Project 3 Comcast Telecom Consumer Complaints Shubham Jain

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Project 4 Comcast Telecom Consumer Complaints

```
[2]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
```

Import data into Python environment.

```
[3]: df_complaints = pd.read_csv("C:\Users\shubham.
      ↪jain\Desktop\Comcast_telecom_complaints_data.csv")
```

```
[4]: df_complaints.head()
```

```
[4]:   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
```

```
[5]: df_complaints["date_index"] = df_complaints["Date_month_year"] + " " +␣
      ↪df_complaints["Time"]
     df_complaints["date_index"] = pd.to_datetime(df_complaints["date_index"])
```

```
df_complaints["Date_month_year"] = pd.
↪to_datetime(df_complaints["Date_month_year"])
df_complaints = df_complaints.set_index(df_complaints["date_index"])
```

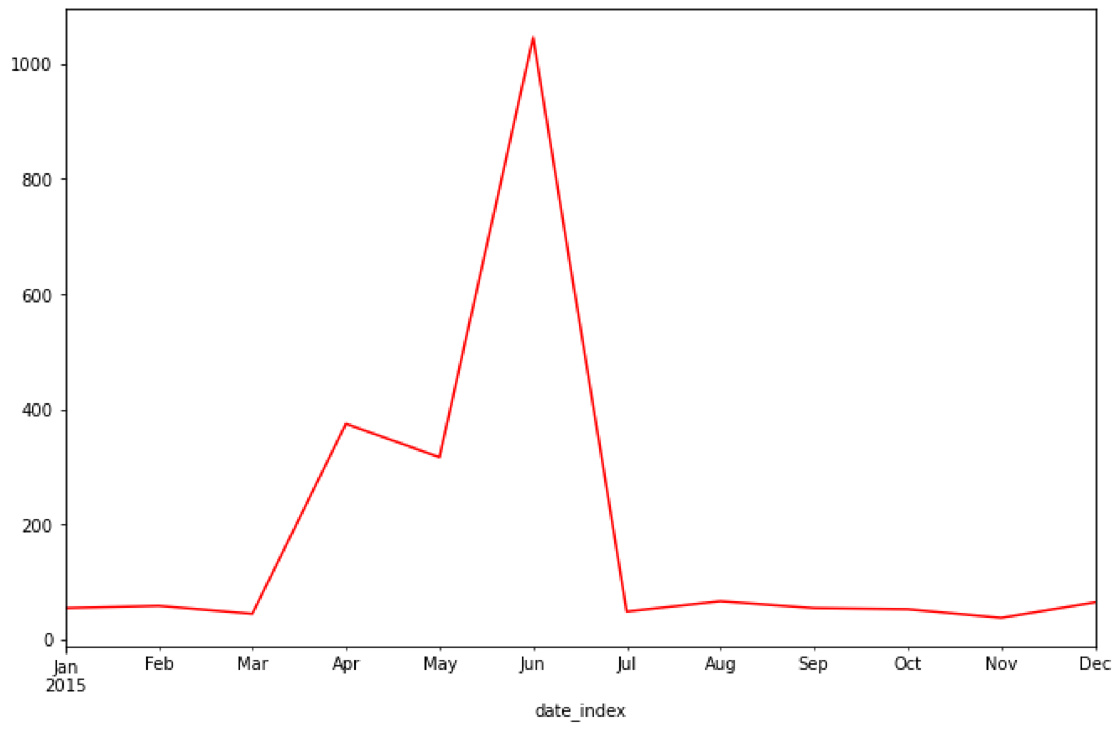
[6]:
```
df_complaints.head()
```

[6]:
```
                     Ticket #  \
date_index
2015-04-22 15:53:50   250635
2015-08-04 10:22:56   223441
2015-04-18 09:55:47   242732
2015-07-05 11:59:35   277946
2015-05-26 13:25:26   307175

                                                Customer Complaint  \
date_index
2015-04-22 15:53:50                     Comcast Cable Internet Speeds
2015-08-04 10:22:56      Payment disappear - service got disconnected
2015-04-18 09:55:47                                 Speed and Service
2015-07-05 11:59:35  Comcast Imposed a New Usage Cap of 300GB that …
2015-05-26 13:25:26         Comcast not working and no service to boot

                          Date Date_month_year         Time  \
date_index
2015-04-22 15:53:50  22-04-15      2015-04-22   3:53:50 PM
2015-08-04 10:22:56  04-08-15      2015-08-04  10:22:56 AM
2015-04-18 09:55:47  18-04-15      2015-04-18   9:55:47 AM
2015-07-05 11:59:35  05-07-15      2015-07-05  11:59:35 AM
2015-05-26 13:25:26  26-05-15      2015-05-26   1:25:26 PM

                          Received Via      City     State  Zip code  Status  \
date_index
2015-04-22 15:53:50  Customer Care Call  Abingdon  Maryland     21009  Closed
2015-08-04 10:22:56            Internet   Acworth   Georgia     30102  Closed
2015-04-18 09:55:47            Internet   Acworth   Georgia     30101  Closed
2015-07-05 11:59:35            Internet   Acworth   Georgia     30101    Open
2015-05-26 13:25:26            Internet   Acworth   Georgia     30101  Solved

                    Filing on Behalf of Someone          date_index
date_index
2015-04-22 15:53:50                          No 2015-04-22 15:53:50
2015-08-04 10:22:56                          No 2015-08-04 10:22:56
2015-04-18 09:55:47                         Yes 2015-04-18 09:55:47
2015-07-05 11:59:35                         Yes 2015-07-05 11:59:35
2015-05-26 13:25:26                          No 2015-05-26 13:25:26
```

Trend chart for the number of complaints at monthly granularity levels

```
[7]: df_complaints.groupby(pd.Grouper(freq="M")).size().plot(figsize = (11,7), color␣
     ↪= 'red')
```

```
[7]: <AxesSubplot:xlabel='date_index'>
```



Trend chart for the number of complaints at daily granularity levels

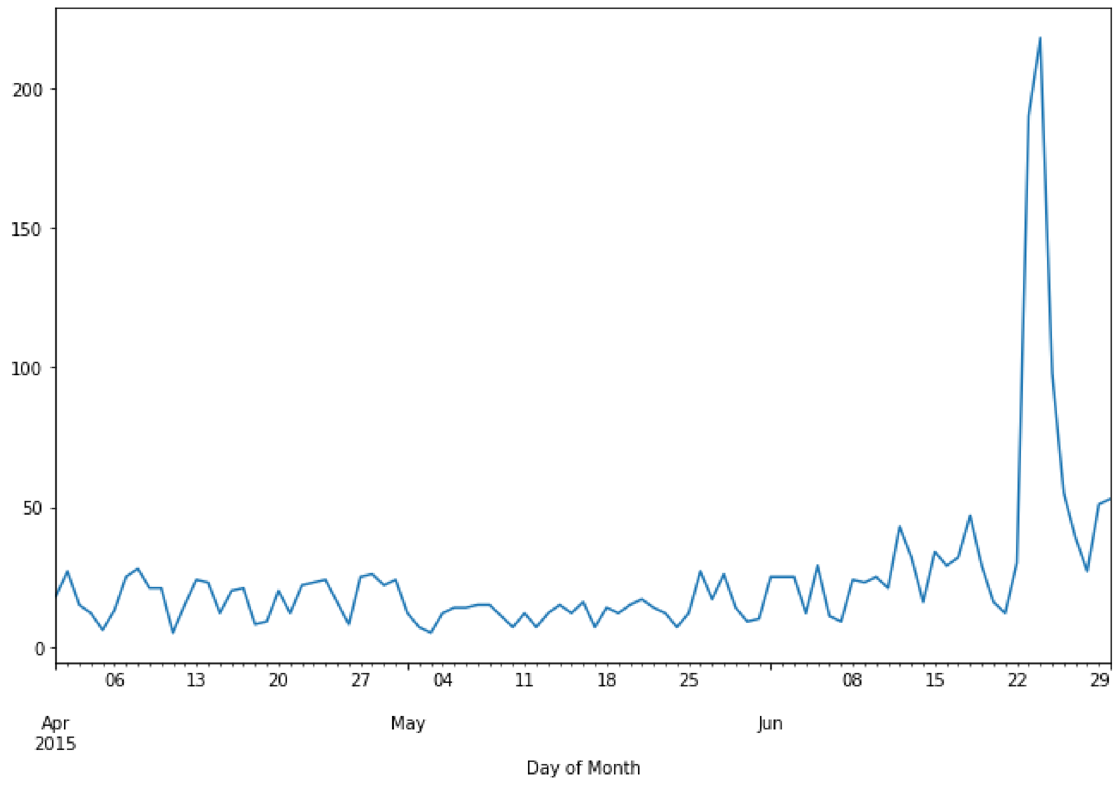
```
[12]: df_complaints['Day of Month'] = pd.to_datetime(df_complaints["Date"])
      df_complaints = df_complaints.set_index(df_complaints["Day of Month"])
      df_complaints['Day of Month'].value_counts()
```

```
[12]: 2015-06-24    218
      2015-06-23    190
      2015-06-25     98
      2015-06-26     55
      2015-06-30     53
                   …
      2015-05-24      7
      2015-05-02      7
      2015-04-05      6
      2015-04-11      5
      2015-05-03      5
```

```
Name: Day of Month, Length: 91, dtype: int64
```

[10]:
```
df_complaints.groupby(pd.Grouper(freq="D")).size().plot(figsize = (11,7))
```

[10]:
```
<AxesSubplot:xlabel='Day of Month'>
```



Provide a table with the frequency of complaint types

[13]:
```
df_type = df_complaints["Customer Complaint"].value_counts()
```

[14]:
```
df_type.head(25)
```

[14]:
```
Comcast                            83
Comcast Internet                   18
Comcast Data Cap                   17
comcast                            13
Comcast Data Caps                  11
Comcast Billing                    11
Data Caps                          11
Unfair Billing Practices            9
Data Cap                            8
Comcast data cap                    8
```

```
Internet speed                    8
Comcast/Xfinity                   8
Comcast data caps                 8
Comcast internet                  8
COMCAST                           6
Comcast service                   6
Comcast Service                   6
Billing                           6
Comcast billing                   6
Internet Speed                    5
Comcast complaint                 5
Comcast Complaint                 5
Comcast Internet Service          5
Comcast Unfair Billing Practices  4
Data cap                          4
Name: Customer Complaint, dtype: int64
```

Python is case-sensitive it is treating Comcast, COMCAST and comcast as two different complaints.If all complaints are changed to upper case then it will give a correct count.

[15]:
```
df_type = df_complaints['Customer Complaint'].str.upper().value_counts()
```

[16]:
```
df_type.head(25)
```

[16]:
```
COMCAST                     102
COMCAST DATA CAP             30
COMCAST INTERNET             29
COMCAST DATA CAPS            21
COMCAST BILLING              18
COMCAST SERVICE              15
INTERNET SPEED               15
UNFAIR BILLING PRACTICES     13
DATA CAPS                    13
DATA CAP                     12
COMCAST COMPLAINT            11
COMCAST/XFINITY              11
COMCAST INTERNET SERVICE     10
BILLING                       9
BILLING ISSUES                8
COMCAST BILLING PRACTICES     5
SERVICE ISSUES                5
COMCAST CABLE                 5
COMCAST BILLING COMPLAINT     5
INTERNET                      5
COMPLAINT AGAINST COMCAST     5
SLOW INTERNET                 5
```

```
COMCAST ISSUES              5
INTERNET SERVICE            5
COMCAST XFINITY             4
Name: Customer Complaint, dtype: int64
```

Complaint types are maximum around Comcast , Comcast data Cap , Comcast Internet , Comcast data Cap , Comcast Billing

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.

[18]:
```
# Open & Pending Category will be categorized as Open, else status is closed
df_complaints["newStatus"] = ["Open" if Status=="Open" or Status=="Pending"␣
 ↪else "Closed" for Status in df_complaints["Status"]]
```

Provide state wise status of complaints in a stacked bar chart. Use the categorized variable from Q3.

[22]:
```
df_status = df_complaints.groupby('State').newStatus.value_counts().unstack()
#df_status = df_complaints.groupby(['State','newStatus'])['COUNT'].sum().
 ↪unstack()
```

[23]:
```
df_status.head(25)
```

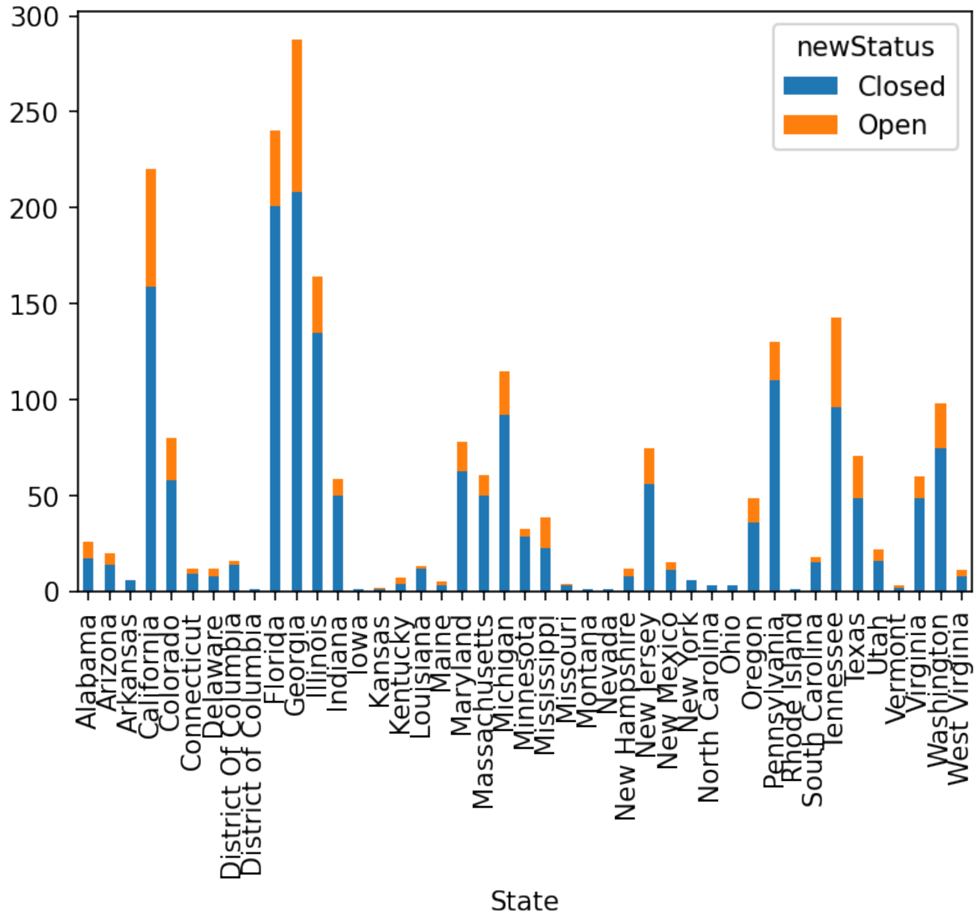
[23]:
```
newStatus             Closed  Open
State
Alabama                 17.0   9.0
Arizona                 14.0   6.0
Arkansas                 6.0   NaN
California             159.0  61.0
Colorado                58.0  22.0
Connecticut              9.0   3.0
Delaware                 8.0   4.0
District 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
```

[30]:
```python
plt.figure(figsize=(20,10))
plt.rcParams['figure.dpi'] = 150
# Stacked = True, Stacked Plot
df_status.plot(kind='bar', stacked=True)
```

[30]:
```
<AxesSubplot:xlabel='State'>
```

```
<Figure size 2000x1000 with 0 Axes>
```



- Which state has the maximum complaints

Georgia has maximum number of complaints

Which state has the highest percentage of unresolved complaints

[31]:
```
# Unresolved complaints distribution across State
df_unresolved = df_complaints[df_complaints['newStatus']=='Open']
colors = ['#639ace','#ca6b39','#7f67ca','#5ba85f','#c360aa','#a7993f','#cc566a']
df_unresolved = df_unresolved['State'].value_counts()
df_unresolved.head(25)
```

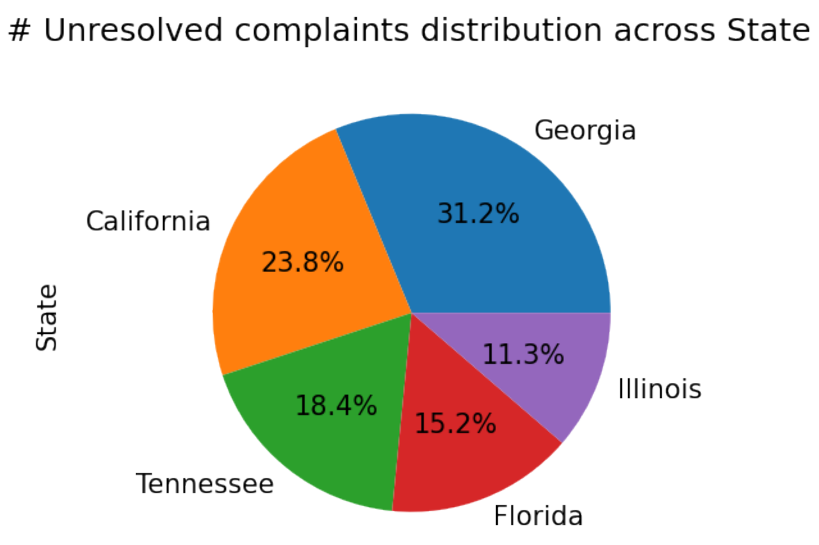
[31]:
```
Georgia          80
California       61
Tennessee        47
Florida          39
Illinois         29
Washington       23
Michigan         23
Colorado         22
Texas            22
Pennsylvania     20
New Jersey       19
Mississippi      16
Maryland         15
Oregon           13
Virginia         11
Massachusetts    11
Alabama           9
Indiana           9
Arizona           6
Utah              6
New Hampshire     4
Delaware          4
Minnesota         4
New Mexico        4
Kentucky          3
Name: State, dtype: int64
```

[35]:
```
df_unresolved/df_complaints.shape[0]
```

[35]:
```
Georgia                 0.035971
California              0.027428
Tennessee               0.021133
Florida                 0.017536
Illinois                0.013040
Washington              0.010342
Michigan                0.010342
Colorado                0.009892
```

```
Texas                   0.009892
Pennsylvania            0.008993
New Jersey              0.008543
Mississippi             0.007194
Maryland                0.006745
Oregon                  0.005845
Virginia                0.004946
Massachusetts           0.004946
Alabama                 0.004047
Indiana                 0.004047
Arizona                 0.002698
Utah                    0.002698
New Hampshire           0.001799
Delaware                0.001799
Minnesota               0.001799
New Mexico              0.001799
Kentucky                0.001349
South Carolina          0.001349
West Virginia           0.001349
Connecticut             0.001349
Maine                   0.000899
District Of Columbia    0.000899
Kansas                  0.000450
Louisiana               0.000450
Missouri                0.000450
Vermont                 0.000450
Name: State, dtype: float64
```

[36]:
```
df_unresolved.head().plot(kind='pie',autopct='%1.1f%%',
                        #explode = (0.15, 0, 0, 0, 0), startangle=45,␣
 ↪shadow=False, colors = colors,
                        figsize = (4,3))
plt.axis('equal')
plt.title('# Unresolved complaints distribution across State\n')
plt.tight_layout()
plt.show()
```



Georgia has maximum percentage of unresolved complaints

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

```
[37]: df_received = df_complaints[df_complaints['Received Via'].
       ↪isin(['Internet','Customer Care Call'])]
```

```
[38]: df_received.head()
```

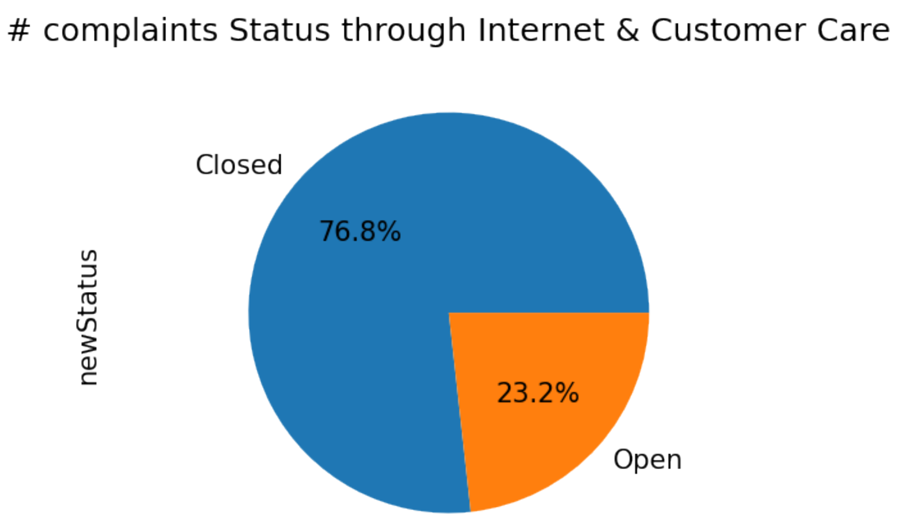
```
[38]:              Ticket #                        Customer Complaint  \
Day of Month
2015-04-22     250635                Comcast Cable Internet Speeds
2015-04-08     223441      Payment disappear - service got disconnected
2015-04-18     242732                            Speed and Service
2015-05-07     277946  Comcast Imposed a New Usage Cap of 300GB that …
2015-05-26     307175        Comcast not working and no service to boot

                   Date Date_month_year         Time        Received Via  \
Day of Month
2015-04-22    22-04-15      2015-04-22   3:53:50 PM  Customer Care Call
2015-04-08    04-08-15      2015-08-04  10:22:56 AM            Internet
2015-04-18    18-04-15      2015-04-18   9:55:47 AM            Internet
2015-05-07    05-07-15      2015-07-05  11:59:35 AM            Internet
2015-05-26    26-05-15      2015-05-26   1:25:26 PM            Internet

                   City     State  Zip code  Status   \
Day of Month
```

```
2015-04-22    Abingdon  Maryland     21009  Closed
2015-04-08     Acworth   Georgia     30102  Closed
2015-04-18     Acworth   Georgia     30101  Closed
2015-05-07     Acworth   Georgia     30101    Open
2015-05-26     Acworth   Georgia     30101  Solved

             Filing on Behalf of Someone          date_index Day of Month  \
Day of Month
2015-04-22                            No 2015-04-22 15:53:50   2015-04-22
2015-04-08                            No 2015-08-04 10:22:56   2015-04-08
2015-04-18                           Yes 2015-04-18 09:55:47   2015-04-18
2015-05-07                           Yes 2015-07-05 11:59:35   2015-05-07
2015-05-26                            No 2015-05-26 13:25:26   2015-05-26

             newStatus
Day of Month
2015-04-22      Closed
2015-04-08      Closed
2015-04-18      Closed
2015-05-07        Open
2015-05-26      Closed
```

[39]:
```
df_received.newStatus.value_counts()
```

[39]:
```
Closed    1707
Open       517
Name: newStatus, dtype: int64
```

[40]:
```
df_received.newStatus.value_counts().plot(kind='pie',autopct='%1.1f%%',
                        #explode = (0.15, 0, 0, 0, 0), startangle=45,␣
 ↪shadow=False, colors = colors,
                        figsize = (4,3))
plt.axis('equal')
plt.title('# complaints Status through Internet & Customer Care\n')
plt.tight_layout()
plt.show()
```



```
[41]: df_received_closed = df_received[df_received['newStatus']=='Closed']
```

```
[42]: df_received_closed.newStatus.value_counts()
```

```
[42]: Closed    1707
      Name: newStatus, dtype: int64
```

```
[ ]:
```