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

url = "https://github.com/Harshita-Devgan/Comcast-Telecom-Consumer-
Complaints-Analysis/blob/main/Comcast_telecom_complaints_data.csv"
df = pd.read_csv(url)

df.head()

  Ticket #                                Customer Complaint
Date  \
0   250635                     Comcast Cable Internet Speeds  22-04-
15
1   223441       Payment disappear - service got disconnected  04-08-
15
2   242732                                  Speed and Service  18-04-
15
3   277946  Comcast Imposed a New Usage Cap of 300GB that ...  05-07-
15
4   307175         Comcast not working and no service to boot  26-05-
15

  Date_month_year         Time        Received Via      City     State
\
0       22-Apr-15   3:53:50 PM  Customer Care Call  Abingdon  Maryland

1       04-Aug-15  10:22:56 AM            Internet   Acworth   Georgia

2       18-Apr-15   9:55:47 AM            Internet   Acworth   Georgia

3       05-Jul-15  11:59:35 AM            Internet   Acworth   Georgia

4       26-May-15   1:25:26 PM            Internet   Acworth   Georgia


   Zip code  Status Filing on Behalf of Someone
0     21009  Closed                         No
1     30102  Closed                         No
2     30101  Closed                        Yes
3     30101    Open                        Yes
4     30101  Solved                         No

df.isna().sum()

Ticket #                      0
Customer Complaint            0
```

```
Date                            0
Date_month_year                 0
Time                            0
Received Via                    0
City                            0
State                           0
Zip code                        0
Status                          0
Filing on Behalf of Someone     0
dtype: int64
```

```
df.describe(include='all').T
```

```
                               count unique                  top
freq  \
Ticket #                        2224   2224               250635
1

Customer Complaint              2224   1841               Comcast
83

Date                            2224     91             24-06-15
218

Date_month_year                 2224     91            24-Jun-15
218

Time                            2224   2190          12:41:14 PM
2

Received Via                    2224      2  Customer Care Call
1119

City                            2224    928              Atlanta
63

State                           2224     43              Georgia
288

Zip code                      2224.0    NaN                  NaN
NaN

Status                          2224      4               Solved
973

Filing on Behalf of Someone     2224      2                   No
2021


                                      mean           std     min
25%  \
Ticket #                               NaN           NaN     NaN
NaN
Customer Complaint                     NaN           NaN     NaN
NaN
Date                                   NaN           NaN     NaN
NaN
Date_month_year                        NaN           NaN     NaN
NaN
Time                                   NaN           NaN     NaN
NaN
Received Via                           NaN           NaN     NaN
```

```
NaN
City                                 NaN           NaN     NaN
NaN
State                                NaN           NaN     NaN
NaN
Zip code                    47994.393435  28885.279427  1075.0
30056.5
Status                               NaN           NaN     NaN
NaN
Filing on Behalf of Someone          NaN           NaN     NaN
NaN

                                    50%       75%      max
Ticket #                            NaN       NaN      NaN
Customer Complaint                  NaN       NaN      NaN
Date                                NaN       NaN      NaN
Date_month_year                     NaN       NaN      NaN
Time                                NaN       NaN      NaN
Received Via                        NaN       NaN      NaN
City                                NaN       NaN      NaN
State                               NaN       NaN      NaN
Zip code                    37211.0  77058.75  99223.0
Status                              NaN       NaN      NaN
Filing on Behalf of Someone         NaN       NaN      NaN
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2224 entries, 0 to 2223
Data columns (total 11 columns):
 #   Column                       Non-Null Count  Dtype
---  ------                       --------------  -----
 0   Ticket #                     2224 non-null   object
 1   Customer Complaint           2224 non-null   object
 2   Date                         2224 non-null   object
 3   Date_month_year              2224 non-null   object
 4   Time                         2224 non-null   object
 5   Received Via                 2224 non-null   object
 6   City                         2224 non-null   object
 7   State                        2224 non-null   object
 8   Zip code                     2224 non-null   int64
 9   Status                       2224 non-null   object
 10  Filing on Behalf of Someone  2224 non-null   object
dtypes: int64(1), object(10)
memory usage: 191.2+ KB
```

```
df.shape
```

```
(2224, 11)
```

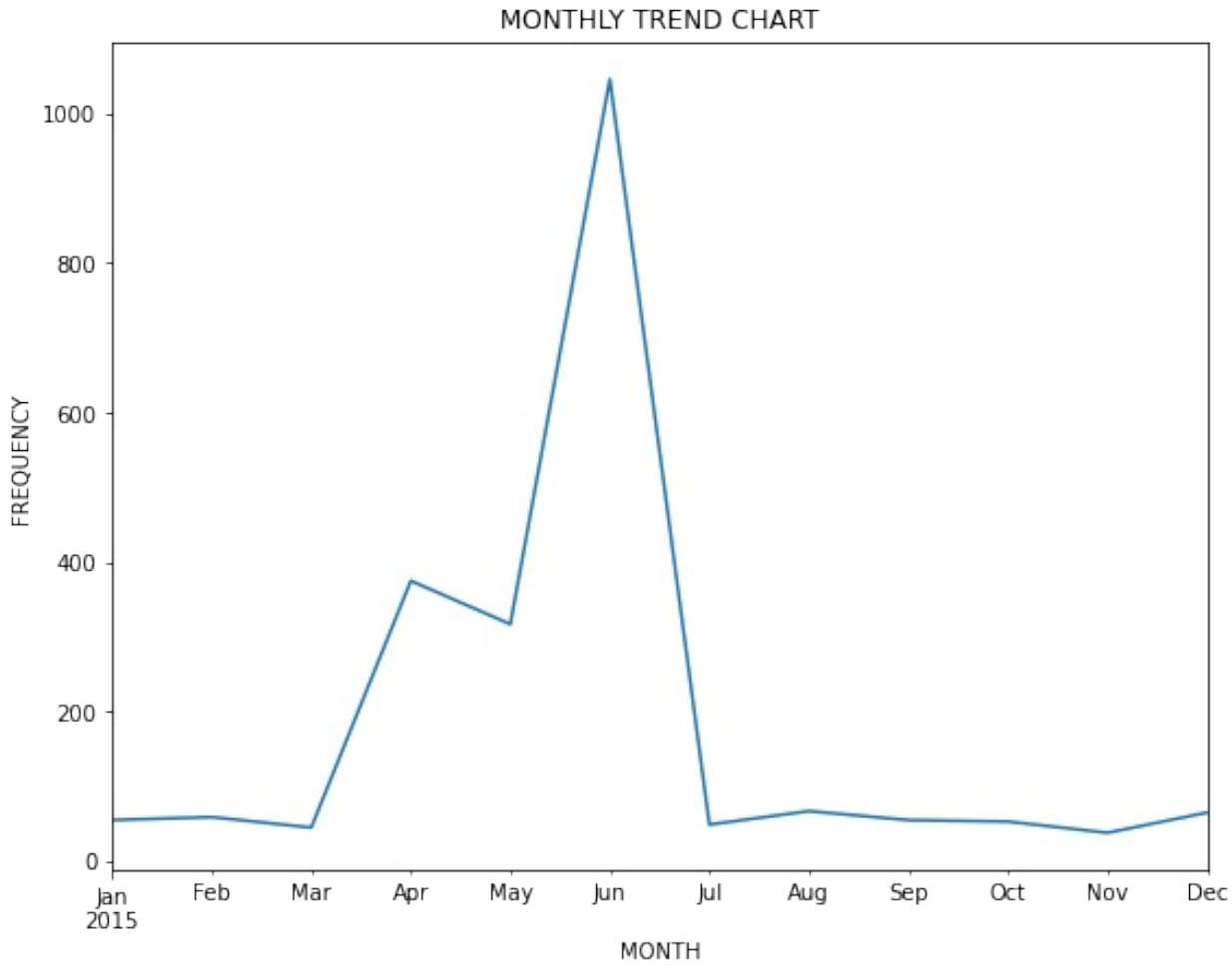
```
# Provide the trend chart for the number of complaints at monthly and
daily granularity levels.

df['Date_month_year'] = df['Date_month_year'].apply(pd.to_datetime)

df = df.set_index('Date_month_year')

df.head()
```

```
                 Ticket #                                    Customer
Complaint  \
Date_month_year

2015-04-22         250635                       Comcast Cable Internet
Speeds
2015-08-04         223441       Payment disappear - service got
disconnected
2015-04-18         242732                                    Speed and
Service
2015-07-05         277946  Comcast Imposed a New Usage Cap of 300GB
that ...
2015-05-26         307175         Comcast not working and no service to
boot

                      Date          Time        Received Via
City  \
Date_month_year

2015-04-22       22-04-15   3:53:50 PM  Customer Care Call  Abingdon

2015-08-04       04-08-15  10:22:56 AM            Internet   Acworth

2015-04-18       18-04-15   9:55:47 AM            Internet   Acworth

2015-07-05       05-07-15  11:59:35 AM            Internet   Acworth

2015-05-26       26-05-15   1:25:26 PM            Internet   Acworth


                     State  Zip code  Status Filing on Behalf of
Someone
Date_month_year

2015-04-22       Maryland     21009  Closed
No
2015-08-04        Georgia     30102  Closed
No
2015-04-18        Georgia     30101  Closed
Yes
2015-07-05        Georgia     30101    Open
Yes
```

```
2015-05-26        Georgia     30101  Solved
No
```

```
#Plotting monthly trend chart

plt.figure(figsize=(9,7))
month = df.groupby(pd.Grouper(freq="M")).size().plot()
plt.xlabel("MONTH")
plt.ylabel("FREQUENCY")
plt.title("MONTHLY TREND CHART")
```

```
Text(0.5, 1.0, 'MONTHLY TREND CHART')
```



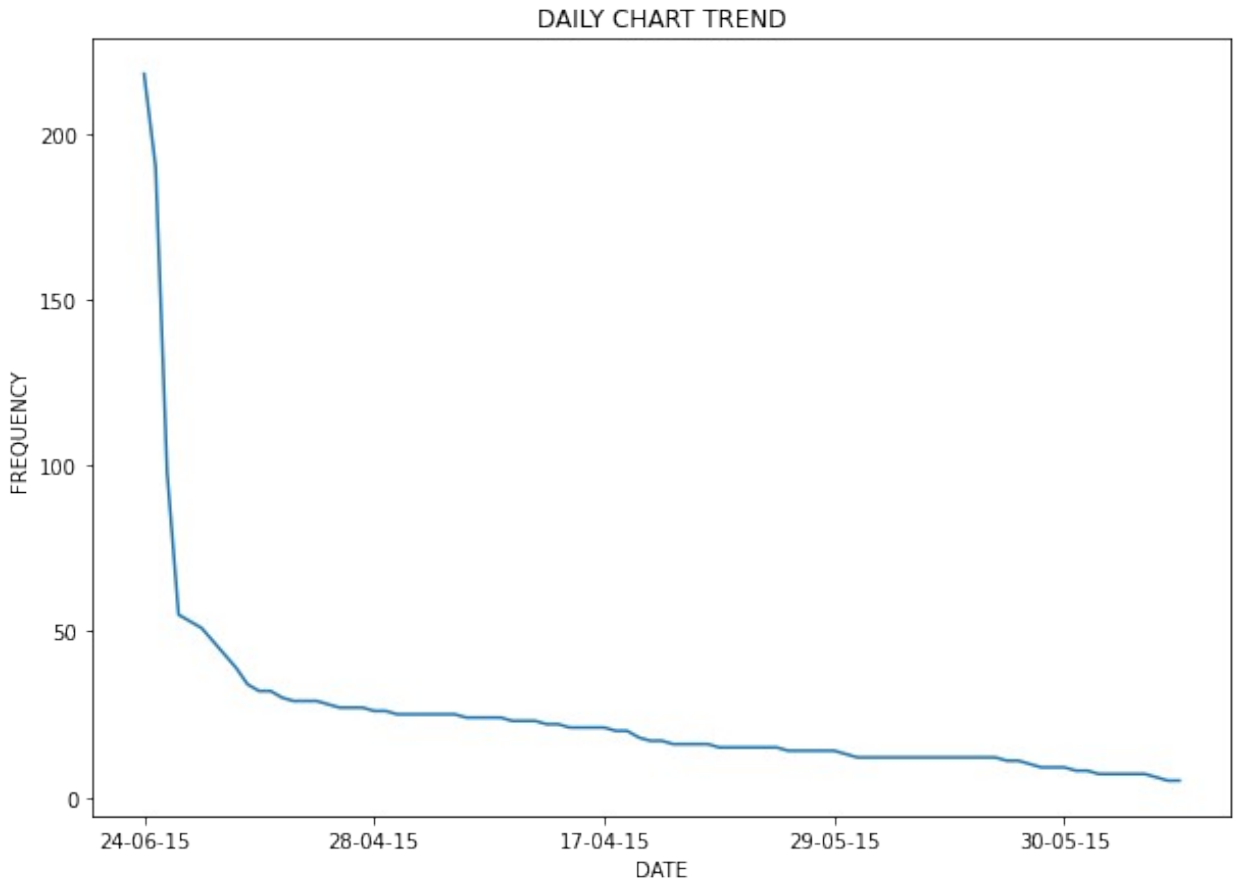

```
df['Date'].value_counts()[:10]
```

```
24-06-15    218
23-06-15    190
25-06-15     98
26-06-15     55
30-06-15     53
```

```
29-06-15     51
18-06-15     47
06-12-15     43
27-06-15     39
15-06-15     34
Name: Date, dtype: int64
```

```
#Plotting Daily trend chart

plt.figure(figsize=(10,7))
df = df.sort_values(by='Date')
df['Date'].value_counts().plot()
plt.xlabel("DATE")
plt.ylabel("FREQUENCY")
plt.title("DAILY CHART TREND")
```

```
Text(0.5, 1.0, 'DAILY CHART TREND')
```

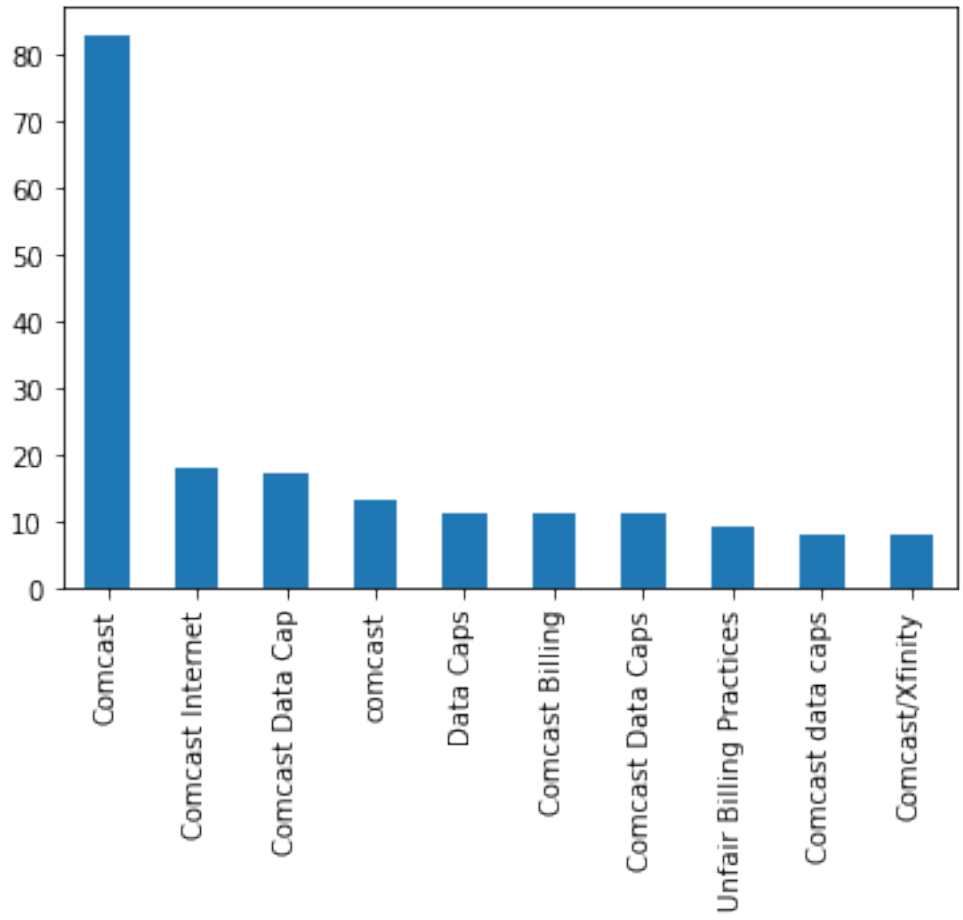



```
# Provide a table with the frequency of complaint types.

df['Customer Complaint'].value_counts()[:10]
```

```
Comcast                          83
Comcast Internet                 18
Comcast Data Cap                 17
comcast                          13
Data Caps                        11
Comcast Billing                  11
Comcast Data Caps                11
Unfair Billing Practices          9
Comcast data caps                 8
Comcast/Xfinity                   8
Name: Customer Complaint, dtype: int64
```

```
df['Customer Complaint'].value_counts()[:10].plot.bar()
```

```
<AxesSubplot:>
```




```
# Which complaint types are maximum i.e., around internet, network
issues, or across any other domains.
```

```
df['Customer Complaint'].values
```

```
array(['Fraudulent claims reported to collections agency',
       'Comcast refusal of service', 'Comcast Cable', ..., 'n/a (b)
(6)',
       'Complaint against Comcast for incredibly bad service',
       'Questionable internet slowdown'], dtype=object)
```

```
internet_issues1 = df[df['Customer
Complaint'].str.contains('speed')].count()

internet_issues2 = df[df['Customer
Complaint'].str.contains('network')].count()

internet_issues3 = df[df['Customer
Complaint'].str.contains('data')].count()

internet_issues4 = df[df['Customer
Complaint'].str.contains('internet')].count()

billing_issues1 = df[df['Customer
Complaint'].str.contains('billing')].count()

billing_issues2 = df[df['Customer
Complaint'].str.contains('charges')].count()

service_issues1 = df[df['Customer
Complaint'].str.contains('service')].count()

service_issues2 = df[df['Customer
Complaint'].str.contains('customer')].count()

total_internet_issues = internet_issues1 + internet_issues2 +
internet_issues3 + internet_issues4

total_billing_issues = billing_issues1 + billing_issues2

total_service_issues = service_issues1 + service_issues2

other_issues = df.count() - (total_internet_issues +
total_billing_issues  + total_service_issues)

total_internet_issues
```

```
Ticket #                    374
Customer Complaint          374
Date                        374
Time                        374
Received Via                374
City                        374
State                       374
Zip code                    374
Status                      374
```

```
Filing on Behalf of Someone    374
dtype: int64

total_billing_issues

Ticket #                       169
Customer Complaint             169
Date                           169
Time                           169
Received Via                   169
City                           169
State                          169
Zip code                       169
Status                         169
Filing on Behalf of Someone    169
dtype: int64

total_service_issues

Ticket #                       360
Customer Complaint             360
Date                           360
Time                           360
Received Via                   360
City                           360
State                          360
Zip code                       360
Status                         360
Filing on Behalf of Someone    360
dtype: int64

other_issues

Ticket #                       1321
Customer Complaint             1321
Date                           1321
Time                           1321
Received Via                   1321
City                           1321
State                          1321
Zip code                       1321
Status                         1321
Filing on Behalf of Someone    1321
dtype: int64

#Create a new categorical variable with value as Open and Closed. Open
& Pending is to be categorized as Open and Closed & Solved is to be
categorized as Closed.

df['Status'].unique()
```

```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

```
df["New Status"] = ["Open" if status == "Open" or status == "Pending"
else "Closed" for status in df["Status"]]
```

```
df.sample(10)
```

```
                 Ticket #                                    Customer
Complaint  \
Date_month_year

2015-08-04        223179  Comcast bandwidth every evening drops to 10%
o...
2015-06-24        361980                            Throttled Internet
Speeds
2015-06-20        353984                               Connecting the
service
2015-05-13        287000                  Xfinity Throttling Apple TV
bitrate
2015-06-25        363966                                       Bill
Flucuation
2015-06-24        361123                                       Comcast
Billing
2015-04-24        255808
availabilty
2015-06-22        356202
Internet cap
2015-06-16        343049             comcast fraudulent pricing and
practices
2015-05-19        297456  Excessive early termination fees due
immediate...

                     Date         Time        Received Via
City  \
Date_month_year

2015-08-04       04-08-15   1:04:24 AM            Internet
Angels Camp
2015-06-24       24-06-15   1:44:55 PM            Internet
Roseville
2015-06-20       20-06-15   3:28:21 PM  Customer Care Call
Bethesda
2015-05-13       13-05-15   3:15:58 AM  Customer Care Call  Colorado
Springs
2015-06-25       25-06-15   9:15:11 AM  Customer Care Call
Manvel
2015-06-24       24-06-15  10:05:42 AM            Internet
Tallahassee
2015-04-24       24-04-15   3:56:45 PM            Internet
Kent
```

```
2015-06-22       22-06-15   3:07:00 PM  Customer Care Call     Fort
Campbell
2015-06-16       16-06-15  11:55:45 AM  Customer Care Call
Hobart
2015-05-19       19-05-15   3:45:08 PM            Internet
Stephens City

                       State  Zip code   Status Filing on Behalf of
Someone  \
Date_month_year

2015-08-04       California     95222   Closed
No
2015-06-24       California     95661  Pending
No
2015-06-20         Maryland     20817   Solved
No
2015-05-13         Colorado     80918     Open
No
2015-06-25            Texas     77578   Solved
No
2015-06-24          Florida     32311   Solved
Yes
2015-04-24       Washington     98030   Closed
No
2015-06-22         Kentucky     42223   Solved
No
2015-06-16          Indiana     46342   Solved
No
2015-05-19         Virginia     22655   Solved
No

                 New Status
Date_month_year
2015-08-04           Closed
2015-06-24             Open
2015-06-20           Closed
2015-05-13             Open
2015-06-25           Closed
2015-06-24           Closed
2015-04-24           Closed
2015-06-22           Closed
2015-06-16           Closed
2015-05-19           Closed
```

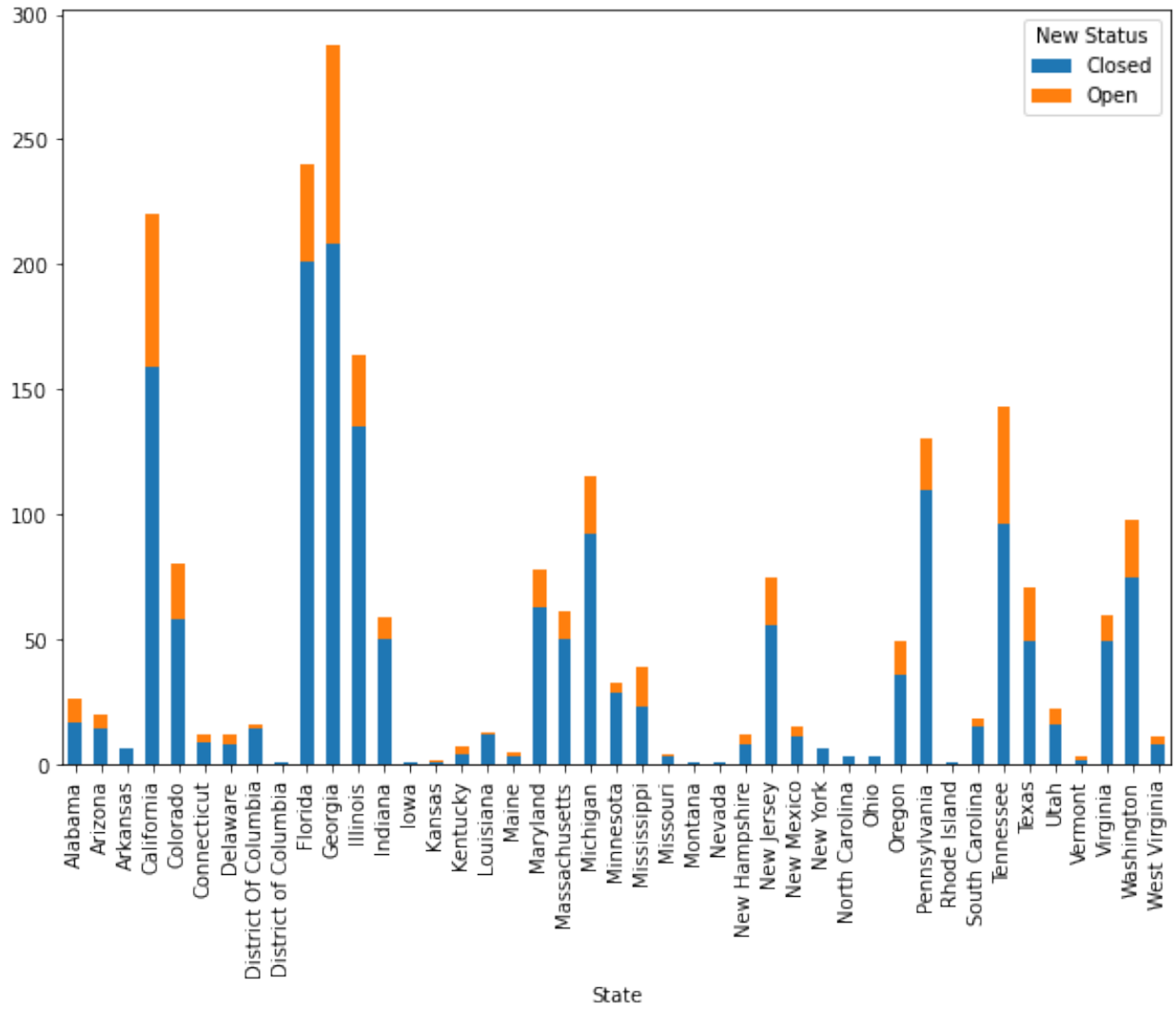
```
# Provide state wise status of complaints in a stacked bar chart. Use
the categorized variable from Q3. Provide insights on:

state_complain = df.groupby(['State','New Status']).size().unstack()
```

```
state_complain
```

New Status	Closed	Open
State		
Alabama	17.0	9.0
Arizona	14.0	6.0
Arkansas	6.0	NaN
California	159.0	61.0
Colorado	58.0	22.0
Connecticut	9.0	3.0
Delaware	8.0	4.0
District Of Columbia	14.0	2.0
District of Columbia	1.0	NaN
Florida	201.0	39.0
Georgia	208.0	80.0
Illinois	135.0	29.0
Indiana	50.0	9.0
Iowa	1.0	NaN
Kansas	1.0	1.0
Kentucky	4.0	3.0
Louisiana	12.0	1.0
Maine	3.0	2.0
Maryland	63.0	15.0
Massachusetts	50.0	11.0
Michigan	92.0	23.0
Minnesota	29.0	4.0
Mississippi	23.0	16.0
Missouri	3.0	1.0
Montana	1.0	NaN
Nevada	1.0	NaN
New Hampshire	8.0	4.0
New Jersey	56.0	19.0
New Mexico	11.0	4.0
New York	6.0	NaN
North Carolina	3.0	NaN
Ohio	3.0	NaN
Oregon	36.0	13.0
Pennsylvania	110.0	20.0
Rhode Island	1.0	NaN
South Carolina	15.0	3.0
Tennessee	96.0	47.0
Texas	49.0	22.0
Utah	16.0	6.0
Vermont	2.0	1.0
Virginia	49.0	11.0
Washington	75.0	23.0
West Virginia	8.0	3.0

```
state_complain.plot.bar(figsize=(10,7),stacked=True)
```

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




```
# Which state has the maximum complaints

df.groupby('State').size().sort_values(ascending=False)[:5]
```

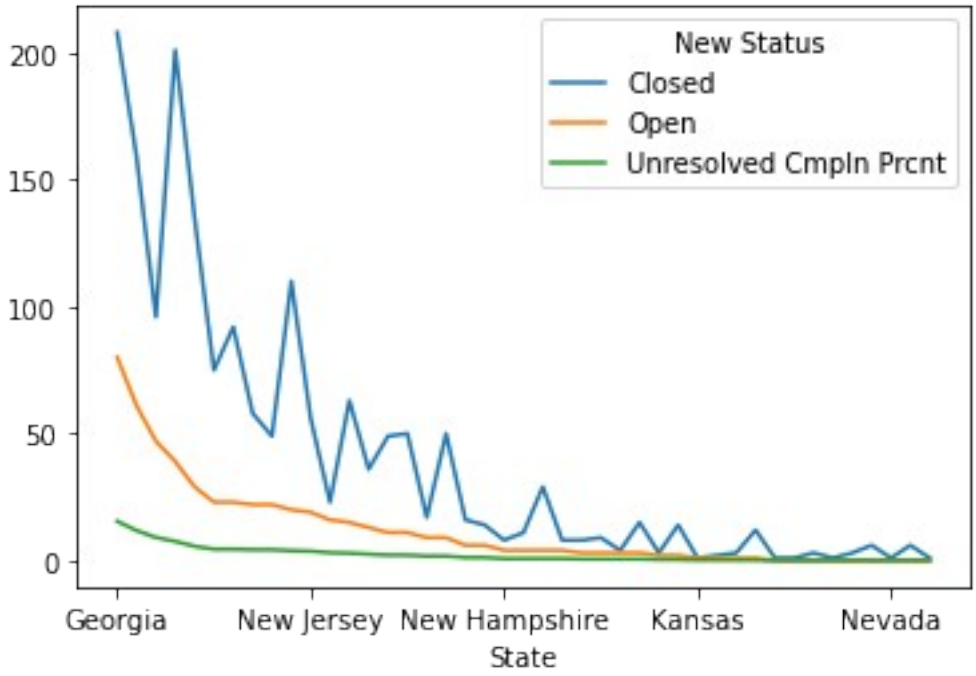
```
State
Georgia       288
Florida       240
California    220
Illinois      164
Tennessee     143
dtype: int64
```

```
# Which state has the highest percentage of unresolved complaints
```

```
unresolved_data = df.groupby(['State', 'New
Status']).size().unstack().fillna(0).sort_values(by="Open",ascending =
False)

unresolved_data['Unresolved Cmpln Prcnt'] =
unresolved_data['Open']/unresolved_data['Open'].sum()*100

unresolved_data
```

New Status	Closed	Open	Unresolved Cmpln Prcnt
State			
Georgia	208.0	80.0	15.473888
California	159.0	61.0	11.798839
Tennessee	96.0	47.0	9.090909
Florida	201.0	39.0	7.543520
Illinois	135.0	29.0	5.609284
Washington	75.0	23.0	4.448743
Michigan	92.0	23.0	4.448743
Colorado	58.0	22.0	4.255319
Texas	49.0	22.0	4.255319
Pennsylvania	110.0	20.0	3.868472
New Jersey	56.0	19.0	3.675048
Mississippi	23.0	16.0	3.094778
Maryland	63.0	15.0	2.901354
Oregon	36.0	13.0	2.514507
Virginia	49.0	11.0	2.127660
Massachusetts	50.0	11.0	2.127660
Alabama	17.0	9.0	1.740812
Indiana	50.0	9.0	1.740812
Utah	16.0	6.0	1.160542
Arizona	14.0	6.0	1.160542
New Hampshire	8.0	4.0	0.773694
New Mexico	11.0	4.0	0.773694
Minnesota	29.0	4.0	0.773694
Delaware	8.0	4.0	0.773694
West Virginia	8.0	3.0	0.580271
Connecticut	9.0	3.0	0.580271
Kentucky	4.0	3.0	0.580271
South Carolina	15.0	3.0	0.580271
Maine	3.0	2.0	0.386847
District Of Columbia	14.0	2.0	0.386847
Kansas	1.0	1.0	0.193424
Vermont	2.0	1.0	0.193424
Missouri	3.0	1.0	0.193424
Louisiana	12.0	1.0	0.193424
Montana	1.0	0.0	0.000000
Rhode Island	1.0	0.0	0.000000
Ohio	3.0	0.0	0.000000
District of Columbia	1.0	0.0	0.000000
North Carolina	3.0	0.0	0.000000

```
New York                    6.0   0.0                  0.000000
Nevada                      1.0   0.0                  0.000000
Arkansas                    6.0   0.0                  0.000000
Iowa                        1.0   0.0                  0.000000

unresolved_data.plot()

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




```
# Provide the percentage of complaints resolved till date, which were
received through the Internet and customer care calls.

df.head()

                Ticket #                                    Customer
Complaint  \
Date_month_year

2015-01-04        211976  Fraudulent claims reported to collections
agency
2015-01-04        211677                         Comcast refusal of
service
2015-01-04        212507                                    Comcast
Cable
2015-01-04        213120                                    Data
Overages
2015-01-04        211478
Comcast
```

```
                       Date         Time        Received Via
City  \
Date_month_year

2015-01-04       04-01-15   1:26:53 PM  Customer Care Call
Atlanta
2015-01-04       04-01-15  12:01:06 PM  Customer Care Call
Wayne
2015-01-04       04-01-15   3:54:43 PM            Internet
Franklin
2015-01-04       04-01-15   8:05:57 PM            Internet
Savannah
2015-01-04       04-01-15  10:47:35 AM            Internet  North
Huntingdon

                         State  Zip code  Status Filing on Behalf of
Someone  \
Date_month_year

2015-01-04             Georgia     30312  Closed
No
2015-01-04        Pennsylvania     19087  Closed
No
2015-01-04           Tennessee     37067  Closed
No
2015-01-04             Georgia     31406  Closed
No
2015-01-04        Pennsylvania     15642  Closed
No

                 New Status
Date_month_year
2015-01-04           Closed
2015-01-04           Closed
2015-01-04           Closed
2015-01-04           Closed
2015-01-04           Closed
```

```
resolved_data = df.groupby(['Received Via','New
Status']).size().unstack().fillna(0)

resolved_data.head()
```

```
New Status           Closed  Open
Received Via
Customer Care Call      864   255
Internet                843   262
```

```
resolved_data['Resolved Cmpln Prcnt'] =
resolved_data['Closed']/resolved_data['Closed'].sum()*100
```

```
resolved_data.plot(kind='bar',figsize=(10,7))
```

```
<AxesSubplot:xlabel='Received Via'>
```