Movielens_project

April 5, 2021

[1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from matplotlib import style
%matplotlib inline
```

[8]:

```
#Import the three datasets
movies = pd.read_csv("movies.dat", sep="::", names=['MovieID', 'Title',␣
 ↪'Genres'])
ratings = pd.read_csv("ratings.dat", sep="::", names=['UserID', 'MovieID',␣
 ↪'Rating', 'Timestamp'])
users = pd.read_csv("users.dat", sep="::", names=['UserID', 'Gender', 'Age',␣
 ↪'Occupation', 'Zip-code'])
```

```
<ipython-input-8-3f2fb1081e27>:2: ParserWarning: Falling back to the 'python'
engine because the 'c' engine does not support regex separators (separators > 1
char and different from '\s+' are interpreted as regex); you can avoid this
warning by specifying engine='python'.
  movies = pd.read_csv("movies.dat", sep="::", names=['MovieID', 'Title',
'Genres'])
<ipython-input-8-3f2fb1081e27>:3: ParserWarning: Falling back to the 'python'
engine because the 'c' engine does not support regex separators (separators > 1
char and different from '\s+' are interpreted as regex); you can avoid this
warning by specifying engine='python'.
  ratings = pd.read_csv("ratings.dat", sep="::", names=['UserID', 'MovieID',
'Rating', 'Timestamp'])
<ipython-input-8-3f2fb1081e27>:4: ParserWarning: Falling back to the 'python'
engine because the 'c' engine does not support regex separators (separators > 1
char and different from '\s+' are interpreted as regex); you can avoid this
warning by specifying engine='python'.
  users = pd.read_csv("users.dat", sep="::", names=['UserID', 'Gender', 'Age',
'Occupation', 'Zip-code'])
```

[9]:

```
movies.head()
```

[9]:

```
   MovieID                               Title                        Genres
0        1                    Toy Story (1995)   Animation|Children's|Comedy
1        2                      Jumanji (1995)  Adventure|Children's|Fantasy
```

```
2        3            Grumpier Old Men (1995)                Comedy|Romance
3        4           Waiting to Exhale (1995)                  Comedy|Drama
4        5  Father of the Bride Part II (1995)                       Comedy
```

[10]:
```
ratings.head()
```

[10]:
```
   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
```

[11]:
```
users.head()
```

[11]:
```
   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
```

[12]:
```
#Create a new dataset [Master_Data] with the following columns MovieID Title␣
 ↪UserID Age Gender Occupation Rating.
#(i) Merge two tables at a time. (ii) Merge the tables using two primary keys␣
 ↪MovieID & UserId
userRatings = pd.merge(users, ratings, on=['UserID'])
movieRatings = pd.merge(movies, ratings, on=['MovieID'])
```

[13]:
```
userRatings.head()
```

[13]:
```
   UserID Gender  Age  Occupation Zip-code  MovieID  Rating  Timestamp
0       1      F    1          10    48067     1193       5  978300760
1       1      F    1          10    48067      661       3  978302109
2       1      F    1          10    48067      914       3  978301968
3       1      F    1          10    48067     3408       4  978300275
4       1      F    1          10    48067     2355       5  978824291
```

[14]:
```
movieRatings.head()
```

[14]:
```
   MovieID             Title                       Genres  UserID  Rating  \
0        1  Toy Story (1995)  Animation|Children's|Comedy       1       5
1        1  Toy Story (1995)  Animation|Children's|Comedy       6       4
2        1  Toy Story (1995)  Animation|Children's|Comedy       8       4
3        1  Toy Story (1995)  Animation|Children's|Comedy       9       5
4        1  Toy Story (1995)  Animation|Children's|Comedy      10       5

   Timestamp
```

```
0    978824268
1    978237008
2    978233496
3    978225952
4    978226474
```

[15]:

```
Master_Data = pd.merge(userRatings, movieRatings, on=['UserID', 'MovieID',␣
 ↪'Rating'])
```

[16]:

```
Master_Data.head()
```

[16]:

```
   UserID Gender  Age  Occupation Zip-code  MovieID  Rating  Timestamp_x  \
0       1      F    1          10    48067     1193       5    978300760
1       1      F    1          10    48067      661       3    978302109
2       1      F    1          10    48067      914       3    978301968
3       1      F    1          10    48067     3408       4    978300275
4       1      F    1          10    48067     2355       5    978824291

                                    Title                        Genres  \
0  One Flew Over the Cuckoo's Nest (1975)                         Drama
1        James and the Giant Peach (1996)  Animation|Children's|Musical
2                     My Fair Lady (1964)               Musical|Romance
3                  Erin Brockovich (2000)                         Drama
4                    Bug's Life, A (1998)   Animation|Children's|Comedy

   Timestamp_y
0    978300760
1    978302109
2    978301968
3    978300275
4    978824291
```

[17]:

```
Master_Data = Master_Data[['MovieID', 'Title', 'UserID', 'Age', 'Gender',␣
 ↪'Occupation', "Rating"]]
```

[18]:

```
Master_Data.head()
```

[18]:

```
   MovieID                                   Title  UserID  Age Gender  \
0     1193  One Flew Over the Cuckoo's Nest (1975)       1    1      F
1      661        James and the Giant Peach (1996)       1    1      F
2      914                     My Fair Lady (1964)       1    1      F
3     3408                  Erin Brockovich (2000)       1    1      F
4     2355                    Bug's Life, A (1998)       1    1      F

   Occupation  Rating
0          10       5
1          10       3
```

```
2            10        3
3            10        4
4            10        5
```

[19]:

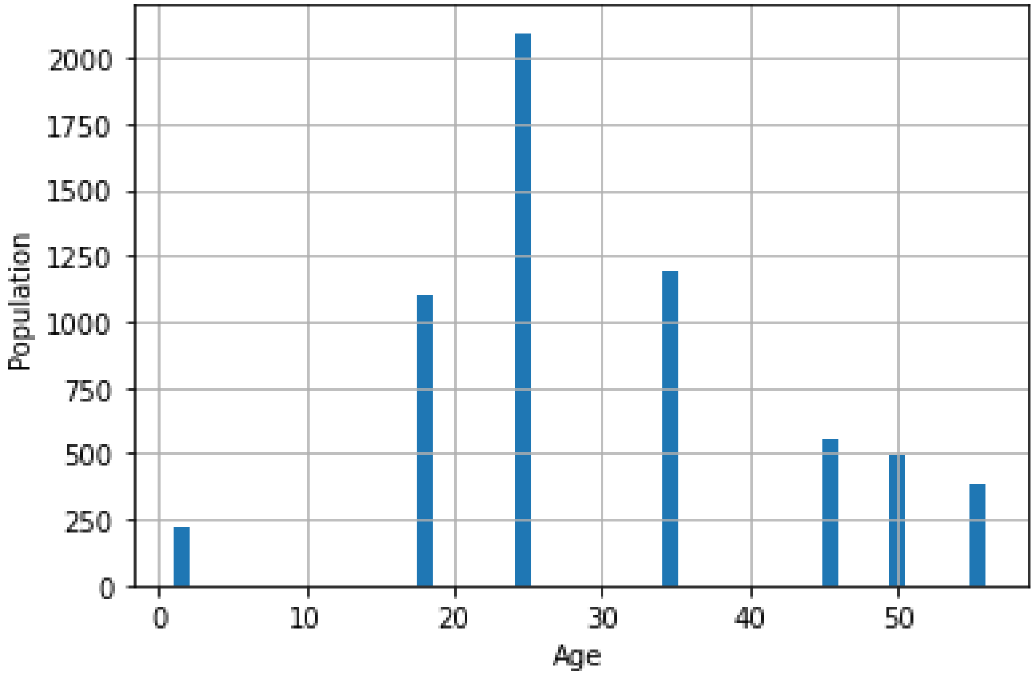
```
#Explore the datasets using visual representations (graphs or tables), also␣
 ↪include your comments on the following:
#User Age Distribution
#User rating of the movie "Toy Story"
#Top 25 movies by viewership rating
#Find the ratings for all the movies reviewed by for a particular user of user␣
 ↪id = 2696
```

[20]:

```
#User Age Distribution
users['Age'].hist(bins=50)
plt.xlabel('Age')
plt.ylabel('Population')
plt.show
```

[20]:

```
<function matplotlib.pyplot.show(close=None, block=None)>
```

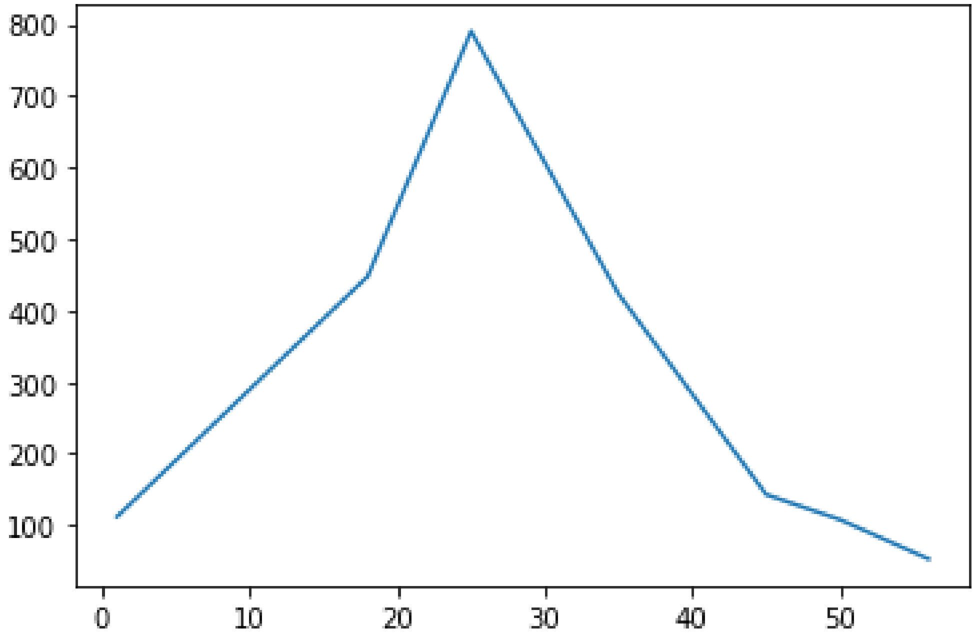


[23]:

```
#User rating of the movie "Toy Story"
toy = Master_Data[Master_Data.Title == "Toy Story (1995)"]
plt.plot(toy.groupby("Age")["MovieID"].count())
toy.groupby("Age")["MovieID"].count()
```

[23]:

```
Age
1     112
18    448
25    790
35    423
45    143
50    108
56     53
Name: MovieID, dtype: int64
```

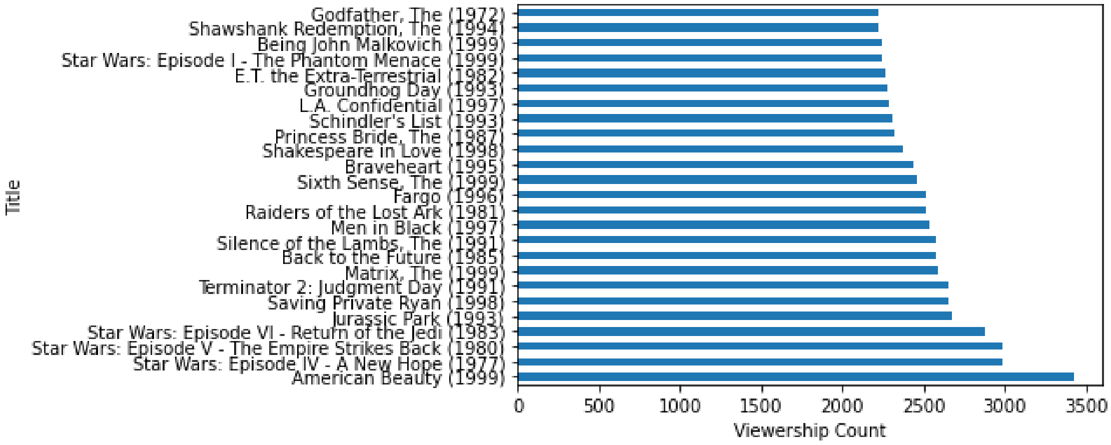


[35]:

```
#Top 25 movies by viewership rating
top = Master_Data.groupby("Title").size().sort_values(ascending=False).head(25)
plt.ylabel("Title")
plt.xlabel("Viewership Count")
top.plot(kind='barh')
```

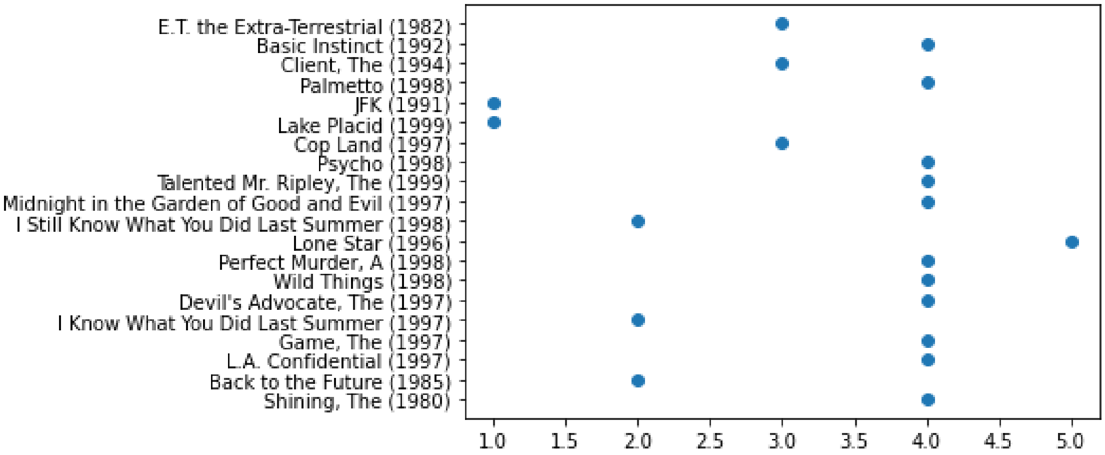
[35]:

```
<AxesSubplot:xlabel='Viewership Count', ylabel='Title'>
```



```
[37]: #Find the ratings for all the movies reviewed by for a particular user of user␣
       ↪id = 2696
      res = Master_Data[Master_Data.UserID == 2696]
      plt.scatter(y=res.Title, x=res.Rating)
```

```
[37]: <matplotlib.collections.PathCollection at 0x26f6b109b50>
```



```
[ ]: #Feature Engineering:
     #Use column genres:
     #Find out all the unique genres (Hint: split the data in column genre making a␣
      ↪list)
     #process the data to find out only the unique categories of genres)
     #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.
     #Determine the features affecting the ratings of any particular movie.
```

```
#Develop an appropriate model to predict the movie ratings
```

[38]:
```
#Use column genres:
#Find out all the unique genres (Hint: split the data in column genre making a␣
↪list)
val = movies.Genres.str.split("|")
```

[39]:
```
val.head()
```

[39]:
```
0     [Animation, Children's, Comedy]
1    [Adventure, Children's, Fantasy]
2                   [Comedy, Romance]
3                     [Comedy, Drama]
4                            [Comedy]
Name: Genres, dtype: object
```

[41]:
```
res_col = []
for v in val:
    for i in v:
        if i not in res_col:
            res_col.append(i)
```

[42]:
```
res_col.append("Gender")
res_col.append("Age")
res_col.append("Rating")
df = pd.DataFrame(columns=res_col)
df.head()
```

[42]:
```
Empty DataFrame
Columns: [Animation, Children's, Comedy, Adventure, Fantasy, Romance, Drama,
Action, Crime, Thriller, Horror, Sci-Fi, Documentary, War, Musical, Mystery,
Film-Noir, Western, Gender, Age, Rating]
Index: []

[0 rows x 21 columns]
```

[48]:
```
res = Master_Data.merge(movies, on = ['MovieID'],␣
↪how="left")[["Genres","Rating","Gender", "Age"]]
```

[51]:
```
#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.
for index, row in res.head(20000).iterrows():
    tmp = row.Genres.split("|")
    for i in tmp:
        df.loc[index,i] = 1
        df.loc[index,"Gender"] = res.loc[index,"Gender"]
        df.loc[index,"Age"] = res.loc[index,"Age"]
        df.loc[index,"Rating"] = res.loc[index,"Rating"]
        df.loc[index,df.columns[~df.columns.
↪isin(tmp+["Gender","Rating","Age"])]] = 0
```

[52]:
```
df.head()
```

[52]:
```
      Animation Children's Comedy Adventure Fantasy Romance Drama Action  \
19999         0          0      1         0       0       0     1      1
0             0          0      0         0       0       0     1      0
1             1          1      0         0       0       0     0      0
2             0          0      0         0       0       1     0      0
3             0          0      0         0       0       0     1      0

      Crime Thriller  … Sci-Fi Documentary War Musical Mystery Film-Noir  \
19999     0        0  …      0           0   0       0       0         0
0         0        0  …      0           0   0       0       0         0
1         0        0  …      0           0   0       1       0         0
2         0        0  …      0           0   0       1       0         0
3         0        0  …      0           0   0       0       0         0

      Western Gender Age Rating
19999       0      M  25      3
0           0      F   1      5
1           0      F   1      3
2           0      F   1      3
3           0      F   1      4

[5 rows x 21 columns]
```

[55]:
```
#Develop an appropriate model to predict the movie ratings
from sklearn.metrics import confusion_matrix
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder

x = df[df.columns[~df.columns.isin(["Rating"])]]
y = df.Rating

x_train, x_test, y_train, y_test = train_test_split(x, y, random_state = 0)

number = LabelEncoder()
x_train.Gender = number.fit_transform(x_train["Gender"].astype("str"))
x_test.Gender = number.fit_transform(x_test["Gender"].astype("str"))
y_train = number.fit_transform(y_train.astype("int"))
y_test = number.fit_transform(y_test.astype("int"))
```

```
C:\ProgramData\Anaconda3\lib\site-packages\pandas\core\generic.py:5168:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
```

```
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self[name] = value
```

[57]:

```
#SVM

from sklearn.svm import SVC
svm_model_linear = SVC(kernel = 'linear', C = 1).fit(x_train, y_train)
svm_predictions = svm_model_linear.predict(x_test)

# model accuracy for x_test
accuracy = svm_model_linear.score(x_test, y_test)

# creating a confusion matrix
cm = confusion_matrix(y_test, svm_predictions)
accuracy
```

[57]:

```
0.3412
```

[64]:

```
cm
```

[64]:

```
array([[134,  20,  62,  58,  13],
       [162,  15, 143, 135,  28],
       [322,  62, 428, 436,  87],
       [418,  60, 552, 541, 149],
       [233,  61, 317, 405, 159]], dtype=int64)
```

[59]:

```
#KNN

from sklearn.neighbors import KNeighborsClassifier
knn = KNeighborsClassifier(n_neighbors = 7).fit(x_train, y_train)

# accuracy on X_test
accuracy = knn.score(x_test, y_test)

# creating a confusion matrix
knn_predictions = knn.predict(x_test)
cm = confusion_matrix(y_test, knn_predictions)

accuracy
```

[59]:

```
0.3052
```

[65]:

```
cm
```

```
[65]: array([[134,  20,  62,  58,  13],
              [162,  15, 143, 135,  28],
              [322,  62, 428, 436,  87],
              [418,  60, 552, 541, 149],
              [233,  61, 317, 405, 159]], dtype=int64)
```

```
[61]: #Naive Bayes classifier

      from sklearn.naive_bayes import GaussianNB
      gnb = GaussianNB().fit(x_train, y_train)
      gnb_predictions = gnb.predict(x_test)

      # accuracy on X_test
      accuracy = gnb.score(x_test, y_test)

      # creating a confusion matrix
      cm = confusion_matrix(y_test, gnb_predictions)

      accuracy
```

```
[61]: 0.2554
```

```
[63]: from sklearn.linear_model import LinearRegression
      lr = LinearRegression().fit(x_train, y_train)
      lr_predictions = lr.predict(x_test)

      # accuracy on X_test
      accuracy = lr.score(x_test, y_test)

      accuracy
```

```
[63]: 0.02635611144303962
```

```
[ ]:
```