Sixth Sense, The (1999)                               2459
Braveheart (1995)                                     2443
Shakespeare in Love (1998)                            2369
Princess Bride, The (1987)                            2318
Schindler's List (1993)                               2304
L.A. Confidential (1997)                              2288
Groundhog Day (1993)                                  2278
E.T. the Extra-Terrestrial (1982)                     2269
Star Wars: Episode I - The Phantom Menace (1999)      2250
Being John Malkovich (1999)                           2241
Shawshank Redemption, The (1994)                      2227
Godfather, The (1972)                                 2223
dtype: int64
```

```
plt.figure(figsize=(10,7))
dfTop25.plot(kind='barh')
```

```
<AxesSubplot:ylabel='Title'>
```




```
user_2696 = dfMaster.loc[dfMaster.UserID==2696,
"Rating"].sort_values(ascending=False)
```

```
user_2696
```

```
991036    5
991039    4
991051    4
991037    4
991049    4
991048    4
991047    4
991046    4
991045    4
991053    4
991043    4
991042    4
991035    3
991041    3
991038    3
991044    2
991040    2
991050    2
991052    1
991054    1
Name: Rating, dtype: int64
```

```
user_2696.shape
```

```
(20,)
```

Feature Engineering:

Use column genres:

1.Find out all the unique genres (Hint: split the data in column genre making a list and then process the data to find out only the unique categories of genres) 2.Create a separate column for each genre category with a one-hot encoding (1 and 0) whether or not the movie belongs to that genre. 3.Determine the features affecting the ratings of any particular movie. 4.Develop an appropriate model to predict the movie ratings

```
dfMaster['Genre']
```

```
0                    Animation|Children's|Comedy
1          Animation|Children's|Musical|Romance
2                                         Drama
3               Action|Adventure|Fantasy|Sci-Fi
4                                    Drama|War
                           ...
1000204                        Drama|Thriller
1000205                 Comedy|Horror|Thriller
1000206                        Comedy|Romance
1000207                       Action|Thriller
1000208                          Action|Drama
Name: Genre, Length: 1000209, dtype: object
```

```
dfMaster.Genre.unique()
```

```
array(["Animation|Children's|Comedy",
       "Animation|Children's|Musical|Romance", 'Drama',
       'Action|Adventure|Fantasy|Sci-Fi', 'Drama|War', "Children's|
Drama",
       "Animation|Children's|Comedy|Musical",
       "Animation|Children's|Musical", 'Crime|Drama|Thriller',
       'Animation', 'Animation|Comedy|Thriller', 'Musical|Romance',
       "Adventure|Children's|Drama|Musical", 'Musical',
       "Children's|Comedy|Musical", "Children's|Drama|Fantasy|Sci-Fi",
       'Action|Adventure|Comedy|Romance', 'Comedy|Sci-Fi',
       'Action|Adventure|Drama',
       "Adventure|Animation|Children's|Comedy|Musical", 'Drama|
Romance',
       "Animation|Children's", 'Action|Drama|War', 'Comedy',
'Romance',
       'Action|Crime|Romance', 'Thriller', 'Comedy|Fantasy',
       'Comedy|Drama', "Children's|Comedy|Drama", 'Drama|Musical',
       'Drama|Romance|War|Western', 'Crime|Drama',
       'Action|Comedy|Western', 'Action|Romance|Thriller', 'Western',
       "Children's|Comedy", 'Adventure|Drama|Western', 'Comedy|
Romance',
       'Comedy|Drama|Romance', 'Drama|Romance|War',
```

```
       "Children's|Comedy|Western",
       "Adventure|Animation|Children's|Musical", 'Action|Romance',
       'Action|Adventure|Romance|Sci-Fi|War', 'Comedy|Musical|
Romance',
       'Drama|Romance|Thriller', "Adventure|Children's|Comedy",
       'Action|Adventure|Romance', "Children's|Fantasy|Musical",
       "Animation|Children's|Comedy|Musical|Romance",
       'Comedy|Fantasy|Romance', 'Action|Drama', 'Comedy|Musical',
       'Action', 'Adventure|Drama|Romance|Sci-Fi', 'Action|Crime',
       'Drama|Thriller', 'Drama|Sci-Fi', 'Action|Crime|Drama',
       'Drama|Thriller|War', 'Drama|Horror', 'Action|Thriller',
       'Action|Adventure|Thriller', 'Action|Adventure|Sci-Fi',
       'Action|Sci-Fi|Thriller', 'Animation|Sci-Fi',
       'Adventure|Animation|Sci-Fi|Thriller', 'Action|Drama|Romance',
       'Action|Drama|Thriller|War', 'Action|Adventure|Comedy|Sci-Fi',
       'Crime|Drama|Mystery', 'Drama|Sci-Fi|Thriller',
       'Comedy|Crime|Drama|Mystery', 'Action|Comedy|Drama',
       'Action|Crime|Thriller', "Adventure|Children's|Drama",
       'Drama|Mystery', 'Action|Comedy|Sci-Fi|Thriller',
       'Action|Adventure|Sci-Fi|Thriller',
       'Action|Drama|Romance|Thriller', 'Crime|Thriller',
'Documentary',
       'Comedy|Crime|Fantasy', 'Animation|Comedy', 'Comedy|Crime',
       'Crime|Film-Noir|Mystery|Thriller', 'Sci-Fi|Thriller',
       'Action|Sci-Fi', 'Horror|Sci-Fi|Thriller',
       "Adventure|Children's|Fantasy", 'Action|Adventure|Comedy|
Crime',
       'Action|Adventure', 'Action|Drama|Thriller',
       "Children's|Comedy|Fantasy", 'Comedy|Romance|War',
       'Film-Noir|Sci-Fi', 'Comedy|Romance|Thriller',
       'Action|Adventure|Crime|Drama', 'Action|Adventure|Mystery',
       'Action|Adventure|Fantasy', 'Sci-Fi|War', 'Action|Sci-Fi|War',
       'Mystery|Thriller', 'Film-Noir|Mystery',
       'Drama|Mystery|Sci-Fi|Thriller', 'Action|Adventure|Romance|
War',
       "Adventure|Children's", "Adventure|Children's|Fantasy|Sci-Fi",
       "Adventure|Children's|Musical",
       "Adventure|Children's|Comedy|Fantasy",
       'Action|Adventure|Drama|Sci-Fi|War', 'Action|Sci-Fi|Thriller|
War',
       'Action|Western', 'Adventure|War', 'Action|Horror|Sci-Fi|
Thriller',
       'Action|Adventure|Comedy|Horror|Sci-Fi', 'Action|Comedy|
Musical',
       'Film-Noir|Mystery|Thriller', 'Adventure', 'Comedy|War',
       'Adventure|Comedy|Drama', 'Comedy|Mystery|Thriller',
       'Comedy|Horror', 'Horror|Romance', 'Horror', 'Action|Horror',
       'Action|Romance|War', "Children's|Fantasy",
       "Children's|Drama|Fantasy", 'Action|Adventure|Sci-Fi|War',
       'Action|Horror|Sci-Fi', 'Action|Comedy|Crime|Drama', 'War',
```

```
       'Comedy|Sci-Fi|Western', 'Fantasy|Sci-Fi',
       "Action|Adventure|Children's|Comedy",
       "Adventure|Children's|Drama|Romance",
       "Adventure|Children's|Sci-Fi", "Children's",
       "Adventure|Children's|Comedy|Fantasy|Sci-Fi",
       "Animation|Children's|Fantasy|Musical", "Children's|Sci-Fi",
       'Adventure|Comedy', 'Adventure|Musical',
       "Animation|Children's|Drama|Fantasy", "Children's|Fantasy|Sci-
Fi",
       'Drama|Fantasy', 'Action|Adventure|Horror|Thriller',
       'Comedy|Horror|Musical|Sci-Fi', 'Comedy|Horror|Musical',
       'Action|Horror|Thriller', 'Action|Drama|Fantasy|Romance',
       'Adventure|Fantasy|Sci-Fi', 'Comedy|Drama|War',
       'Comedy|Drama|Western', 'Adventure|Comedy|Sci-Fi',
       "Action|Children's|Fantasy", 'Adventure|Fantasy', 'Comedy|
Western',
       'Crime|Drama|Sci-Fi', 'Adventure|Sci-Fi', 'Adventure|Drama',
       'Action|Adventure|Drama|Romance', 'Action|Comedy|Musical|Sci-
Fi',
       'Action|Adventure|Crime', 'Action|Comedy|War', 'Action|Comedy',
       'Comedy|Crime|Horror', "Action|Adventure|Children's|Sci-Fi",
       'Action|Adventure|Comedy', 'Action|Adventure|Romance|Thriller',
       'Film-Noir|Thriller', 'Action|Comedy|Sci-Fi|War',
       'Comedy|Crime|Mystery|Thriller', "Action|Children's",
       'Crime|Drama|Mystery|Thriller', 'Action|Drama|Sci-Fi|Thriller',
       "Children's|Musical", "Adventure|Animation|Children's|Sci-Fi",
       'Adventure|Fantasy|Romance', 'Action|Adventure|Horror',
       'Action|Comedy|Fantasy', 'Animation|Musical', 'Action|War',
       'Comedy|Crime|Thriller', 'Action|Sci-Fi|Western',
       'Adventure|Animation|Film-Noir', 'Adventure|Romance|Sci-Fi',
       'Adventure|Drama|Thriller', 'Adventure|Western',
       'Action|Crime|Sci-Fi', 'Sci-Fi', 'Horror|Thriller',
       'Action|Adventure|Comedy|Horror', 'Horror|Sci-Fi',
       'Action|Mystery|Romance|Thriller', 'Horror|Mystery|Thriller',
       'Crime|Horror|Mystery|Thriller', 'Mystery|Sci-Fi|Thriller',
       'Comedy|Documentary', 'Action|Sci-Fi|Thriller|Western',
       'Drama|Mystery|Thriller', 'Action|Romance|Sci-Fi',
       'Action|Adventure|Animation', 'Adventure|Animation|Sci-Fi',
       'Action|Comedy|Crime|Horror|Thriller',
       'Crime|Drama|Romance|Thriller',
       'Action|Adventure|Animation|Horror|Sci-Fi',
       'Comedy|Fantasy|Romance|Sci-Fi', 'Comedy|Mystery|Romance|
Thriller',
       'Crime|Drama|Film-Noir', 'Crime|Film-Noir|Thriller', 'Crime',
       'Film-Noir|Sci-Fi|Thriller', 'Comedy|Thriller',
       'Action|Crime|Drama|Thriller', 'Mystery|Sci-Fi',
       'Action|Adventure|Sci-Fi|Thriller|War', 'Crime|Film-Noir',
       'Adventure|Thriller', 'Mystery|Romance|Thriller',
       'Comedy|Crime|Drama', 'Adventure|Crime|Sci-Fi|Thriller',
       'Action|Adventure|Mystery|Sci-Fi', 'Action|Adventure|Western',
```

```
       'Action|Drama|Mystery',
       "Adventure|Animation|Children's|Comedy|Fantasy",
       'Drama|Musical|War', 'Comedy|Mystery', 'Adventure|Sci-Fi|
Thriller',
       "Children's|Comedy|Sci-Fi", 'Adventure|Romance',
       'Drama|Mystery|Romance', 'Adventure|Drama|Romance',
       'Comedy|Drama|Sci-Fi', 'Romance|Thriller',
       'Film-Noir|Romance|Thriller', 'Crime|Drama|Film-Noir|Thriller',
       'Drama|Fantasy|Romance|Thriller',
       'Action|Drama|Mystery|Romance|Thriller', 'Action|Thriller|War',
       "Animation|Children's|Fantasy|War", 'Documentary|Musical',
       'Adventure|Comedy|Romance', "Adventure|Children's|Comedy|
Musical",
       'Action|Mystery|Thriller', "Children's|Horror",
       'Adventure|Musical|Romance', "Children's|Comedy|Mystery",
       'Romance|War', 'Action|Comedy|Romance|Thriller',
       'Musical|Romance|War', "Animation|Children's|Comedy|Romance",
       'Comedy|Mystery|Romance', 'Action|Drama|Western',
       "Action|Animation|Children's|Sci-Fi|Thriller|War",
       'Comedy|Drama|Musical', 'Adventure|Comedy|Musical',
       'Action|Crime|Mystery|Thriller', 'Action|Adventure|Drama|
Thriller',
       'Action|Adventure|Comedy|War', 'Mystery', 'Drama|Western',
       'Action|Adventure|Crime|Thriller',
       'Action|Mystery|Sci-Fi|Thriller',
       "Adventure|Children's|Comedy|Fantasy|Romance",
       "Adventure|Children's|Romance",
       "Action|Adventure|Animation|Children's|Fantasy",
       "Action|Adventure|Children's", "Adventure|Animation|
Children's",
       'Musical|War', 'Action|Crime|Mystery',
       "Adventure|Animation|Children's|Fantasy", 'Comedy|Horror|
Thriller',
       'Film-Noir', 'Crime|Film-Noir|Mystery', 'Drama|Film-Noir|
Thriller',
       'Drama|Film-Noir', 'Action|Adventure|War', 'Crime|Drama|
Romance',
       'Documentary|War', 'Sci-Fi|Thriller|War', 'Action|Comedy|
Crime',
       'Crime|Horror', 'Drama|Romance|Sci-Fi', 'Crime|Mystery',
       'Comedy|Drama|Thriller', 'Crime|Horror|Thriller', 'Horror|
Mystery',
       'Documentary|Drama', 'Drama|Horror|Thriller',
       'Comedy|Horror|Sci-Fi', "Action|Adventure|Children's|Fantasy",
       'Animation|Mystery', 'Comedy|Romance|Sci-Fi', 'Romance|
Western',
       'Drama|Romance|Western', 'Comedy|Film-Noir|Thriller',
       'Film-Noir|Horror', 'Fantasy'], dtype=object)

dfGenres =dfMaster['Genre'].str.split('|')
```

```
dfGenres
```

```
0                    [Animation, Children's, Comedy]
1          [Animation, Children's, Musical, Romance]
2                                             [Drama]
3               [Action, Adventure, Fantasy, Sci-Fi]
4                                        [Drama, War]
                             ...
1000204                             [Drama, Thriller]
1000205                   [Comedy, Horror, Thriller]
1000206                             [Comedy, Romance]
1000207                           [Action, Thriller]
1000208                              [Action, Drama]
Name: Genre, Length: 1000209, dtype: object
```

```
listgenres=set()
for genre in dfGenres:
    listgenres=listgenres.union(set(genre))
```

```
listgenres
```

```
{'Action',
 'Adventure',
 'Animation',
 "Children's",
 'Comedy',
 'Crime',
 'Documentary',
 'Drama',
 'Fantasy',
 'Film-Noir',
 'Horror',
 'Musical',
 'Mystery',
 'Romance',
 'Sci-Fi',
 'Thriller',
 'War',
 'Western'}
```

```
len(listgenres)
```

```
18
```

2.Create a separate column for each genre category with a one-hot encoding (1 and 0) whether or not the movie belongs to that genre.

```
dfMaster['Genre']
```

```
0                    Animation|Children's|Comedy
1          Animation|Children's|Musical|Romance
2                                         Drama
```

```
3               Action|Adventure|Fantasy|Sci-Fi
4                                   Drama|War
                           ...
1000204                         Drama|Thriller
1000205                  Comedy|Horror|Thriller
1000206                         Comedy|Romance
1000207                       Action|Thriller
1000208                          Action|Drama
Name: Genre, Length: 1000209, dtype: object
```

```
GenreOneHot=dfMaster['Genre'].str.get_dummies('|')
```

```
GenreOneHot
```

```
         Action  Adventure  Animation  Children's  Comedy  Crime
Documentary  \
0             0          0          1           1       1      0
0
1             0          0          1           1       0      0
0
2             0          0          0           0       0      0
0
3             1          1          0           0       0      0
0
4             0          0          0           0       0      0
0
...         ...        ...        ...         ...     ...    ...
...
1000204       0          0          0           0       0      0
0
1000205       0          0          0           0       1      0
0
1000206       0          0          0           0       1      0
0
1000207       1          0          0           0       0      0
0
1000208       1          0          0           0       0      0
0

         Drama  Fantasy  Film-Noir  Horror  Musical  Mystery  Romance
Sci-Fi  \
0            0        0          0       0        0        0        0
0
1            0        0          0       0        1        0        1
0
2            1        0          0       0        0        0        0
0
3            0        1          0       0        0        0        0
1
4            1        0          0       0        0        0        0
0
```

```
...        ...      ...        ...     ...      ...      ...      ...
...
1000204      1        0          0       0        0        0        0
0
1000205      0        0          0       1        0        0        0
0
1000206      0        0          0       0        0        0        1
0
1000207      0        0          0       0        0        0        0
0
1000208      1        0          0       0        0        0        0
0

         Thriller  War  Western
0               0    0        0
1               0    0        0
2               0    0        0
3               0    0        0
4               0    1        0
...           ...  ...      ...
1000204         1    0        0
1000205         1    0        0
1000206         0    0        0
1000207         1    0        0
1000208         0    0        0

[1000209 rows x 18 columns]

GenreOneHot.shape

(1000209, 18)

dfMaster=pd.concat([dfMaster,GenreOneHot],axis=1)

dfMaster

         MovieID                                      Title  \
0              1                          Toy Story (1995)
1             48                         Pocahontas (1995)
2            150                          Apollo 13 (1995)
3            260  Star Wars: Episode IV - A New Hope (1977)
4            527                    Schindler's List (1993)
...          ...                                        ...
1000204     3513                Rules of Engagement (2000)
1000205     3535                    American Psycho (2000)
1000206     3536                  Keeping the Faith (2000)
1000207     3555                               U-571 (2000)
1000208     3578                          Gladiator (2000)

                                    Genre  UserID  Rating
Timestamp  \
```

```
0                 Animation|Children's|Comedy       1       5
978824268
1        Animation|Children's|Musical|Romance       1       5
978824351
2                                     Drama       1       5
978301777
3             Action|Adventure|Fantasy|Sci-Fi       1       4
978300760
4                                  Drama|War       1       5
978824195
...                                      ...     ...     ...        .
..
1000204                       Drama|Thriller    5727       4
958489970
1000205                Comedy|Horror|Thriller    5727       2
958489970
1000206                        Comedy|Romance    5727       5
958489902
1000207                       Action|Thriller    5727       3
958490699
1000208                          Action|Drama    5727       5
958490171

        Gender  Age  Occupation Zip Code  ...  Fantasy  Film-Noir
Horror  \
0            F    1          10    48067  ...        0          0
0
1            F    1          10    48067  ...        0          0
0
2            F    1          10    48067  ...        0          0
0
3            F    1          10    48067  ...        1          0
0
4            F    1          10    48067  ...        0          0
0
...        ...  ...         ...      ...  ...      ...        ...
...
1000204      M   25           4    92843  ...        0          0
0
1000205      M   25           4    92843  ...        0          0
1
1000206      M   25           4    92843  ...        0          0
0
1000207      M   25           4    92843  ...        0          0
0
1000208      M   25           4    92843  ...        0          0
0

         Musical  Mystery  Romance  Sci-Fi  Thriller  War  Western
0              0        0        0       0         0    0        0
```

```
1              1        0        1       0         0    0        0
2              0        0        0       0         0    0        0
3              0        0        0       1         0    0        0
4              0        0        0       0         0    1        0
...          ...      ...      ...     ...       ...  ...      ...
1000204        0        0        0       0         1    0        0
1000205        0        0        0       0         1    0        0
1000206        0        0        1       0         0    0        0
1000207        0        0        0       0         1    0        0
1000208        0        0        0       0         0    0        0

[1000209 rows x 28 columns]
```

```
dfMaster.to_csv('New Master Data.csv')
```

3.Determine the features affecting the ratings of any particular movie.

```
dfMaster['Gender']=dfMaster['Gender'].replace('M','0')
dfMaster['Gender']=dfMaster['Gender'].replace('F','1')
```

```
dfMaster
```

```
         MovieID                                        Title  \
0              1                            Toy Story (1995)
1             48                           Pocahontas (1995)
2            150                            Apollo 13 (1995)
3            260  Star Wars: Episode IV - A New Hope (1977)
4            527                     Schindler's List (1993)
...          ...                                        ...
1000204     3513                 Rules of Engagement (2000)
1000205     3535                     American Psycho (2000)
1000206     3536                   Keeping the Faith (2000)
1000207     3555                                U-571 (2000)
1000208     3578                            Gladiator (2000)

                                       Genre  UserID  Rating
Timestamp  \
0                  Animation|Children's|Comedy       1       5
978824268
1        Animation|Children's|Musical|Romance       1       5
978824351
2                                      Drama       1       5
978301777
3             Action|Adventure|Fantasy|Sci-Fi       1       4
978300760
4                                  Drama|War       1       5
978824195
...                                      ...     ...     ...        .
..
1000204                       Drama|Thriller    5727       4
958489970
1000205                 Comedy|Horror|Thriller    5727       2
```

```
958489970
1000206                        Comedy|Romance    5727       5
958489902
1000207                       Action|Thriller    5727       3
958490699
1000208                          Action|Drama    5727       5
958490171

        Gender  Age  Occupation Zip Code  ...  Fantasy  Film-Noir
Horror  \
0            1    1          10    48067  ...        0          0
0
1            1    1          10    48067  ...        0          0
0
2            1    1          10    48067  ...        0          0
0
3            1    1          10    48067  ...        1          0
0
4            1    1          10    48067  ...        0          0
0
...        ...  ...         ...      ...  ...      ...        ...
...
1000204      0   25           4    92843  ...        0          0
0
1000205      0   25           4    92843  ...        0          0
1
1000206      0   25           4    92843  ...        0          0
0
1000207      0   25           4    92843  ...        0          0
0
1000208      0   25           4    92843  ...        0          0
0

         Musical  Mystery  Romance  Sci-Fi  Thriller  War  Western
0              0        0        0       0         0    0        0
1              1        0        1       0         0    0        0
2              0        0        0       0         0    0        0
3              0        0        0       1         0    0        0
4              0        0        0       0         0    1        0
...          ...      ...      ...     ...       ...  ...      ...
1000204        0        0        0       0         1    0        0
1000205        0        0        0       0         1    0        0
1000206        0        0        1       0         0    0        0
1000207        0        0        0       0         1    0        0
1000208        0        0        0       0         0    0        0

[1000209 rows x 28 columns]
```

```
dfMaster["Gender"].astype('int')
```

```
0          1
1          1
2          1
3          1
4          1
          ..
1000204    0
1000205    0
1000206    0
1000207    0
1000208    0
Name: Gender, Length: 1000209, dtype: int64
```

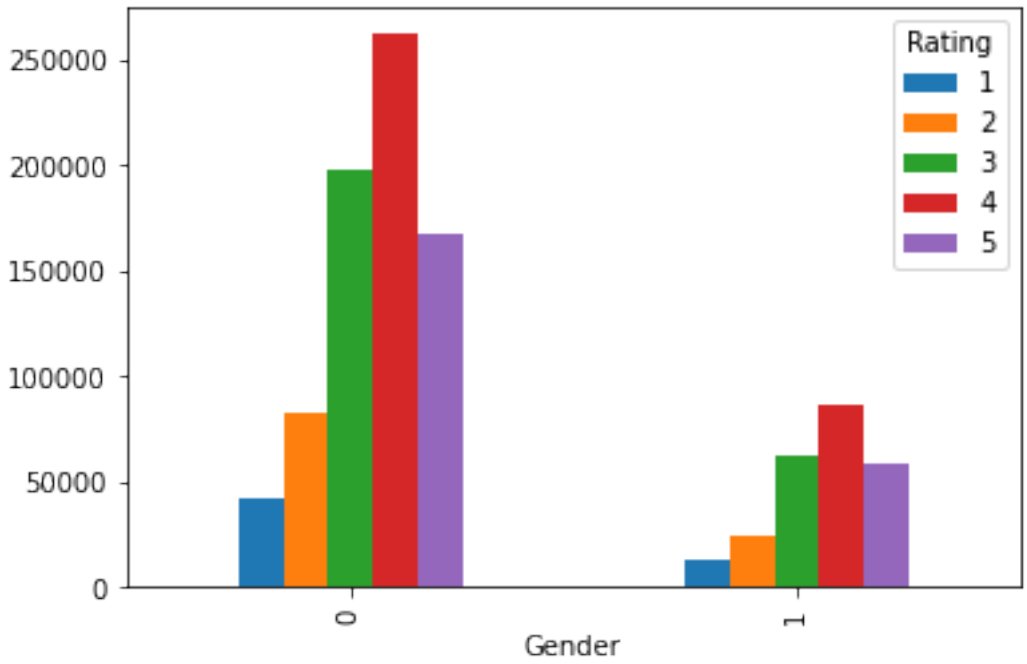
```
# Gender vs rating
GenderAffecting=dfMaster.groupby('Gender').size().sort_values(ascendin
g=False)[:25]
```

```
GenderAffecting
```

```
Gender
0    753769
1    246440
dtype: int64
```

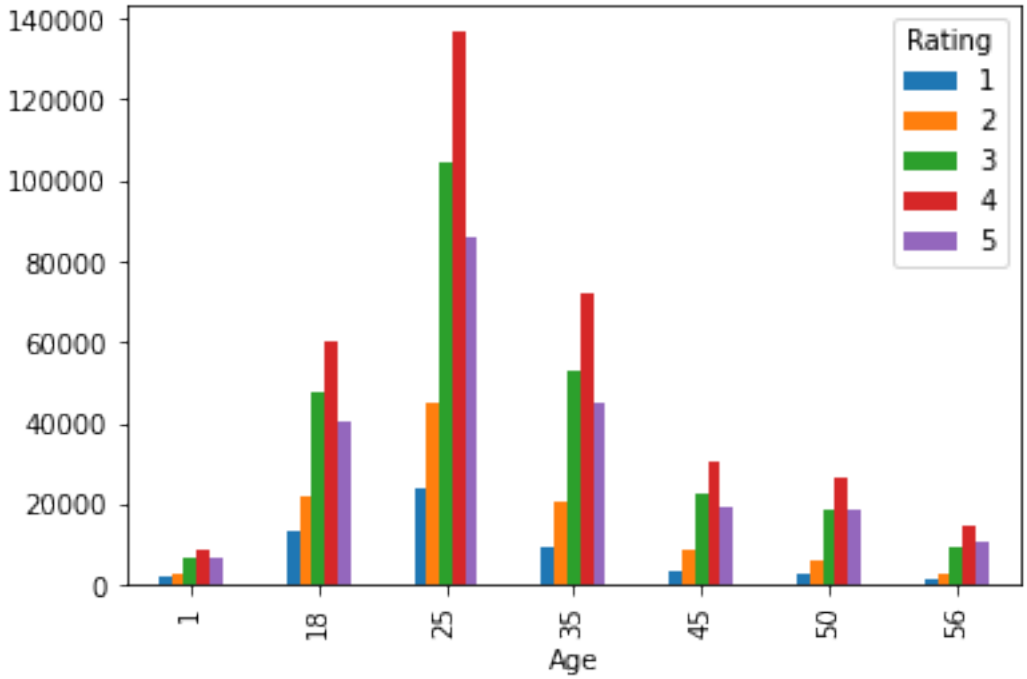
```
dfMaster.groupby(['Gender','Rating']).size().unstack().plot(kind='bar'
,legend=True)
```

```
<AxesSubplot:xlabel='Gender'>
```



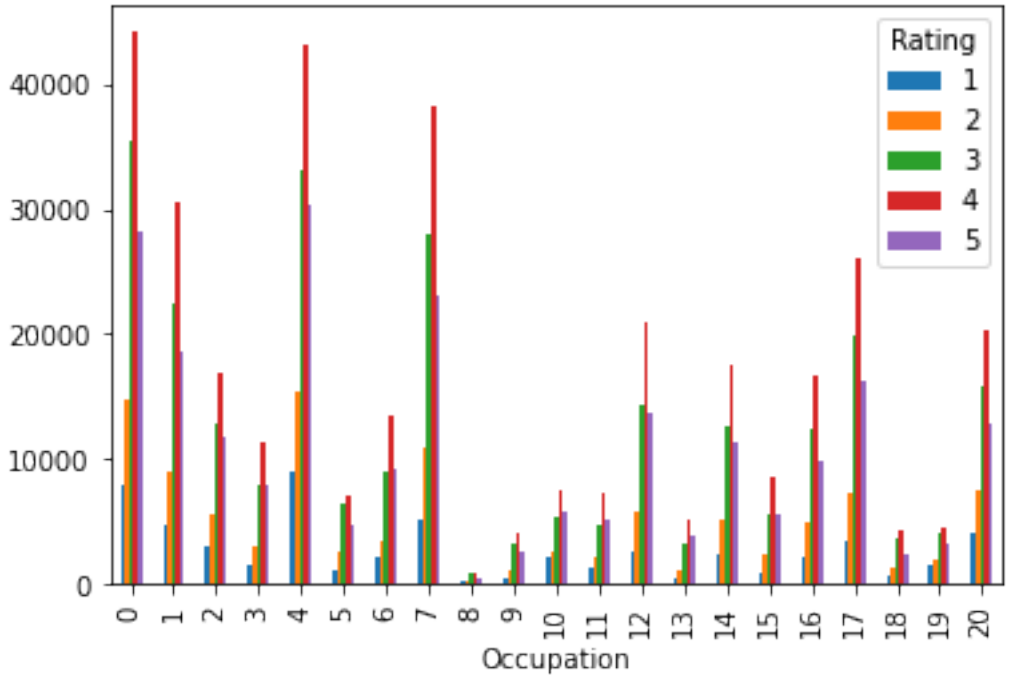

```
dfMaster.groupby(['Age','Rating']).size().unstack().plot(kind='bar',le
gend=True)
```

```
<AxesSubplot:xlabel='Age'>
```




```
dfMaster.groupby(['Occupation','Rating']).size().unstack().plot(kind='
bar',legend=True)
```

```
<AxesSubplot:xlabel='Occupation'>
```



Develop an appropriate model to predict the movie ratings

```
 ## first 500 records
new_data=dfMaster[:500]

new_data.shape

(500, 28)

new_data
```

```
     MovieID                                        Title  \
0          1                            Toy Story (1995)
1         48                           Pocahontas (1995)
2        150                            Apollo 13 (1995)
3        260  Star Wars: Episode IV - A New Hope (1977)
4        527                    Schindler's List (1993)
..       ...                                        ...
495     1197                Princess Bride, The (1987)
496     1198             Raiders of the Lost Ark (1981)
497     1200                                  Aliens (1986)
498     1201     Good, The Bad and The Ugly, The (1966)
499     1203                           12 Angry Men (1957)

                                  Genre  UserID  Rating  Timestamp
Gender  \
0             Animation|Children's|Comedy       1       5  978824268
1
1    Animation|Children's|Musical|Romance       1       5  978824351
1
2                                 Drama       1       5  978301777
1
3         Action|Adventure|Fantasy|Sci-Fi       1       4  978300760
1
4                             Drama|War       1       5  978824195
1
..                                  ...     ...     ...        ...
...
495       Action|Adventure|Comedy|Romance      10       5  979167660
1
496                     Action|Adventure      10       5  978225630
1
497           Action|Sci-Fi|Thriller|War      10       5  979168160
1
498                       Action|Western      10       2  978225853
1
499                                 Drama      10       3  979775159
1

     Age  Occupation Zip Code  ...  Fantasy  Film-Noir  Horror
Musical  \
0      1          10    48067  ...        0          0       0
```

```
0
1      1          10    48067  ...        0          0       0
1
2      1          10    48067  ...        0          0       0
0
3      1          10    48067  ...        1          0       0
0
4      1          10    48067  ...        0          0       0
0
..   ...         ...      ...  ...      ...        ...     ...      ..
.
495   35           1    95370  ...        0          0       0
0
496   35           1    95370  ...        0          0       0
0
497   35           1    95370  ...        0          0       0
0
498   35           1    95370  ...        0          0       0
0
499   35           1    95370  ...        0          0       0
0

     Mystery  Romance  Sci-Fi  Thriller  War  Western
0          0        0       0         0    0        0
1          0        1       0         0    0        0
2          0        0       0         0    0        0
3          0        0       1         0    0        0
4          0        0       0         0    1        0
..       ...      ...     ...       ...  ...      ...
495        0        1       0         0    0        0
496        0        0       0         0    0        0
497        0        0       1         1    1        0
498        0        0       0         0    0        1
499        0        0       0         0    0        0

[500 rows x 28 columns]
```

```
new_data.columns
```

```
Index(['MovieID', 'Title', 'Genre', 'UserID', 'Rating', 'Timestamp',
'Gender',
       'Age', 'Occupation', 'Zip Code', 'Action', 'Adventure',
'Animation',
       'Children's', 'Comedy', 'Crime', 'Documentary', 'Drama',
'Fantasy',
       'Film-Noir', 'Horror', 'Musical', 'Mystery', 'Romance', 'Sci-
Fi',
       'Thriller', 'War', 'Western'],
      dtype='object')
```

```
features=new_data[['MovieID','Age','Occupation','Gender']].values
```

```
features
```

```
array([[1, 1, 10, '1'],
       [48, 1, 10, '1'],
       [150, 1, 10, '1'],
       ...,
       [1200, 35, 1, '1'],
       [1201, 35, 1, '1'],
       [1203, 35, 1, '1']], dtype=object)
```

```
label=new_data[['Rating']].values
```

```
label
```

```
array([[5],
       [5],
       [5],
       [4],
       [5],
       [4],
       [4],
       [4],
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```

```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test=train_test_split(features,label,test_siz
e=0.20,random_state=42)
```

```
X_train.shape
```

```
(400, 4)
```

```
X_test.shape
```

```
(100, 4)
```

```
from sklearn.linear_model import LinearRegression # y=bo+b1X1+b2X2..
lr=LinearRegression()
```

```
lr.fit(X_train,y_train)
```

```
LinearRegression()
```

```
lr.predict(X_test)
```

```
array([[3.46596348],
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y_pred=lr.predict(X_test)

# error
from sklearn.metrics import mean_squared_error
print('Mean Squared Error',mean_squared_error(y_test,y_pred))

Mean Squared Error 0.6489142338657047

from sklearn.metrics import r2_score
print('R2 score',r2_score(y_test,y_pred))

R2 score -0.07240825295935327
```