EDA - Facebook case study

October 30, 2022

1 1.Importing Libraries

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from pandas_profiling import ProfileReport
%matplotlib inline
```

2 2.Data Acquisition

[2]:
```
fbdata= pd.read_csv("https://raw.githubusercontent.com/insaid2018/Term-1/master/
  ↪Data/Projects/facebook_data.csv")
fbdata.head()
```

[2]:

	userid	age	dob_day	dob_year	dob_month	gender	tenure	friend_count	\
0	2094382	14	19	1999	11	male	266.0	0	
1	1192601	14	2	1999	11	female	6.0	0	
2	2083884	14	16	1999	11	male	13.0	0	
3	1203168	14	25	1999	12	female	93.0	0	
4	1733186	14	4	1999	12	male	82.0	0	

	friendships_initiated	likes	likes_received	mobile_likes	\
0	0	0	0	0	
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	

	mobile_likes_received	www_likes	www_likes_received
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0

3 3.Describing the Data

[3]:
```
fbdata.describe()
```

[3]:
```
              userid            age       dob_day      dob_year     dob_month  \
count  9.900300e+04  99003.000000  99003.000000  99003.000000  99003.000000
mean   1.597045e+06     37.280224     14.530408   1975.719776      6.283365
std    3.440592e+05     22.589748      9.015606     22.589748      3.529672
min    1.000008e+06     13.000000      1.000000   1900.000000      1.000000
25%    1.298806e+06     20.000000      7.000000   1963.000000      3.000000
50%    1.596148e+06     28.000000     14.000000   1985.000000      6.000000
75%    1.895744e+06     50.000000     22.000000   1993.000000      9.000000
max    2.193542e+06    113.000000     31.000000   2000.000000     12.000000

             tenure  friend_count  friendships_initiated         likes  \
count  99001.000000  99003.000000           99003.000000  99003.000000
mean     537.887375    196.350787             107.452471    156.078785
std      457.649874    387.304229             188.786951    572.280681
min        0.000000      0.000000               0.000000      0.000000
25%      226.000000     31.000000              17.000000      1.000000
50%      412.000000     82.000000              46.000000     11.000000
75%      675.000000    206.000000             117.000000     81.000000
max     3139.000000   4923.000000            4144.000000  25111.000000

       likes_received  mobile_likes  mobile_likes_received     www_likes  \
count    99003.000000  99003.000000           99003.000000  99003.000000
mean       142.689363    106.116300              84.120491     49.962425
std       1387.919613    445.252985             839.889444    285.560152
min          0.000000      0.000000               0.000000      0.000000
25%          1.000000      0.000000               0.000000      0.000000
50%          8.000000      4.000000               4.000000      0.000000
75%         59.000000     46.000000              33.000000      7.000000
max     261197.000000  25111.000000          138561.000000  14865.000000

       www_likes_received
count        99003.000000
mean            58.568831
std            601.416348
min              0.000000
25%              0.000000
50%              2.000000
75%             20.000000
max         129953.000000
```

Age: Minimum-13, Maximum-113, Average age-37 DOB Year: Minimum-1900, Maximum-2000, Average age-37 Tenure: Minimum-0, Maximum-3139, Average age-537 Likes done are lower than likes received.

4 4.Extracting Info about the Data

[4]:
```
fbdata.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 99003 entries, 0 to 99002
Data columns (total 15 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   userid                 99003 non-null  int64
 1   age                    99003 non-null  int64
 2   dob_day                99003 non-null  int64
 3   dob_year               99003 non-null  int64
 4   dob_month              99003 non-null  int64
 5   gender                 98828 non-null  object
 6   tenure                 99001 non-null  float64
 7   friend_count           99003 non-null  int64
 8   friendships_initiated  99003 non-null  int64
 9   likes                  99003 non-null  int64
 10  likes_received         99003 non-null  int64
 11  mobile_likes           99003 non-null  int64
 12  mobile_likes_received  99003 non-null  int64
 13  www_likes              99003 non-null  int64
 14  www_likes_received     99003 non-null  int64
dtypes: float64(1), int64(13), object(1)
memory usage: 11.3+ MB
```

5 5.Data Pre - Profilling

[5]:
```
profile = fbdata.profile_report(title="Pandas Pre-Profilling Report")
profile.to_file(output_file="pandas_pre_profilling.html")
```

```
Summarize dataset:   0%|          | 0/5 [00:00<?, ?it/s]

Generate report structure:   0%|          | 0/1 [00:00<?, ?it/s]

Render HTML:   0%|          | 0/1 [00:00<?, ?it/s]

Export report to file:   0%|          | 0/1 [00:00<?, ?it/s]
```

6 6.Data preprocessing

[6]:
```
fbdata.isnull().sum()
```

[6]:
```
userid                 0
age                    0
dob_day                0
dob_year               0
```

```
dob_month                  0
gender                   175
tenure                     2
friend_count               0
friendships_initiated      0
likes                      0
likes_received             0
mobile_likes               0
mobile_likes_received      0
www_likes                  0
www_likes_received         0
dtype: int64
```

We have 2 columns with missing values

6.0.1 Dropping the missing values in tenure

[7]:
```
fbdata = fbdata[~fbdata.tenure.isnull()].copy()

fbdata.isnull().sum()
```

[7]:
```
userid                     0
age                        0
dob_day                    0
dob_year                   0
dob_month                  0
gender                   175
tenure                     0
friend_count               0
friendships_initiated      0
likes                      0
likes_received             0
mobile_likes               0
mobile_likes_received      0
www_likes                  0
www_likes_received         0
dtype: int64
```

6.0.2 Gender ratio between male and female users

[8]:
```
x = fbdata['gender']=='male'
males = x.value_counts()[True]
non_male = x.value_counts()[False]

y = fbdata['gender']=='female'
females = y.value_counts()[True]

nan_count = non_male - females
```

```
total = males + non_male
print('males :',males)
print('females:',females)
print('nan count:', nan_count)
print('total:',total)
print('ratio - male:female :' ,males/females)
```

```
males : 58574
females: 40252
nan count: 175
total: 99001
ratio - male:female : 1.4551823511875186
```

6.0.3 Filling the nan values

[9]:
```
fbdata.gender.fillna(value="not revealed",inplace=True)
```

[10]:
```
fbdata.isnull().sum()
```

[10]:
```
userid                  0
age                     0
dob_day                 0
dob_year                0
dob_month               0
gender                  0
tenure                  0
friend_count            0
friendships_initiated   0
likes                   0
likes_received          0
mobile_likes            0
mobile_likes_received   0
www_likes               0
www_likes_received      0
dtype: int64
```

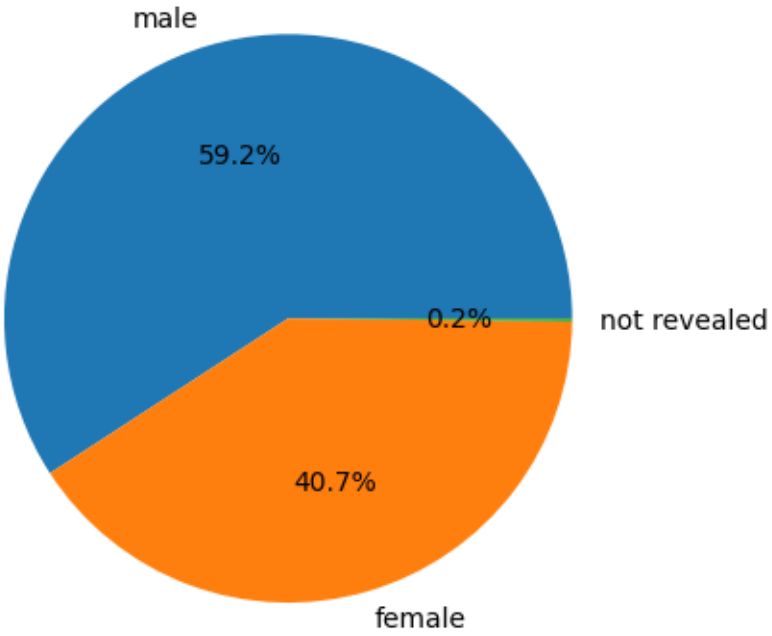
[11]:
```
x = fbdata['gender']=='male'
males = x.value_counts()[True]

y = fbdata['gender']=='female'
females = y.value_counts()[True]

z = fbdata['gender']=='not revealed'
not_revealed = z.value_counts()[True]

total = males + females + not_revealed

print('males :',males)
```

```
print('females:',females)
print('not_revealed:', not_revealed)
print('total:',total)
```

```
males : 58574
females: 40252
not_revealed: 175
total: 99001
```

6.1 Gender distribution through pie chart

[12]:
```
plt.pie(fbdata.gender.value_counts(),labels=['male','female','not␣
↪revealed'],explode=(0,0,0),autopct='%1.1f%%')
plt.show()
```



7 7.Data post profilling

[13]:
```
profile = fbdata.profile_report(title="Pandas Post-Profilling Report")
profile.to_file(output_file="pandas_post_profilling.html")
```

```
Summarize dataset:   0%|          | 0/5 [00:00<?, ?it/s]
Generate report structure:   0%|          | 0/1 [00:00<?, ?it/s]
```

```
Render HTML:   0%|          | 0/1 [00:00<?, ?it/s]
Export report to file:   0%|          | 0/1 [00:00<?, ?it/s]
```

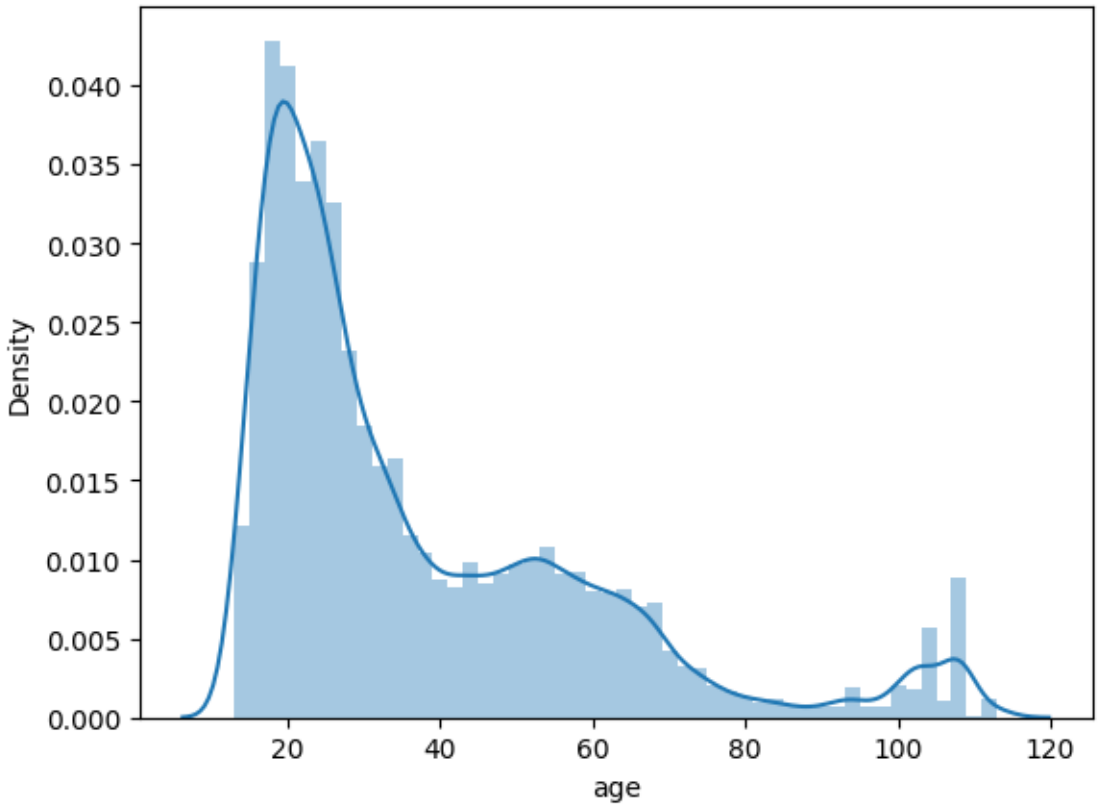
8 8.Exploratory Data Analysis

8.1 Evaluating Distribution of age

[14]:
```
sns.distplot(fbdata['age'])
```

```
C:\Users\hp\AppData\Local\Temp\ipykernel_572\862979134.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(fbdata['age'])
```

[14]:
```
<AxesSubplot:xlabel='age', ylabel='Density'>
```



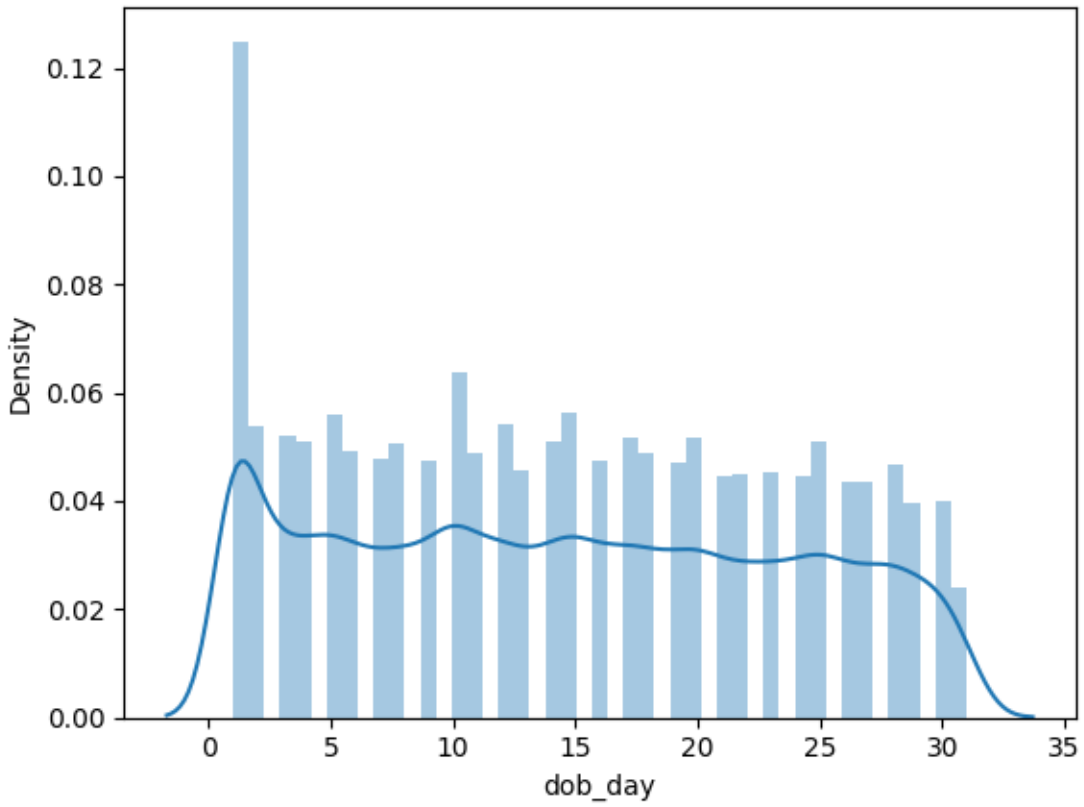
Majority of the People are of age near 20

8.2 Day, Month and Year wise distribution of DOB

[15]:
```
sns.distplot(fbdata['dob_day'])
```

```
C:\Users\hp\AppData\Local\Temp\ipykernel_572\1986788402.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(fbdata['dob_day'])
```

[15]: <AxesSubplot:xlabel='dob_day', ylabel='Density'>

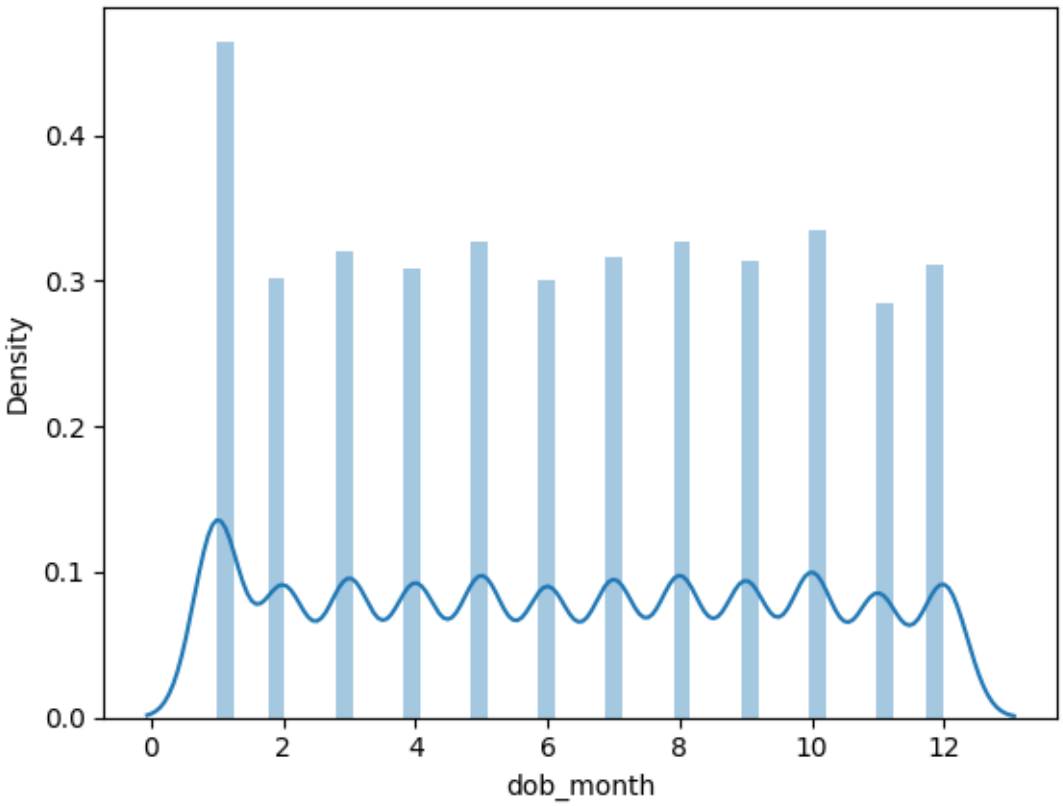


Day of birth is evenly spread across all the days with 1 having larger density

[16]:
```
sns.distplot(fbdata['dob_month'])
```

```
C:\Users\hp\AppData\Local\Temp\ipykernel_572\177632322.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(fbdata['dob_month'])
```

[16]: <AxesSubplot:xlabel='dob_month', ylabel='Density'>



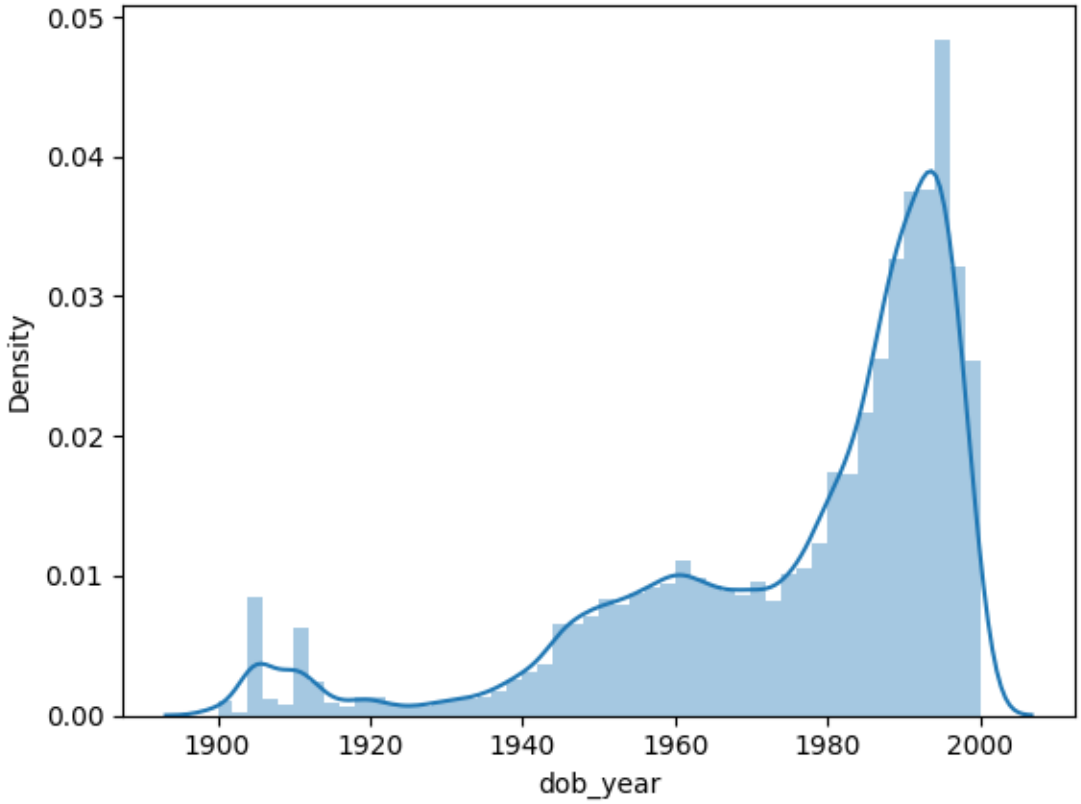
Month of born is evenly spread across all the months

[17]:
```
sns.distplot(fbdata['dob_year'])
```

```
C:\Users\hp\AppData\Local\Temp\ipykernel_572\933665262.py:1: UserWarning:
```

```
`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(fbdata['dob_year'])
```

[17]: <AxesSubplot:xlabel='dob_year', ylabel='Density'>



Majority of the users are born after 1980

8.3 Dividing the dob_year in groups of 10

[18]:
```
labels=['1900-1910','1910-1920','1920-1930','1930-1940','1940-1950','1950-1960','1960-1970','1
fbdata['year_group'] = pd.cut(fbdata.dob_year,bins=np.
  ↪arange(1900,2001,10),labels=labels,right=True)
fbdata.tail()
```

[18]:

	userid	age	dob_day	dob_year	dob_month	gender	tenure	\
98998	1268299	68	4	1945	4	female	541.0	
98999	1256153	18	12	1995	3	female	21.0	
99000	1195943	15	10	1998	5	female	111.0	
99001	1468023	23	11	1990	4	female	416.0	
99002	1397896	39	15	1974	5	female	397.0	

	friend_count	friendships_initiated	likes	likes_received	\
98998	2118	341	3996	18089	
98999	1968	1720	4401	13412	
99000	2002	1524	11959	12554	
99001	2560	185	4506	6516	
99002	2049	768	9410	12443	

	mobile_likes	mobile_likes_received	www_likes	www_likes_received	\
98998	3505	11887	491	6202	
98999	4399	10592	2	2820	
99000	11959	11462	0	1092	
99001	4506	5760	0	756	
99002	9410	9530	0	2913	

	year_group
98998	1940-1950
98999	1990-2000
99000	1990-2000
99001	1980-1990
99002	1970-1980

see last column for year group

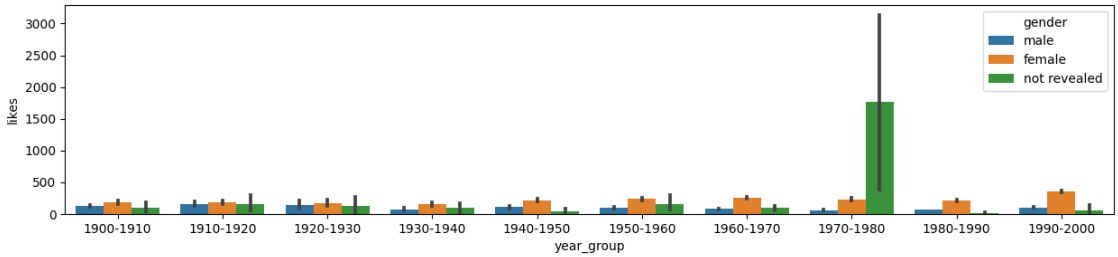
[19]:
```
#Counting value in year groups
fbdata.year_group.value_counts()
```

[19]:
```
1990-2000    31455
1980-1990    25080
1970-1980    10990
1960-1970     9298
1950-1960     8921
1940-1950     5935
1900-1910     3140
1930-1940     1787
1910-1920     1435
1920-1930      758
Name: year_group, dtype: int64
```

8.3.1 Number of likes comparison between males and females based on year born range

[20]:
```
plt.figure(figsize=(15,3))
sns.barplot(x=fbdata['year_group'],y=fbdata['likes'],hue=fbdata.gender)
```

[20]:
```
<AxesSubplot:xlabel='year_group', ylabel='likes'>
```



Number of likes are greater for females as compared to males across all the year groups

8.4 Dividing the likes in groups of 1000

[21]:
```
labels=['0-1000','1001-2000','2001-3000','3001-4000','4001-5000','5001-6000','6001-7000','7001
fbdata['likes_range'] = pd.cut(fbdata.likes,bins=np.
 ↪arange(0,26001,1000),labels=labels,right=True)
fbdata.tail()
```

[21]:

	userid	age	dob_day	dob_year	dob_month	gender	tenure	\
98998	1268299	68	4	1945	4	female	541.0	
98999	1256153	18	12	1995	3	female	21.0	
99000	1195943	15	10	1998	5	female	111.0	
99001	1468023	23	11	1990	4	female	416.0	
99002	1397896	39	15	1974	5	female	397.0	

	friend_count	friendships_initiated	likes	likes_received	\
98998	2118	341	3996	18089	
98999	1968	1720	4401	13412	
99000	2002	1524	11959	12554	
99001	2560	185	4506	6516	
99002	2049	768	9410	12443	

	mobile_likes	mobile_likes_received	www_likes	www_likes_received	\
98998	3505	11887	491	6202	
98999	4399	10592	2	2820	
99000	11959	11462	0	1092	
99001	4506	5760	0	756	
99002	9410	9530	0	2913	

```
      year_group  likes_range
98998  1940-1950    3001-4000
98999  1990-2000    4001-5000
99000  1990-2000  11001-12000
99001  1980-1990    4001-5000
99002  1970-1980   9001-10000
```

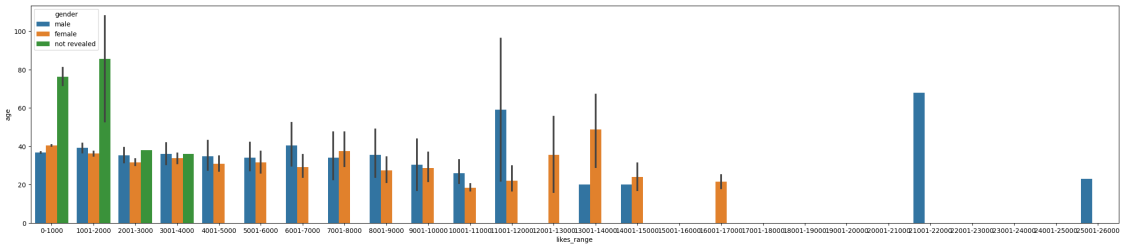
[22]:
```
#Counting value in likes range
fbdata.likes_range.value_counts()
```

[22]:
```
0-1000          73278
1001-2000        2059
2001-3000         668
3001-4000         293
4001-5000         130
5001-6000          82
6001-7000          57
7001-8000          34
8001-9000          33
9001-10000         16
10001-11000        14
11001-12000        12
12001-13000         5
14001-15000         4
13001-14000         4
16001-17000         2
21001-22000         1
25001-26000         1
15001-16000         0
17001-18000         0
18001-19000         0
19001-20000         0
20001-21000         0
22001-23000         0
23001-24000         0
24001-25000         0
Name: likes_range, dtype: int64
```

8.4.1 age comparison between males and females based on likes range

[23]:
```
plt.figure(figsize=(30,6))
sns.barplot(x=fbdata['likes_range'],y=fbdata['age'],hue=fbdata.gender)
```

[23]:
```
<AxesSubplot:xlabel='likes_range', ylabel='age'>
```



Some males have very large number of likes

8.5 Counting people with some non - zero attributes

[24]:
```
#No of people having non-zero likes
np.count_nonzero(fbdata.likes)
```

[24]: 76693

[25]:
```
#No of people having non-zero tenure
np.count_nonzero(fbdata.tenure)
```

[25]: 98931

[26]:
```
#No of people having non-zero friends
np.count_nonzero(fbdata.friend_count)
```

[26]: 97039

8.6 Evaluation on users with Zero friends

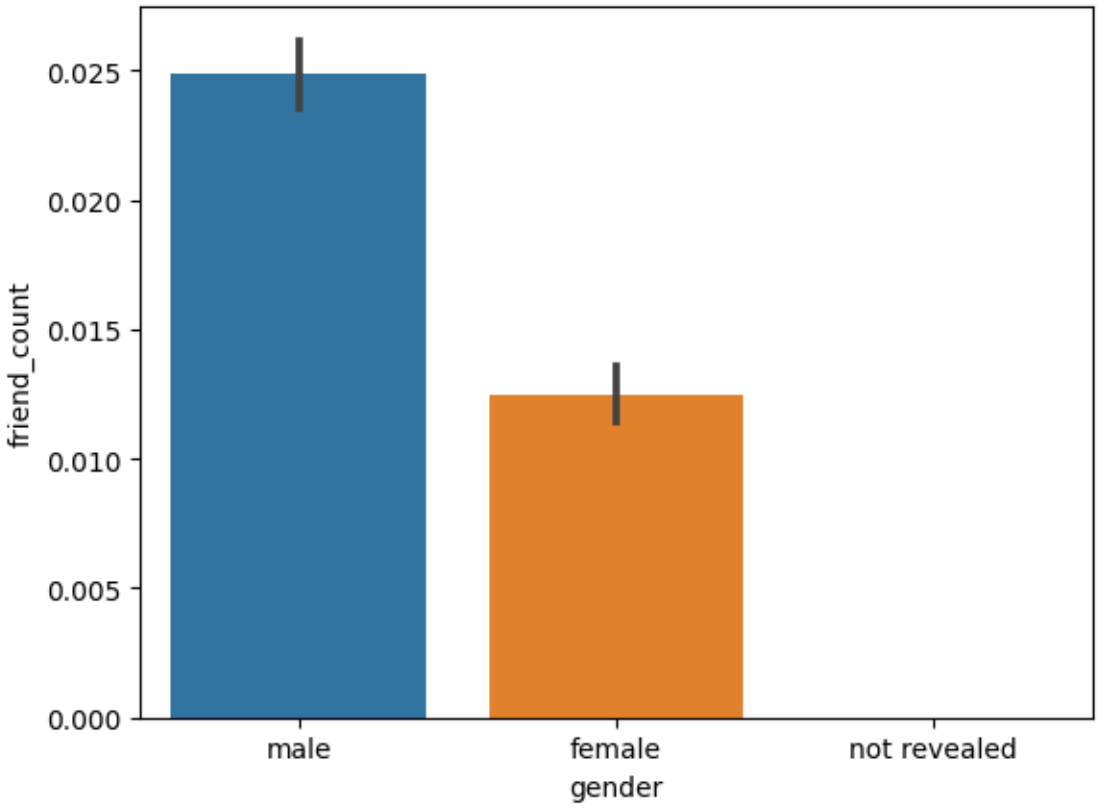
[27]:
```
#All the people having zero friends
fc=fbdata.friend_count==0
fc.value_counts()
```

[27]:
```
False    97039
True      1962
Name: friend_count, dtype: int64
```

This infers that Males have more zero friends than females

[28]:
```
#plotting the gender vs zero friend count people
sns.barplot(y=fbdata.friend_count==0,x=fbdata.gender)
```

[28]: <AxesSubplot:xlabel='gender', ylabel='friend_count'>



8.7 Dividing tenure to year ranges

[29]:
```
fbdata.tenure.interpolate(inplace=True)
tenlabel=['0-1 years','1-2 years','2-3 years','3-4 years','4-5 years','5-6␣
 ↪years','6-7 years','7-8 years','8-9 years']
fbdata['tenure_range']=pd.cut(fbdata.tenure,bins=np.
 ↪arange(0,3300,365),labels=tenlabel,right=True)
```

[30]:
```
fbdata.tail()
```

[30]:

	userid	age	dob_day	dob_year	dob_month	gender	tenure	\
98998	1268299	68	4	1945	4	female	541.0	
98999	1256153	18	12	1995	3	female	21.0	
99000	1195943	15	10	1998	5	female	111.0	
99001	1468023	23	11	1990	4	female	416.0	
99002	1397896	39	15	1974	5	female	397.0	

	friend_count	friendships_initiated	likes	likes_received	\
98998	2118	341	3996	18089	
98999	1968	1720	4401	13412	
99000	2002	1524	11959	12554	

```
99001          2560                    185   4506           6516
99002          2049                    768   9410          12443

       mobile_likes  mobile_likes_received  www_likes  www_likes_received  \
98998          3505                  11887        491                6202
98999          4399                  10592          2                2820
99000         11959                  11462          0                1092
99001          4506                   5760          0                 756
99002          9410                   9530          0                2913

      year_group  likes_range tenure_range
98998  1940-1950    3001-4000    1-2 years
98999  1990-2000    4001-5000    0-1 years
99000  1990-2000  11001-12000    0-1 years
99001  1980-1990    4001-5000    1-2 years
99002  1970-1980   9001-10000    1-2 years
```

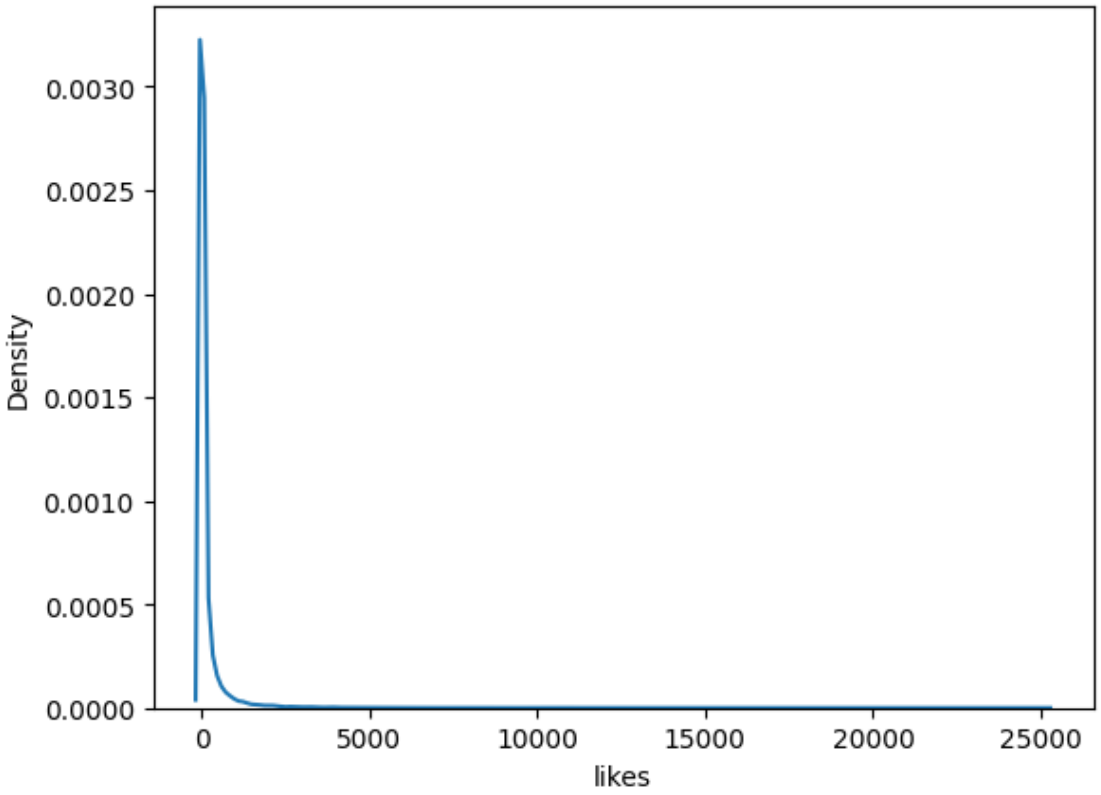
[31]:
```
fbdata.tenure_range.value_counts()
```

[31]:
```
0-1 years    43588
1-2 years    33366
2-3 years     9860
3-4 years     5448
4-5 years     4557
5-6 years     1507
6-7 years      581
7-8 years       15
8-9 years        9
Name: tenure_range, dtype: int64
```

8.8 Evaluating LIKES

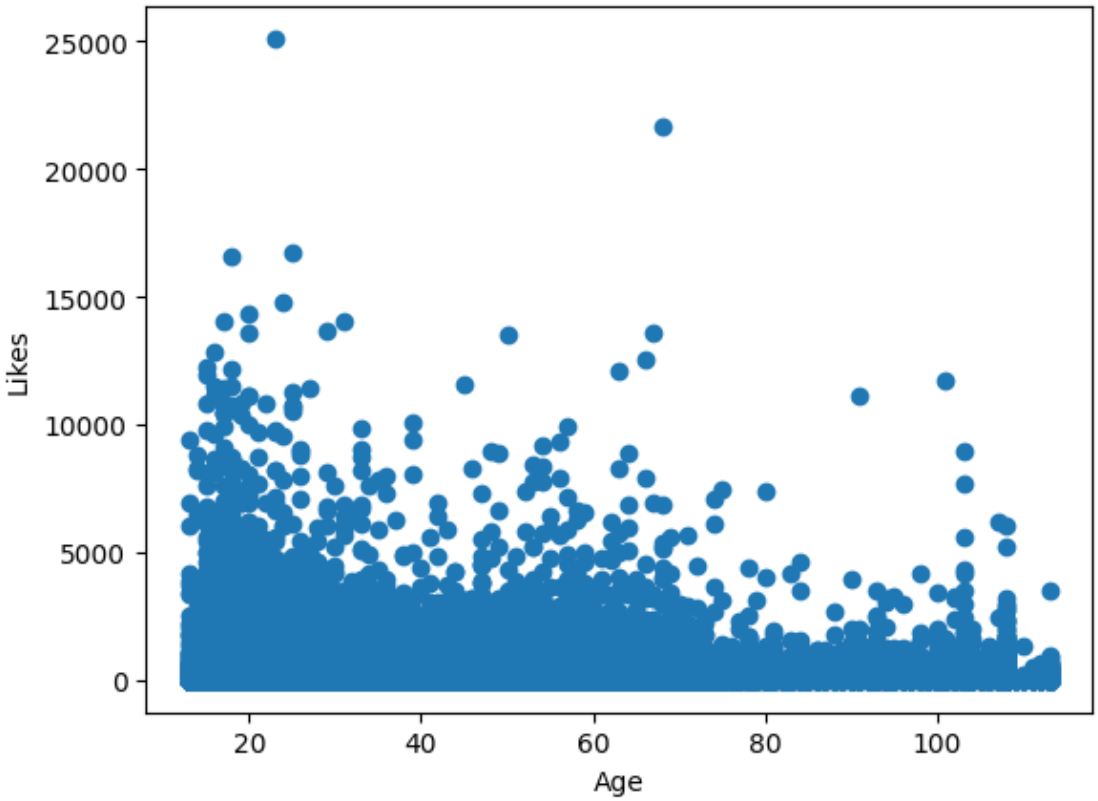
[32]:
```
sns.kdeplot(fbdata['likes'])
```

[32]:
```
<AxesSubplot:xlabel='likes', ylabel='Density'>
```



8.8.1 Likes vs age

[33]:
```
plt.scatter(fbdata.age,fbdata.likes)
plt.xlabel("Age")
plt.ylabel("Likes")
plt.show()
```



As age increases, the number of likes decreases

8.8.2 Most liked people

[34]:
```
fbdata.sort_values(by='likes_received',ascending=False)[:10]
```

[34]:

	userid	age	dob_day	dob_year	dob_month	gender	tenure	\
94906	1674584	17	14	1996	8	female	401.0	
77121	1441676	20	5	1993	8	female	253.0	
98822	1715925	23	4	1990	9	female	705.0	
98994	2063006	20	4	1993	1	female	402.0	
98878	1053087	23	6	1990	6	male	596.0	
49230	1432020	20	12	1993	1	male	245.0	
98773	2042824	18	25	1995	1	male	51.0	
98937	1559908	20	4	1993	12	female	1334.0	
98936	1781243	17	1	1996	5	female	976.0	
98686	1015907	74	27	1939	11	male	832.0	

	friend_count	friendships_initiated	likes	likes_received	\
94906	818	395	1016	261197	
77121	230	73	2078	178166	

```
98822          4077                    793   1877          152014
98994          1988                    332   7351          106025
98878          4320                    836   2996           82623
49230            79                     50    477           53534
98773          4817                     32   1346           52964
98937          4622                   1819   4280           45633
98936          3683                    755  10478           42449
98686          4630                    831    966           39536

       mobile_likes  mobile_likes_received  www_likes  www_likes_received  \
94906           659                 131244        357              129953
77121          1982                 138561         96               39605
98822            80                  89911       1797               62103
98994          7248                  73333        103               32692
98878           179                  43410       2817               39213
49230            78                  30387        399               23147
98773          1342                  18925          4               34039
98937           472                  30754       3808               14879
98936           246                  27353      10232               15096
98686           941                  10199         25               29337

      year_group  likes_range tenure_range
94906  1990-2000    1001-2000    1-2 years
77121  1990-2000    2001-3000    0-1 years
98822  1980-1990    1001-2000    1-2 years
98994  1990-2000    7001-8000    1-2 years
98878  1980-1990    2001-3000    1-2 years
49230  1990-2000       0-1000    0-1 years
98773  1990-2000    1001-2000    0-1 years
98937  1990-2000    4001-5000    3-4 years
98936  1990-2000  10001-11000    2-3 years
98686  1930-1940       0-1000    2-3 years
```

8.8.3 Calculating likes per day

[35]:
```
fbdata['likes_per_day']=fbdata.likes_received/fbdata.tenure.where(fbdata.
 ↪tenure>0)
fbdata.tail()
```

[35]:
```
        userid  age  dob_day  dob_year  dob_month  gender  tenure  \
98998  1268299   68        4      1945          4  female   541.0
98999  1256153   18       12      1995          3  female    21.0
99000  1195943   15       10      1998          5  female   111.0
99001  1468023   23       11      1990          4  female   416.0
99002  1397896   39       15      1974          5  female   397.0

       friend_count  friendships_initiated  likes  likes_received  \
```

```
98998          2118                   341   3996           18089
98999          1968                  1720   4401           13412
99000          2002                  1524  11959           12554
99001          2560                   185   4506            6516
99002          2049                   768   9410           12443

       mobile_likes  mobile_likes_received  www_likes  www_likes_received  \
98998          3505                  11887        491                6202
98999          4399                  10592          2                2820
99000         11959                  11462          0                1092
99001          4506                   5760          0                 756
99002          9410                   9530          0                2913

      year_group  likes_range tenure_range  likes_per_day
98998  1940-1950    3001-4000    1-2 years      33.436229
98999  1990-2000    4001-5000    0-1 years     638.666667
99000  1990-2000   11001-12000    0-1 years     113.099099
99001  1980-1990    4001-5000    1-2 years      15.663462
99002  1970-1980   9001-10000    1-2 years      31.342569
```

8.8.4 Users with most likes per day

[36]:
```
fbdata.sort_values(by='likes_per_day',ascending=False)[:10]
```

[36]:
```
        userid  age  dob_day  dob_year  dob_month  gender  tenure  \
94996  1149300   24        7      1989          3  female     2.0
94057  2175941   18       25      1995          2    male     2.0
98773  2042824   18       25      1995          1    male    51.0
77121  1441676   20        5      1993          8  female   253.0
94906  1674584   17       14      1996          8  female   401.0
98999  1256153   18       12      1995          3  female    21.0
61145  1409983   47        8      1966         10  female     4.0
98994  2063006   20        4      1993          1  female   402.0
76025  1494406   17        1      1996          1  female     2.0
75126  1546811   39       11      1974         12  female    29.0

       friend_count  friendships_initiated  likes  likes_received  \
94996           834                    104   2169            5404
94057           640                    299   5640            2542
98773          4817                     32   1346           52964
77121           230                     73   2078          178166
94906           818                    395   1016          261197
98999          1968                   1720   4401           13412
61145           123                     61   3331            1200
98994          1988                    332   7351          106025
76025           215                    185    292             478
75126           212                    145   8091            6730
```

```
       mobile_likes  mobile_likes_received  www_likes  www_likes_received  \
94996          2169                   1520          0                3884
94057          4251                   1587       1389                 955
98773          1342                  18925          4               34039
77121          1982                 138561         96               39605
94906           659                 131244        357              129953
98999          4399                  10592          2                2820
61145          3331                    468          0                 732
98994          7248                  73333        103               32692
76025           292                    244          0                 234
75126          3181                   2457       4910                4273

      year_group likes_range tenure_range  likes_per_day
94996  1980-1990   2001-3000    0-1 years    2702.000000
94057  1990-2000   5001-6000    0-1 years    1271.000000
98773  1990-2000   1001-2000    0-1 years    1038.509804
77121  1990-2000   2001-3000    0-1 years     704.213439
94906  1990-2000   1001-2000    1-2 years     651.364090
98999  1990-2000   4001-5000    0-1 years     638.666667
61145  1960-1970   3001-4000    0-1 years     300.000000
98994  1990-2000   7001-8000    1-2 years     263.743781
76025  1990-2000      0-1000    0-1 years     239.000000
75126  1970-1980   8001-9000    0-1 years     232.068966
```

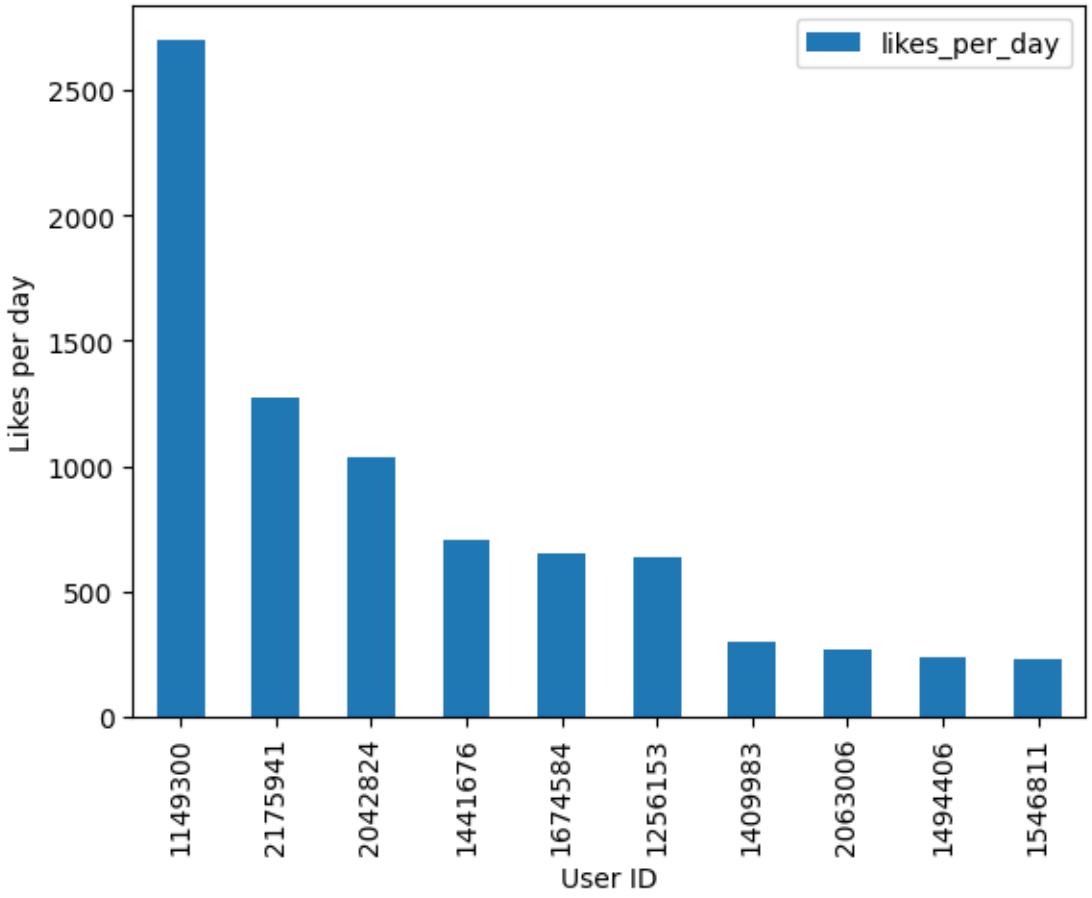
8.8.5 Extracting most famous people

[37]:
```
famous=fbdata.sort_values(by='likes_per_day',ascending=False)[:10]
famous.head()
```

[37]:
```
        userid  age  dob_day  dob_year  dob_month  gender  tenure  \
94996  1149300   24        7      1989          3  female     2.0
94057  2175941   18       25      1995          2    male     2.0
98773  2042824   18       25      1995          1    male    51.0
77121  1441676   20        5      1993          8  female   253.0
94906  1674584   17       14      1996          8  female   401.0

       friend_count  friendships_initiated  likes  likes_received  \
94996           834                    104   2169            5404
94057           640                    299   5640            2542
98773          4817                     32   1346           52964
77121           230                     73   2078          178166
94906           818                    395   1016          261197

       mobile_likes  mobile_likes_received  www_likes  www_likes_received  \
94996          2169                   1520          0                3884
94057          4251                   1587       1389                 955
```

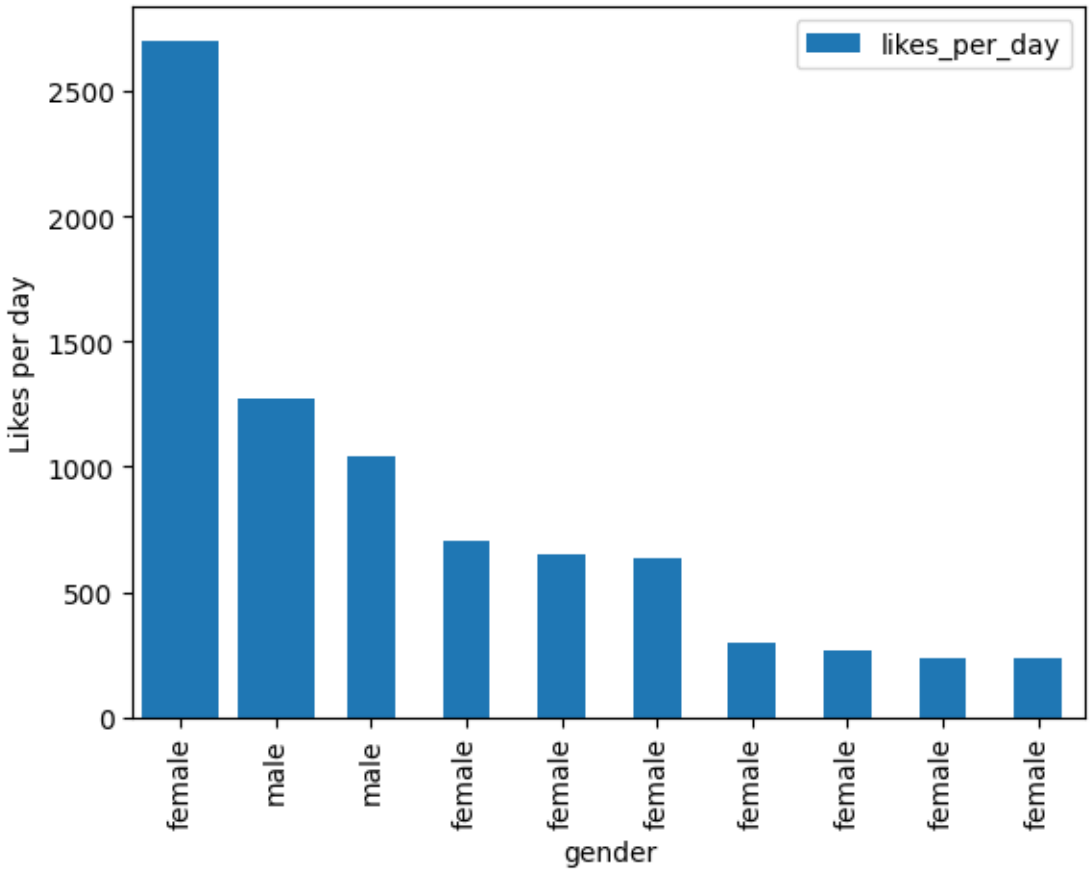
```
98773          1342                  18925          4                34039
77121          1982                 138561         96                39605
94906           659                 131244        357               129953

      year_group likes_range tenure_range  likes_per_day
94996  1980-1990   2001-3000    0-1 years    2702.000000
94057  1990-2000   5001-6000    0-1 years    1271.000000
98773  1990-2000   1001-2000    0-1 years    1038.509804
77121  1990-2000   2001-3000    0-1 years     704.213439
94906  1990-2000   1001-2000    1-2 years     651.364090
```

[38]:
```
famous.plot(x='userid',y='likes_per_day',kind='bar')
plt.ylabel("Likes per day")
plt.xlabel("User ID")
plt.show()
```

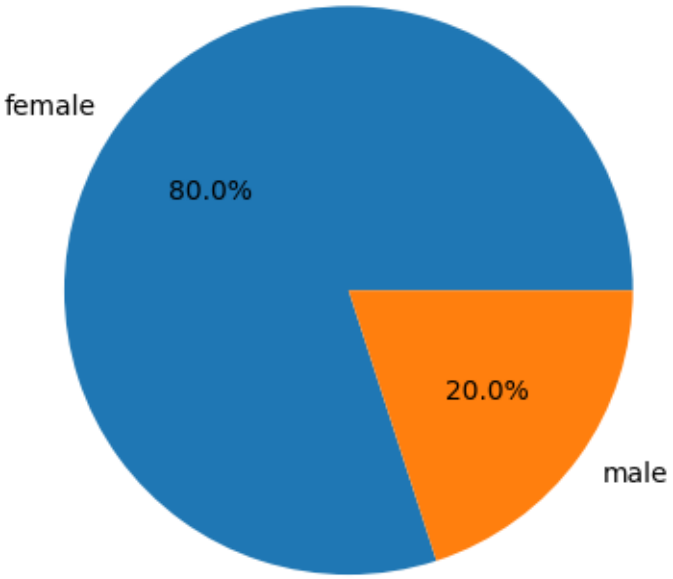


[39]:
```
famous.plot(x='gender',y='likes_per_day',kind='bar')
plt.bar(famous.gender,famous.likes_per_day)
```

```
plt.ylabel("Likes per day")
plt.xlabel("gender")
plt.show()
```



[40]:
```
plt.pie(famous.gender.
  ↪value_counts(),labels=['female','male'],explode=(0,0),autopct='%1.1f%%')
plt.show()
```



Females have more likes per day as compared to males

8.9 Evaluating likes on mobile and www based on tenure range

[41]:
```
pivot_table = fbdata.
  ↪pivot_table(values=['mobile_likes_received','mobile_likes','www_likes_received','www_likes'
pivot_table
```

[41]:

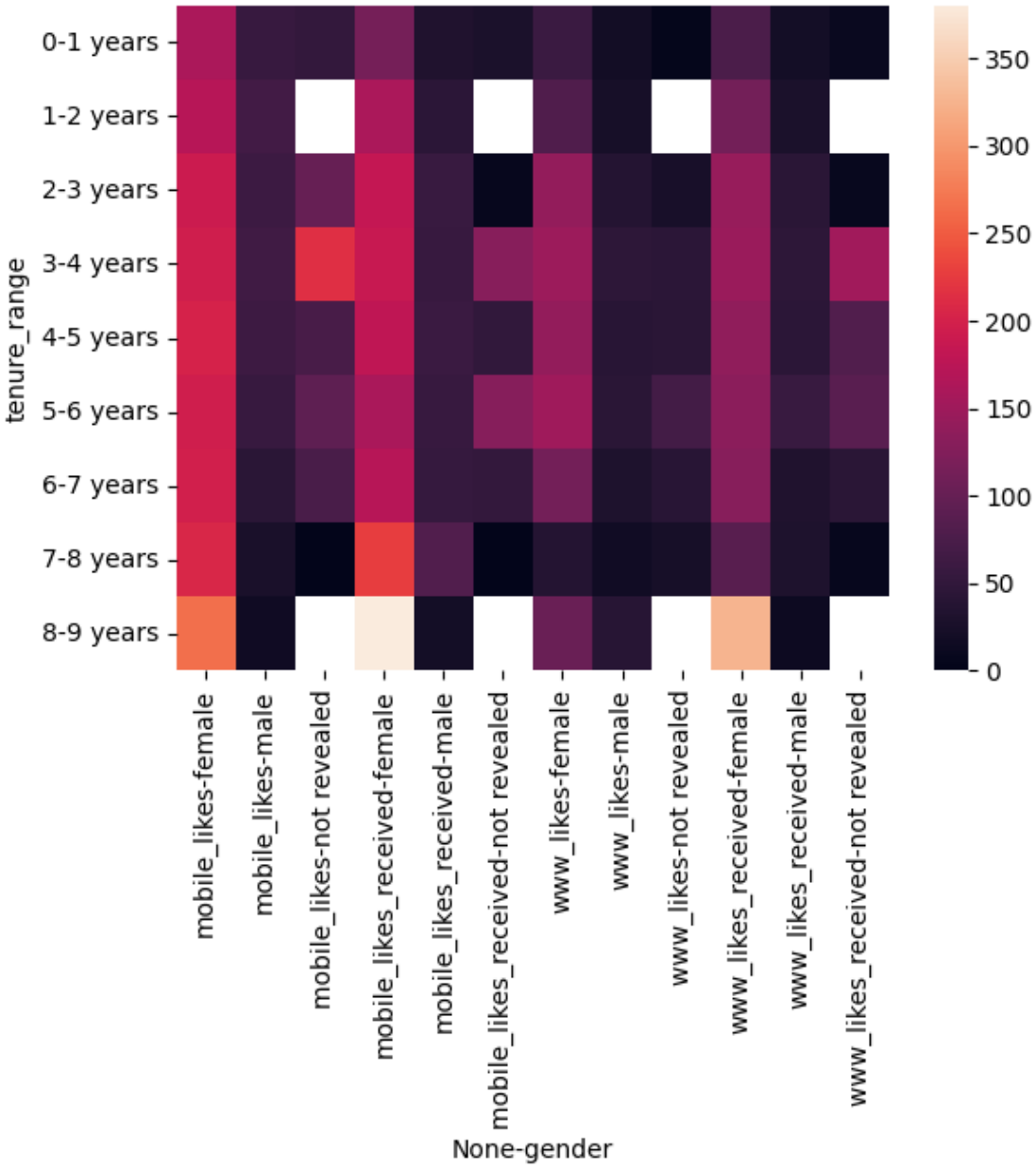
	mobile_likes			mobile_likes_received	\
gender	female	male	not revealed	female	
tenure_range					
0-1 years	161.021670	55.449295	50.937500	113.900098	
1-2 years	171.062174	66.631718	NaN	161.524848	
2-3 years	190.117290	60.030498	100.500000	183.920350	
3-4 years	195.193971	64.467238	214.083333	186.717572	
4-5 years	200.956416	62.295521	72.280000	178.627522	
5-6 years	195.880923	55.479475	92.506667	159.533414	
6-7 years	196.633758	42.675556	74.214286	170.789809	
7-8 years	206.200000	26.250000	0.000000	226.100000	
8-9 years	265.500000	15.666667	NaN	380.166667	

		www_likes		\
gender	male	not revealed	female	male not revealed

```
tenure_range
0-1 years     31.413864    27.875000   59.344209  19.221508     3.562500
1-2 years     44.511169          NaN   79.169273  22.748620          NaN
2-3 years     56.742419     6.500000  139.919621  36.097072    25.000000
3-4 years     56.228130   129.583333  148.349068  45.720412    43.500000
4-5 years     58.890944    49.560000  140.661421  40.704479    42.880000
5-6 years     56.101806   128.173333  151.166464  42.881773    68.306667
6-7 years     54.613333    51.166667  111.831210  30.888889    40.309524
7-8 years     81.250000     1.000000   36.900000  16.500000    23.000000
8-9 years     20.000000          NaN  102.500000  39.666667          NaN

             www_likes_received
gender                   female       male not revealed
tenure_range
0-1 years              74.348800  19.734028     9.437500
1-2 years             112.287895  27.496936          NaN
2-3 years             143.989801  42.415824     8.750000
3-4 years             146.449425  44.799657   152.833333
4-5 years             137.153753  43.714703    80.320000
5-6 years             133.479951  56.655172    88.960000
6-7 years             129.557325  32.026667    43.000000
7-8 years              86.300000  31.000000     7.000000
8-9 years             326.333333  12.666667          NaN
```

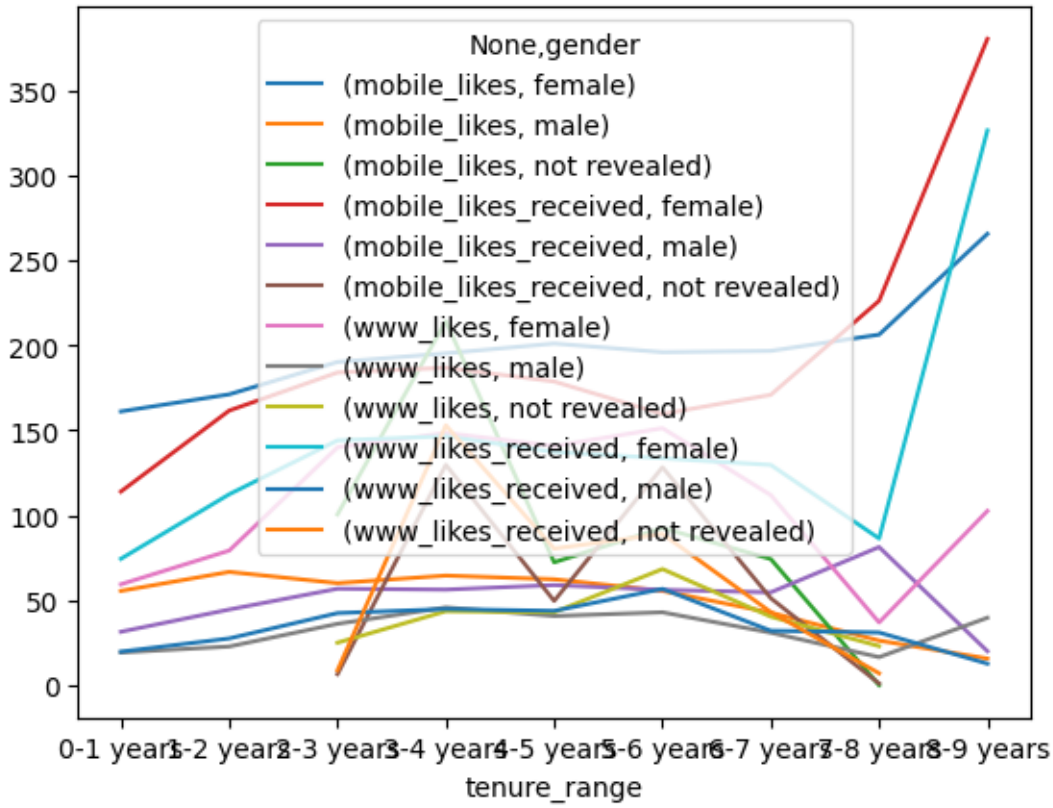
[42]:
```
sns.heatmap(pivot_table)
```

[42]:
```
<AxesSubplot:xlabel='None-gender', ylabel='tenure_range'>
```



[43]:
```
pivot_table.plot()
```

[43]: <AxesSubplot:xlabel='tenure_range'>



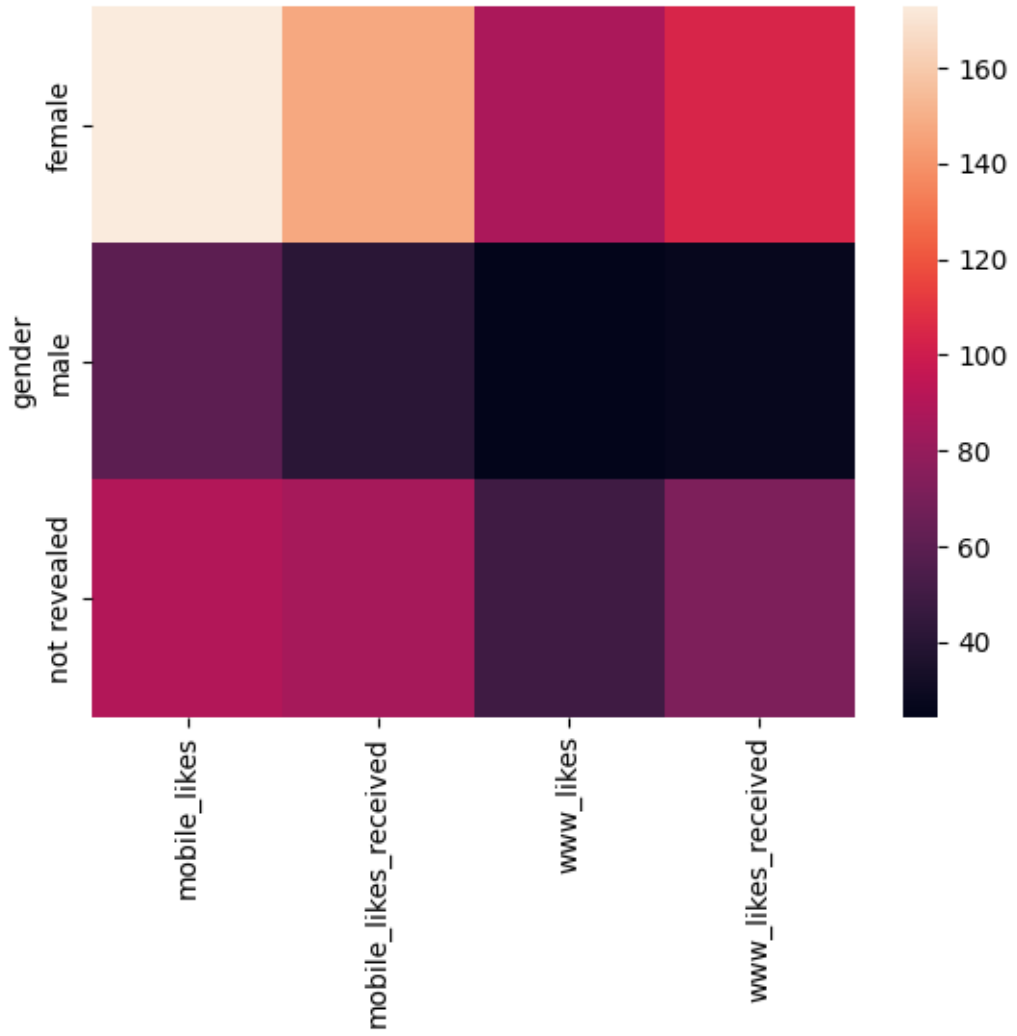
8.10 Evaluating likes on mobile and www based on gender

[44]:
```
pivot_table2 = fbdata.
  ↪pivot_table(values=['mobile_likes_received','mobile_likes','www_likes_received','www_likes'
pivot_table2
```

[44]:
```
              mobile_likes  mobile_likes_received  www_likes  \
gender
female          172.921097             147.107597  87.139869
male             60.261328              40.833015  24.416550
not revealed     89.417143              85.880000  49.085714

              www_likes_received
gender
female                104.338269
male                   27.078533
not revealed           71.502857
```

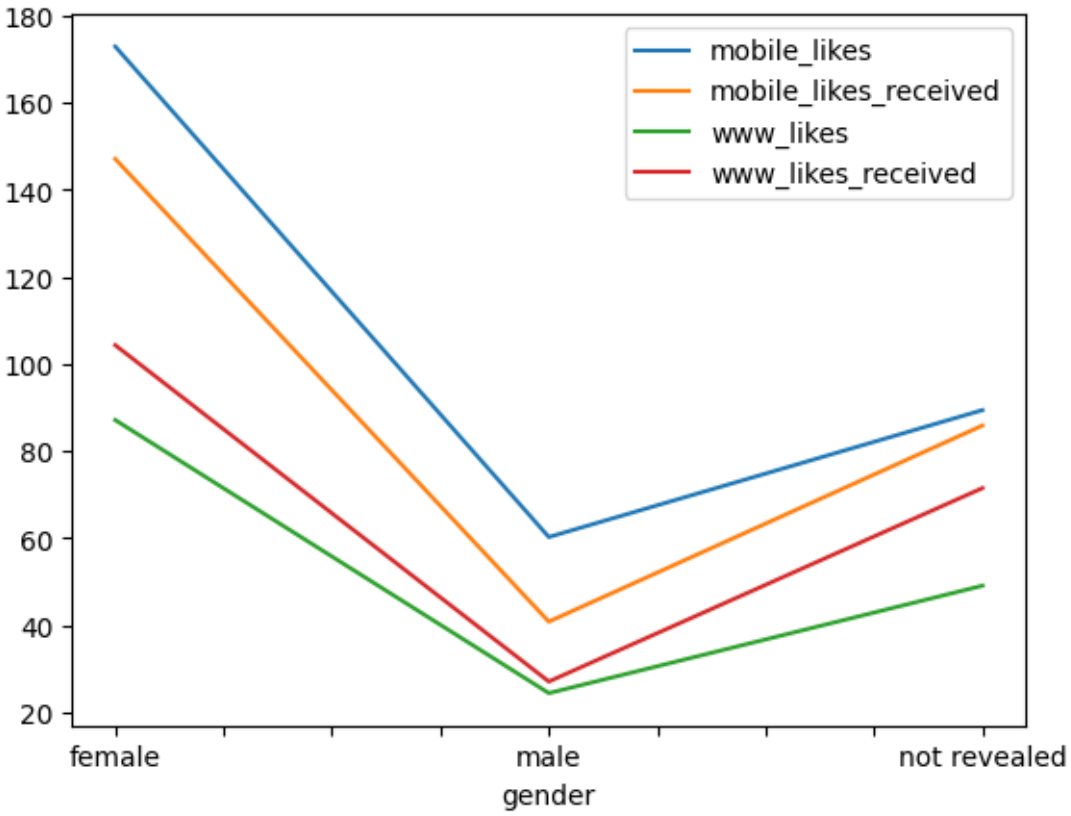
[45]:
```
sns.heatmap(pivot_table2)
```

[45]:
```
<AxesSubplot:ylabel='gender'>
```



[46]:
```
pivot_table2.plot()
```

[46]: <AxesSubplot:xlabel='gender'>



8.11 People willing to initiate friendships

[47]:
```
fbdata.sort_values(by='friendships_initiated',ascending=False)[:10]
```

[47]:

	userid	age	dob_day	dob_year	dob_month	gender	tenure	\
98993	1654565	19	15	1994	8	male	394.0	
98842	1052695	22	23	1991	9	female	874.0	
98675	1949247	19	9	1994	11	female	434.0	
98567	1205425	60	17	1953	6	female	1562.0	
98347	1403953	19	11	1994	11	male	519.0	
98960	1745067	17	1	1996	1	female	947.0	
98898	2010847	18	10	1995	2	female	1084.0	
98949	1103175	15	24	1998	8	female	487.0	
98685	1934087	19	19	1994	5	male	575.0	
98835	1075221	22	23	1991	5	male	907.0	

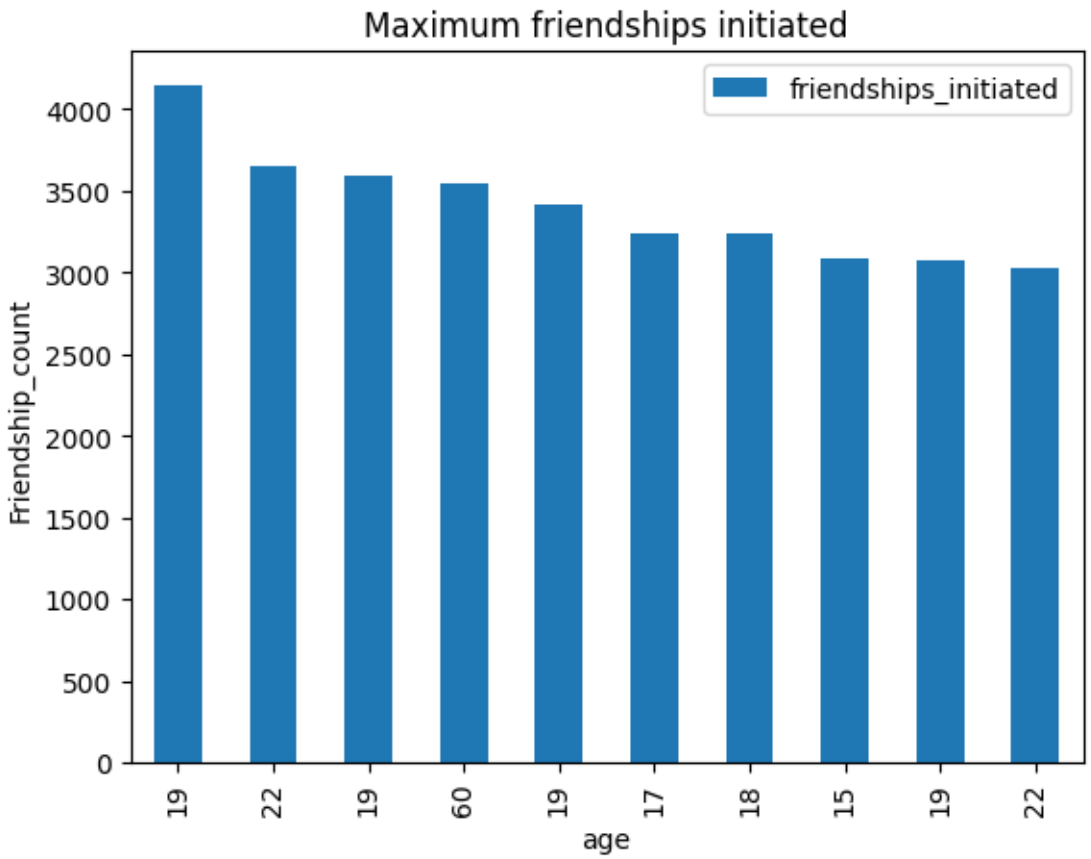
	friend_count	friendships_initiated	likes	likes_received	\
98993	4538	4144	4501	15088	
98842	4297	3654	1968	2006	
98675	4189	3594	927	2859	

```
98567          4794                    3538    586             1318
98347          3693                    3415    170               20
98960          4290                    3238   3780             8185
98898          4509                    3233   2672             2053
98949          3661                    3086   6815             6177
98685          4516                    3078    954             3075
98835          4693                    3024   2028              948

       mobile_likes  mobile_likes_received  www_likes  www_likes_received  \
98993          4435                    5961         66                9127
98842          1825                    1632        143                 374
98675           528                    1290        399                1569
98567           560                     960         26                 358
98347           170                      19          0                   1
98960          1233                    5380       2547                2805
98898          2009                    1074        663                 979
98949          1500                    3990       5315                2187
98685           834                    2464        120                 611
98835          1990                     517         38                 431

      year_group likes_range tenure_range  likes_per_day
98993  1990-2000   4001-5000    1-2 years      38.294416
98842  1990-2000   1001-2000    2-3 years       2.295195
98675  1990-2000      0-1000    1-2 years       6.587558
98567  1950-1960      0-1000    4-5 years       0.843790
98347  1990-2000      0-1000    1-2 years       0.038536
98960  1990-2000   3001-4000    2-3 years       8.643083
98898  1990-2000   2001-3000    2-3 years       1.893911
98949  1990-2000   6001-7000    1-2 years      12.683778
98685  1990-2000      0-1000    1-2 years       5.347826
98835  1990-2000   2001-3000    2-3 years       1.045204
```

[48]:
```
interested = fbdata.sort_values(by='friendships_initiated',ascending=False)[:10]
```

8.11.1 age vs friendship count

[49]:
```
interested.plot(x='age',y='friendships_initiated',kind='bar')
plt.ylabel("Friendship_count")
plt.xlabel("age")
plt.title("Maximum friendships initiated")
plt.show()
```



users with low age initiates more friendships

[50]:
```
interested['fc_per_day']=interested.friendships_initiated / interested.tenure
interested
```

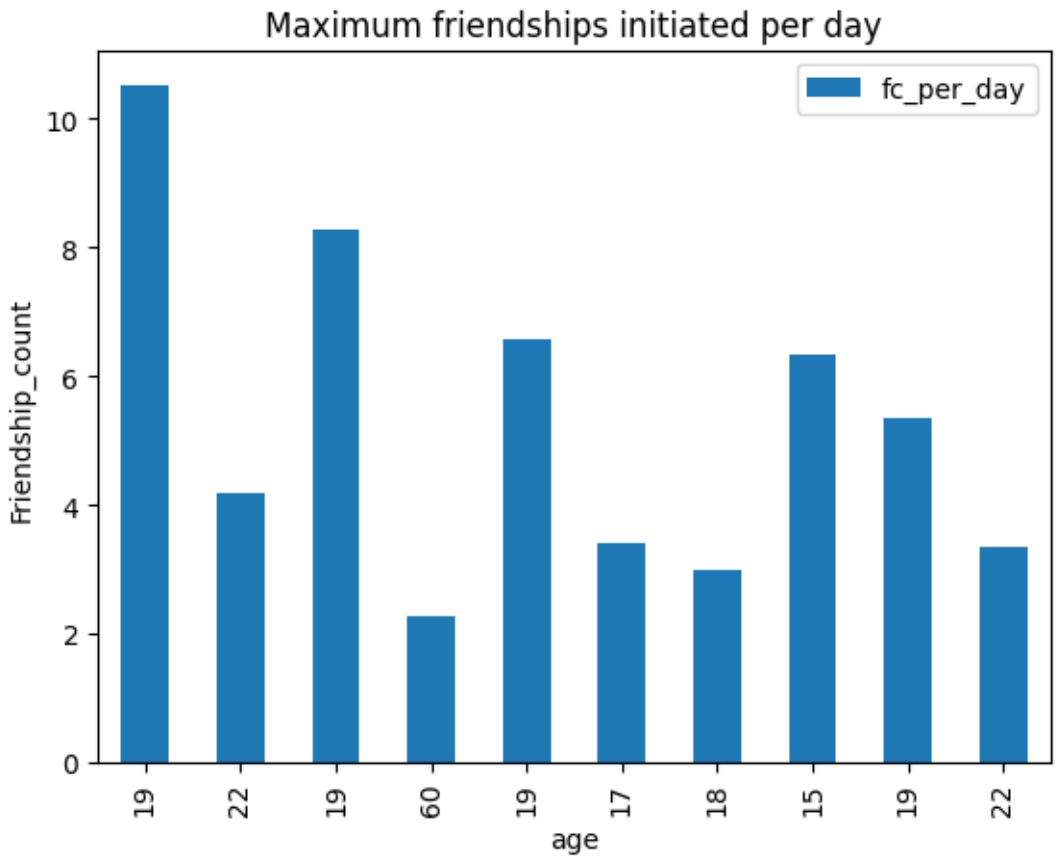
[50]:

	userid	age	dob_day	dob_year	dob_month	gender	tenure	\
98993	1654565	19	15	1994	8	male	394.0	
98842	1052695	22	23	1991	9	female	874.0	
98675	1949247	19	9	1994	11	female	434.0	
98567	1205425	60	17	1953	6	female	1562.0	
98347	1403953	19	11	1994	11	male	519.0	
98960	1745067	17	1	1996	1	female	947.0	
98898	2010847	18	10	1995	2	female	1084.0	
98949	1103175	15	24	1998	8	female	487.0	
98685	1934087	19	19	1994	5	male	575.0	
98835	1075221	22	23	1991	5	male	907.0	

	friend_count	friendships_initiated	likes	likes_received	\
98993	4538	4144	4501	15088	
98842	4297	3654	1968	2006	

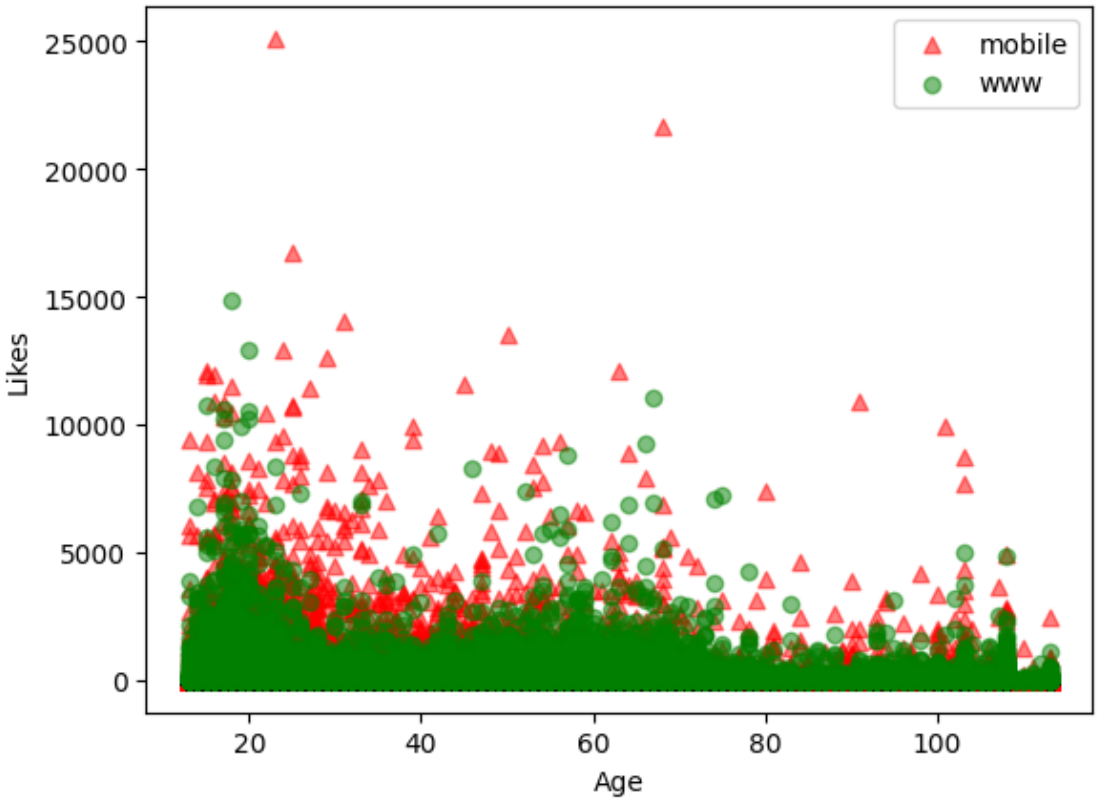
```
98675          4189                    3594    927            2859
98567          4794                    3538    586            1318
98347          3693                    3415    170              20
98960          4290                    3238   3780            8185
98898          4509                    3233   2672            2053
98949          3661                    3086   6815            6177
98685          4516                    3078    954            3075
98835          4693                    3024   2028             948

       mobile_likes  mobile_likes_received  www_likes  www_likes_received  \
98993          4435                   5961         66                9127
98842          1825                   1632        143                 374
98675           528                   1290        399                1569
98567           560                    960         26                 358
98347           170                     19          0                   1
98960          1233                   5380       2547                2805
98898          2009                   1074        663                 979
98949          1500                   3990       5315                2187
98685           834                   2464        120                 611
98835          1990                    517         38                 431

      year_group likes_range tenure_range  likes_per_day  fc_per_day
98993  1990-2000   4001-5000    1-2 years      38.294416   10.517766
98842  1990-2000   1001-2000    2-3 years       2.295195    4.180778
98675  1990-2000      0-1000    1-2 years       6.587558    8.281106
98567  1950-1960      0-1000    4-5 years       0.843790    2.265045
98347  1990-2000      0-1000    1-2 years       0.038536    6.579961
98960  1990-2000   3001-4000    2-3 years       8.643083    3.419219
98898  1990-2000   2001-3000    2-3 years       1.893911    2.982472
98949  1990-2000   6001-7000    1-2 years      12.683778    6.336756
98685  1990-2000      0-1000    1-2 years       5.347826    5.353043
98835  1990-2000   2001-3000    2-3 years       1.045204    3.334068
```

[51]:
```
interested.plot(x='age',y='fc_per_day',kind='bar')
plt.ylabel("Friendship_count")
plt.xlabel("age")
plt.title('Maximum friendships initiated per day')
plt.show()
```



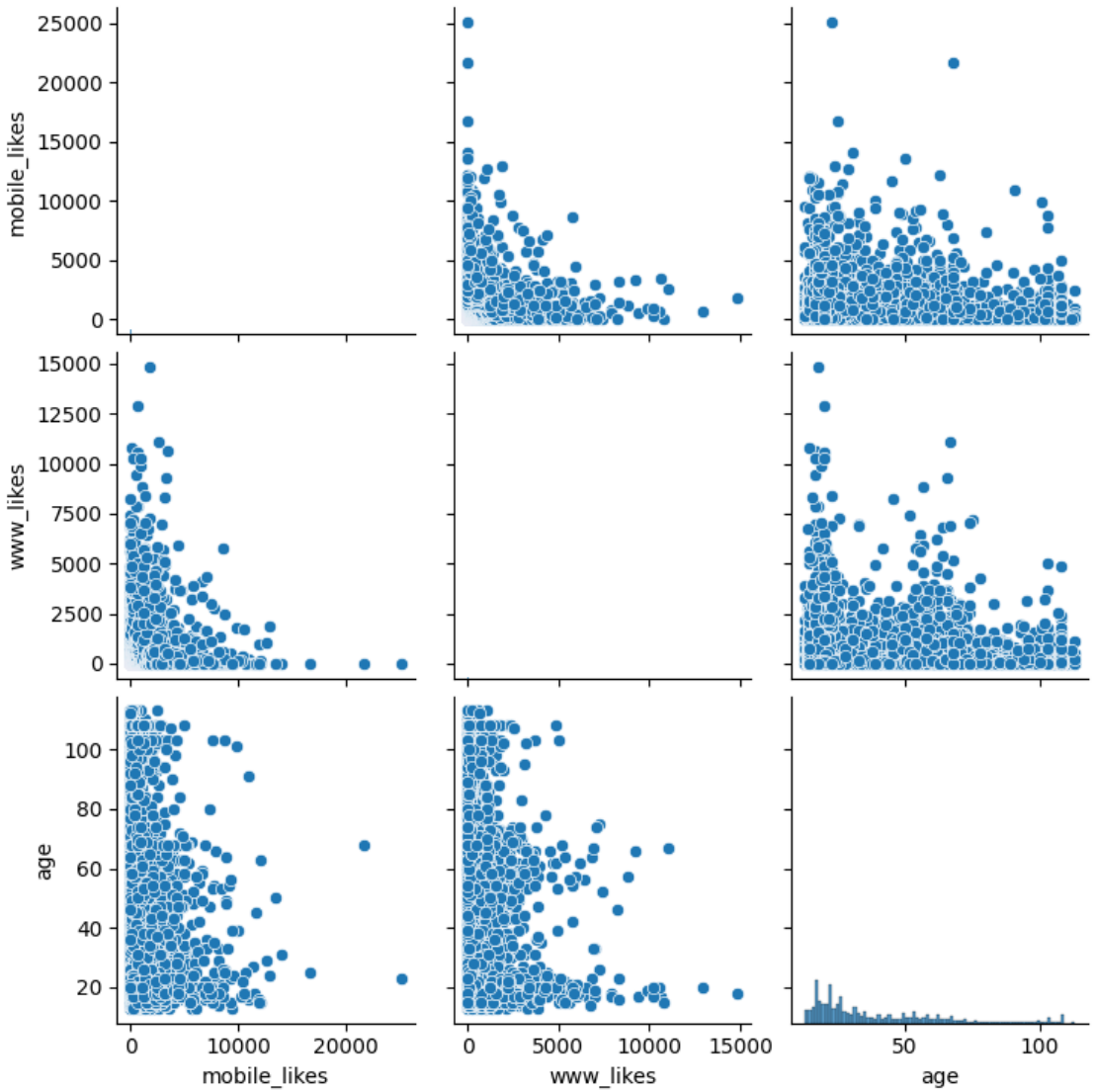
8.11.2 Comparing mobile likes, www likes and age

[52]:
```
plt.scatter(fbdata.age,fbdata.
  ↪mobile_likes,color='red',label="mobile",marker='^',alpha=0.5)
plt.scatter(fbdata.age,fbdata.www_likes,color='green',label="www",alpha=0.5)
plt.xlabel("Age")
plt.ylabel("Likes")
plt.legend()
plt.show()
```



[53]:
```
pairplot_data = fbdata[['mobile_likes','www_likes','age']]
pairplot_data.head()
sns.pairplot(pairplot_data)
```

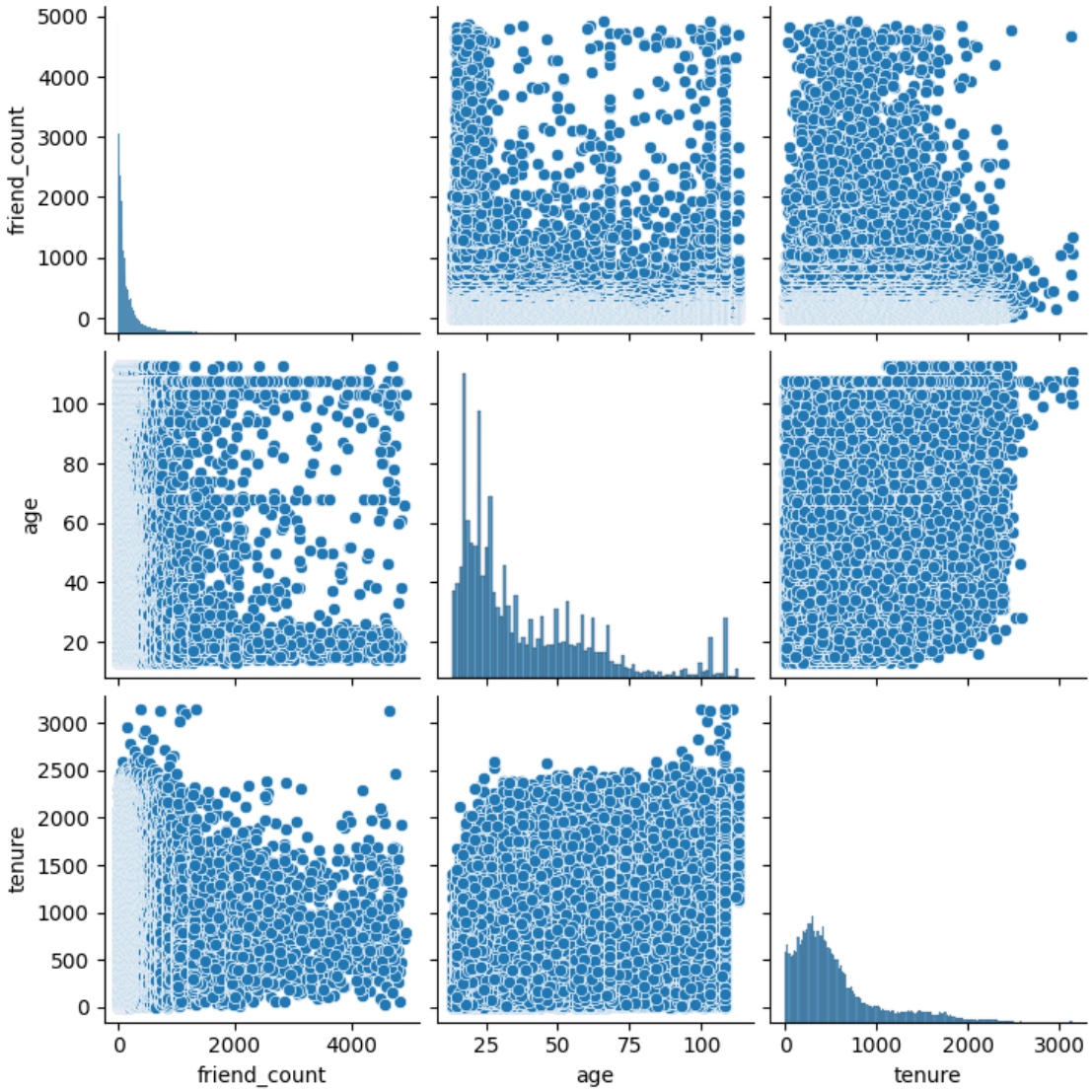
[53]: <seaborn.axisgrid.PairGrid at 0x1fe057aa380>



8.11.3 Comparing friend count, tenure and age

[54]:
```
pairplot_data = fbdata[['friend_count','age','tenure']]
pairplot_data.head()
sns.pairplot(pairplot_data)
```

[54]:
```
<seaborn.axisgrid.PairGrid at 0x1fe07aa0fa0>
```



8.12 Finding correlation between different attributes

[55]:
```
fbdata_corr = fbdata.corr()
fbdata_corr
```

[55]:

	userid	age	dob_day	dob_year	dob_month	\
userid	1.000000	-0.007296	-0.000817	0.007296	0.002955	
age	-0.007296	1.000000	0.035084	-1.000000	0.025177	
dob_day	-0.000817	0.035084	1.000000	-0.035084	0.129426	
dob_year	0.007296	-1.000000	-0.035084	1.000000	-0.025177	
dob_month	0.002955	0.025177	0.129426	-0.025177	1.000000	
tenure	-0.003446	0.462742	0.041855	-0.462742	0.029446	

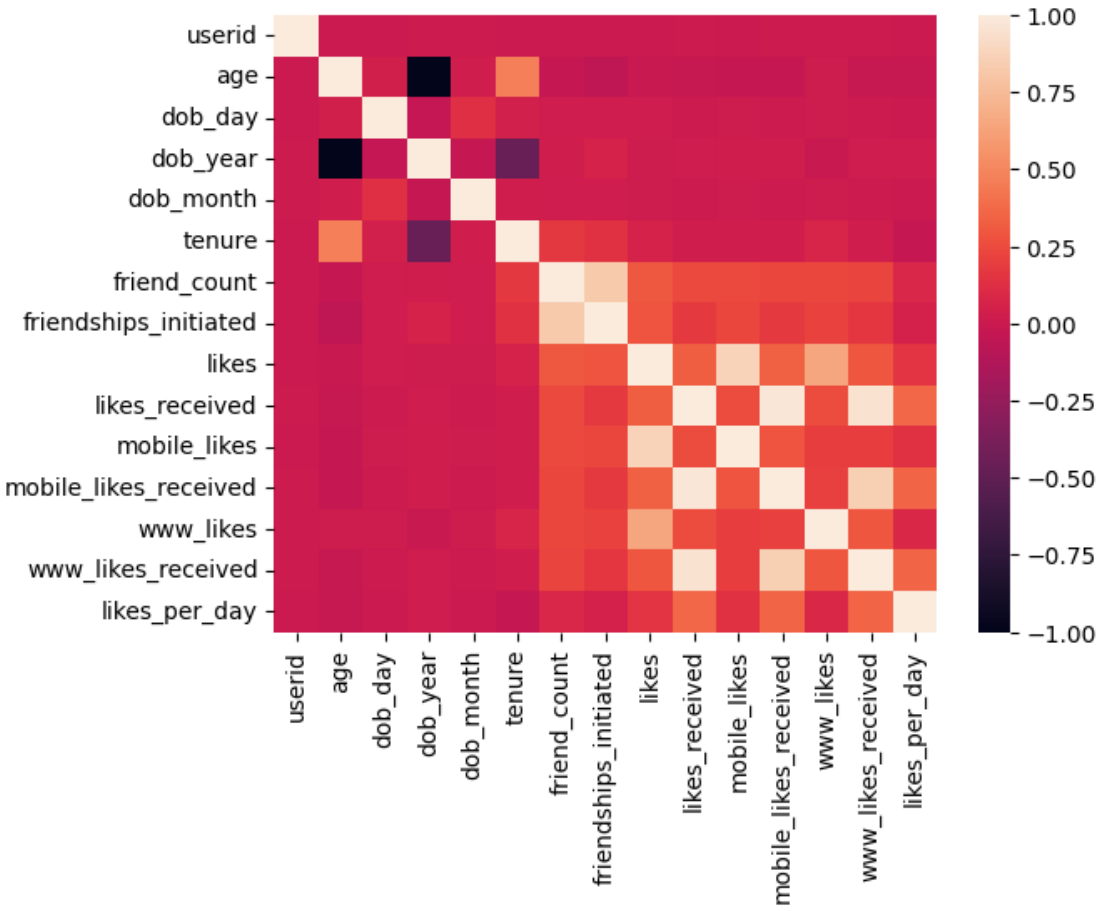
```
friend_count          -0.001314 -0.027396  0.021959  0.027396   0.019809
friendships_initiated -0.001589 -0.058047  0.022994  0.058047   0.020077
likes                 -0.002876 -0.013002  0.015979  0.013002   0.014150
likes_received         0.001526 -0.022568  0.001366  0.022568   0.006496
mobile_likes          -0.004866 -0.026706  0.014537  0.026706   0.010400
mobile_likes_received  0.001753 -0.024245  0.000496  0.024245   0.006436
www_likes              0.001824  0.015584  0.009356 -0.015584   0.012142
www_likes_received     0.001073 -0.018223  0.002460  0.018223   0.006004
likes_per_day         -0.001291 -0.021190 -0.002877  0.021190  -0.004306

                        tenure  friend_count  friendships_initiated  \
userid                -0.003446     -0.001314              -0.001589
age                    0.462742     -0.027396              -0.058047
dob_day                0.041855      0.021959               0.022994
dob_year              -0.462742      0.027396               0.058047
dob_month              0.029446      0.019809               0.020077
tenure                 1.000000      0.166256               0.133505
friend_count           0.166256      1.000000               0.825850
friendships_initiated  0.133505      0.825850               1.000000
likes                  0.057132      0.298016               0.285592
likes_received         0.027745      0.236463               0.175131
mobile_likes           0.028052      0.235656               0.229807
mobile_likes_received  0.023971      0.232700               0.173803
www_likes              0.070757      0.229803               0.214023
www_likes_received     0.030553      0.220727               0.161439
likes_per_day         -0.031023      0.079176               0.052640

                         likes  likes_received  mobile_likes  \
userid                -0.002876        0.001526     -0.004866
age                   -0.013002       -0.022568     -0.026706
dob_day                0.015979        0.001366      0.014537
dob_year               0.013002        0.022568      0.026706
dob_month              0.014150        0.006496      0.010400
tenure                 0.057132        0.027745      0.028052
friend_count           0.298016        0.236463      0.235656
friendships_initiated  0.285592        0.175131      0.229807
likes                  1.000000        0.327376      0.871652
likes_received         0.327376        1.000000      0.256997
mobile_likes           0.871652        0.256997      1.000000
mobile_likes_received  0.329258        0.973679      0.288513
www_likes              0.644960        0.255365      0.187619
www_likes_received     0.295687        0.947990      0.190173
likes_per_day          0.152107        0.363036      0.137597

                       mobile_likes_received  www_likes  www_likes_received  \
userid                              0.001753   0.001824            0.001073
age                                -0.024245   0.015584           -0.018223
```

```
dob_day                          0.000496   0.009356           0.002460
dob_year                         0.024245  -0.015584           0.018223
dob_month                        0.006436   0.012142           0.006004
tenure                           0.023971   0.070757           0.030553
friend_count                     0.232700   0.229803           0.220727
friendships_initiated            0.173803   0.214023           0.161439
likes                            0.329258   0.644960           0.295687
likes_received                   0.973679   0.255365           0.947990
mobile_likes                     0.288513   0.187619           0.190173
mobile_likes_received            1.000000   0.209998           0.850490
www_likes                        0.209998   1.000000           0.296053
www_likes_received               0.850490   0.296053           1.000000
likes_per_day                    0.349276   0.090286           0.350028
```

```
                       likes_per_day
userid                     -0.001291
age                        -0.021190
dob_day                    -0.002877
dob_year                    0.021190
dob_month                  -0.004306
tenure                     -0.031023
friend_count                0.079176
friendships_initiated       0.052640
likes                       0.152107
likes_received              0.363036
mobile_likes                0.137597
mobile_likes_received       0.349276
www_likes                   0.090286
www_likes_received          0.350028
likes_per_day               1.000000
```

[56]:
```
sns.heatmap(fbdata_corr)
```

[56]:
```
<AxesSubplot:>
```



9 9.Summarisation

1.Most of the Users are of age near 20 years.

2.Day and Month of born are uniformly spread across the range.

3.Most of the users are born after 1980.

4.Number of likes are greater for females as compared to males across all the year groups.

5.Males have more number of zero friends than females.

6.As age increases, the number of likes decreases.

7.Females have more likes per day as compared to males.

8.Users with low age initiates more friendships.