Untitled2

July 26, 2022

1 Project Name : Comcast Telecom Consumer Complaints

1.1 DESCRIPTION

Comcast is an American global telecommunication company. The firm has been providing terrible customer service. They continue to fall short despite repeated promises to improve. Only last month (October 2016) the authority fined them a $2.3 million, after receiving over 1000 consumer complaints. The existing database will serve as a repository of public customer complaints filed against Comcast. It will help to pin down what is wrong with Comcast's customer service.

1.2 Data Dictionary

- Ticket #: Ticket number assigned to each complaint
- Customer Complaint: Description of complaint
- Date: Date of complaint
- Time: Time of complaint
- Received Via: Mode of communication of the complaint
- City: Customer city
- State: Customer state
- Zipcode: Customer zip
- Status: Status of complaint
- Filing on behalf of someone

1.3 Analysis Task

To perform these tasks, you can use any of the different Python libraries such as NumPy, SciPy, Pandas, scikit-learn, matplotlib, and BeautifulSoup.

- Import data into Python environment.
- Provide the trend chart for the number of complaints at monthly and daily granularity levels.
- Provide a table with the frequency of complaint types.

Which complaint types are maximum i.e., around internet, network issues, or across any other domains. - 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. - Provide state wise status of complaints in a stacked bar chart. Use the categorized variable from Q3. Provide insights on:

Which state has the maximum complaints

Which state has the highest percentage of unresolved complaints - Provide the percentage of complaints resolved till date, which were received through the Internet and customer care calls.

[1]:
```
#import libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:
```
import zipfile as zf
files=zf.ZipFile("comcast.zip",'a')
files.extractall('directory to extract')
files.close()
```

[3]:
```
comcast=pd.read_csv("Comcast_telecom_complaints_data.csv")
```

[4]:
```
comcast.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]:
```
comcast.dtypes
```

[5]:
```
Ticket #                    object
Customer Complaint          object
Date                        object
Date_month_year             object
Time                        object
```

```
Received Via                    object
City                            object
State                           object
Zip code                         int64
Status                          object
Filing on Behalf of Someone     object
dtype: object
```

[6]:
```
## Datetime series analysis
```

[7]:
```
import datetime
comcast.Date = pd.to_datetime(comcast.Date, format='%d-%m-%y')
```

[8]:
```
month = comcast['Date'].dt.month.astype(str)
year=comcast['Date'].dt.year.astype(str)
comcast['month_year']= month.str.cat(year, sep ="-")
```

[9]:
```
comcast.dtypes
```

[9]:
```
Ticket #                            object
Customer Complaint                  object
Date                          datetime64[ns]
Date_month_year                     object
Time                                object
Received Via                        object
City                                object
State                               object
Zip code                             int64
Status                              object
Filing on Behalf of Someone         object
month_year                          object
dtype: object
```

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

[10]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State
0	250635	Comcast Cable Internet Speeds	2015-04-22	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland
1	223441	Payment disappear - service got disconnected	2015-08-04	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia
2	242732	Speed and Service	2015-04-18	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia
3	277946	Comcast Imposed a New Usage Cap of 300GB that …	2015-07-05	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia
4	307175	Comcast not working and no service to boot	2015-05-26					

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

   Zip code  Status Filing on Behalf of Someone month_year
0     21009  Closed                          No     4-2015
1     30102  Closed                          No     8-2015
2     30101  Closed                         Yes     4-2015
3     30101    Open                         Yes     7-2015
4     30101  Solved                          No     5-2015
```

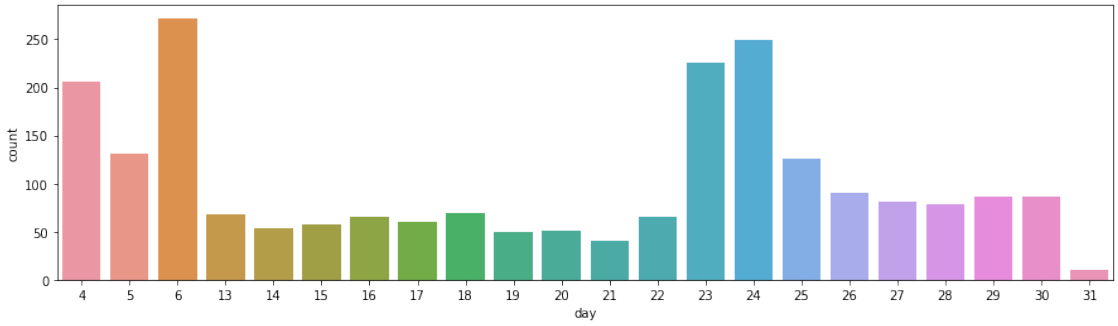
[11]:
```
comcast["Date"].value_counts()[:10]
```

[11]:
```
2015-06-24    218
2015-06-23    190
2015-06-25     98
2015-06-26     55
2015-06-30     53
2015-06-29     51
2015-06-18     47
2015-12-06     43
2015-06-27     39
2015-06-15     34
Name: Date, dtype: int64
```

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

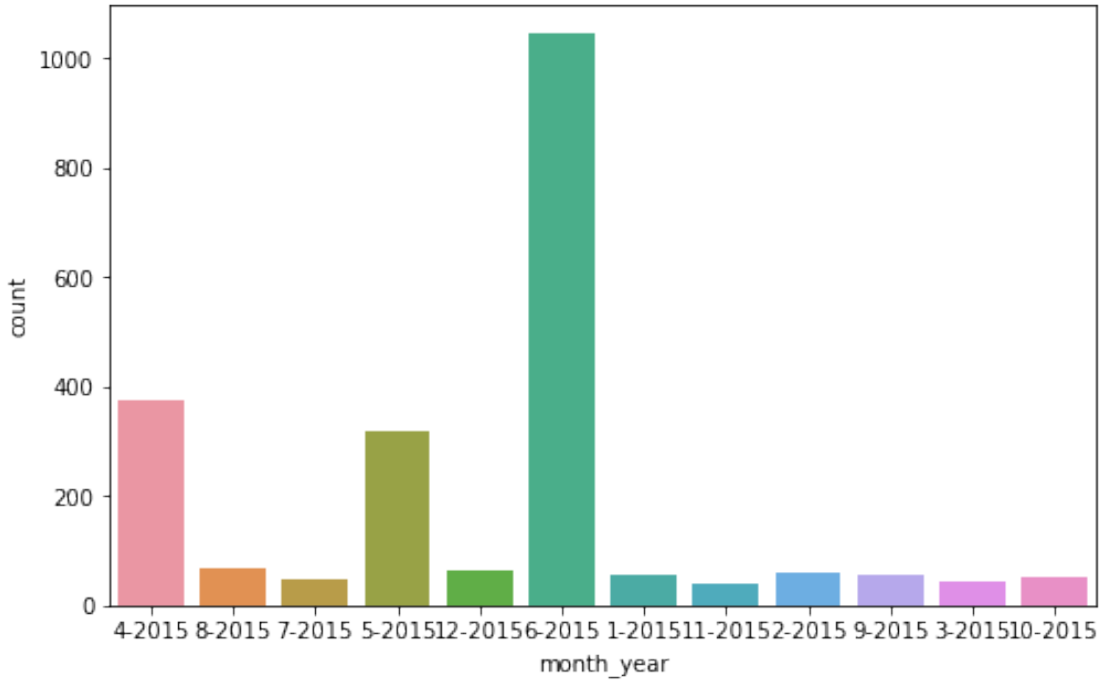
[12]:
```
comcast['day']=comcast['Date'].dt.day
plt.figure(figsize=(15,4))
sns.countplot(x="day",data=comcast)
# trend at daily granulities
# Maximum complaints are recieved on 6th day of month.
```

[12]:
```
<AxesSubplot:xlabel='day', ylabel='count'>
```



[13]:
```
plt.figure(figsize=(8,5))
sns.countplot(x='month_year',data=comcast)
## trend at monthly granularity levels
# Maximum complaints are registered in June-2015
```

[13]:
```
<AxesSubplot:xlabel='month_year', ylabel='count'>
```



1.4 Provide a table with the frequency of complaint types.

[14]:
```
comcast['Customer Complaint'].str.lower().value_counts()
```

[14]:
```
comcast                                                  102
comcast data cap                                          30
comcast internet                                          29
comcast data caps                                         21
comcast billing                                           18
                                                        ...
comcast billing (primary) service (secondary)              1
overcharged internet billing                               1
bills/identity                                             1
concern about comcast internet modem billing practices     1
comcast internet in emeryville throttles speed             1
Name: Customer Complaint, Length: 1740, dtype: int64
```

[29]:
```
import nltk
%pip install wordcloud
```

```
Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: wordcloud in /usr/local/lib/python3.7/site-
packages (1.6.0)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.7/site-
packages (from wordcloud) (3.5.1)
Requirement already satisfied: numpy>=1.6.1 in /usr/local/lib/python3.7/site-
packages (from wordcloud) (1.21.5)
Requirement already satisfied: pillow in /usr/local/lib/python3.7/site-packages
(from wordcloud) (7.1.1)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.7/site-
packages (from matplotlib->wordcloud) (21.0)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.7/site-
packages (from matplotlib->wordcloud) (0.10.0)
Requirement already satisfied: python-dateutil>=2.7 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (2.8.1)
Requirement already satisfied: pyparsing>=2.2.1 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (2.4.6)
Requirement already satisfied: kiwisolver>=1.0.1 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (1.2.0)
Requirement already satisfied: fonttools>=4.22.0 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (4.28.5)
Requirement already satisfied: six in /usr/local/lib/python3.7/site-packages
(from cycler>=0.10->matplotlib->wordcloud) (1.14.0)
WARNING: You are using pip version 22.0.3; however, version 22.2 is
available.
You should consider upgrading via the '/usr/local/bin/python3.7 -m pip install
--upgrade pip' command.
Note: you may need to restart the kernel to use updated packages.
```

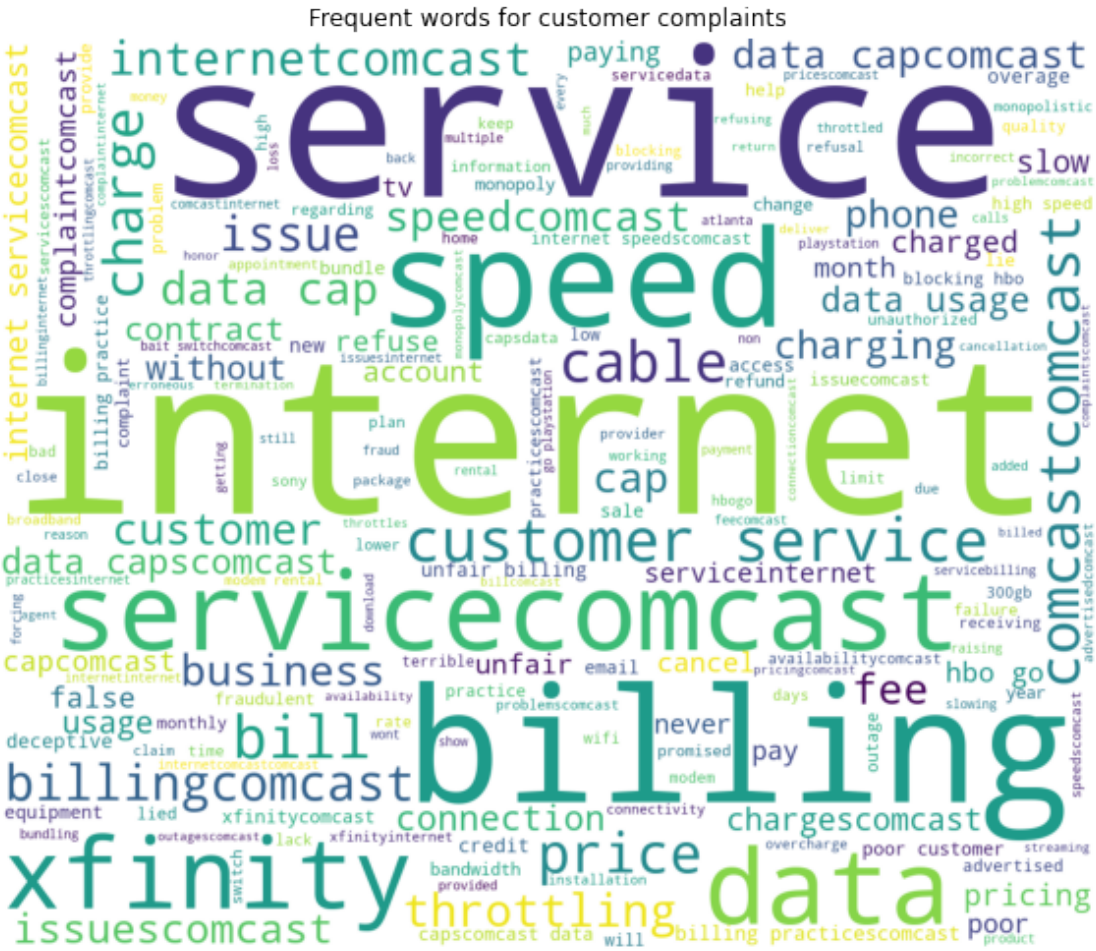
[16]:
```
from wordcloud import WordCloud, STOPWORDS
common_complaints = comcast['Customer Complaint'].dropna().tolist()
common_complaints ='' .join(common_complaints).lower()

list_stops =␣
 ↪('Comcast','Now','Company','Day','Someone','Thing','Also','Got','Way','Call','Called','One'

for word in list_stops:
    STOPWORDS.add(word)
```

[17]:
```
wordcloud=WordCloud(stopwords=STOPWORDS,background_color='white',width=1200,height=1000).
 ↪generate(common_complaints)
plt.figure(figsize=(10,15))
```

```
plt.imshow(wordcloud)
plt.title('Frequent words for customer complaints')
plt.axis('off')
plt.show()
```



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]:
```
comcast.Status.unique()
```

[18]:
```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

[19]:
```
comcast['new_status']= ['Open' if Status=='Open' or Status=='Pending' else␣
↪'Closed' for Status in comcast['Status']]
```

[20]:
```
comcast.head()
```

[20]:
```
  Ticket #                                    Customer Complaint       Date  \
0   250635                       Comcast Cable Internet Speeds 2015-04-22
1   223441       Payment disappear - service got disconnected 2015-08-04
2   242732                                    Speed and Service 2015-04-18
3   277946  Comcast Imposed a New Usage Cap of 300GB that … 2015-07-05
4   307175         Comcast not working and no service to boot 2015-05-26

  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 month_year  day new_status
0     21009  Closed                           No     4-2015   22     Closed
1     30102  Closed                           No     8-2015    4     Closed
2     30101  Closed                          Yes     4-2015   18     Closed
3     30101    Open                          Yes     7-2015    5       Open
4     30101  Solved                           No     5-2015   26     Closed
```

[21]:
```
# **Provide state wise status of complaints in a stacked bar chart.**
comcast.groupby(['State']).size().sort_values(ascending=False).to_frame().
↪reset_index().rename({0:'Count'},axis=1)[ :6]
```

[21]:
```
          State  Count
0       Georgia    288
1       Florida    240
2    California    220
3      Illinois    164
4     Tennessee    143
5  Pennsylvania    130
```

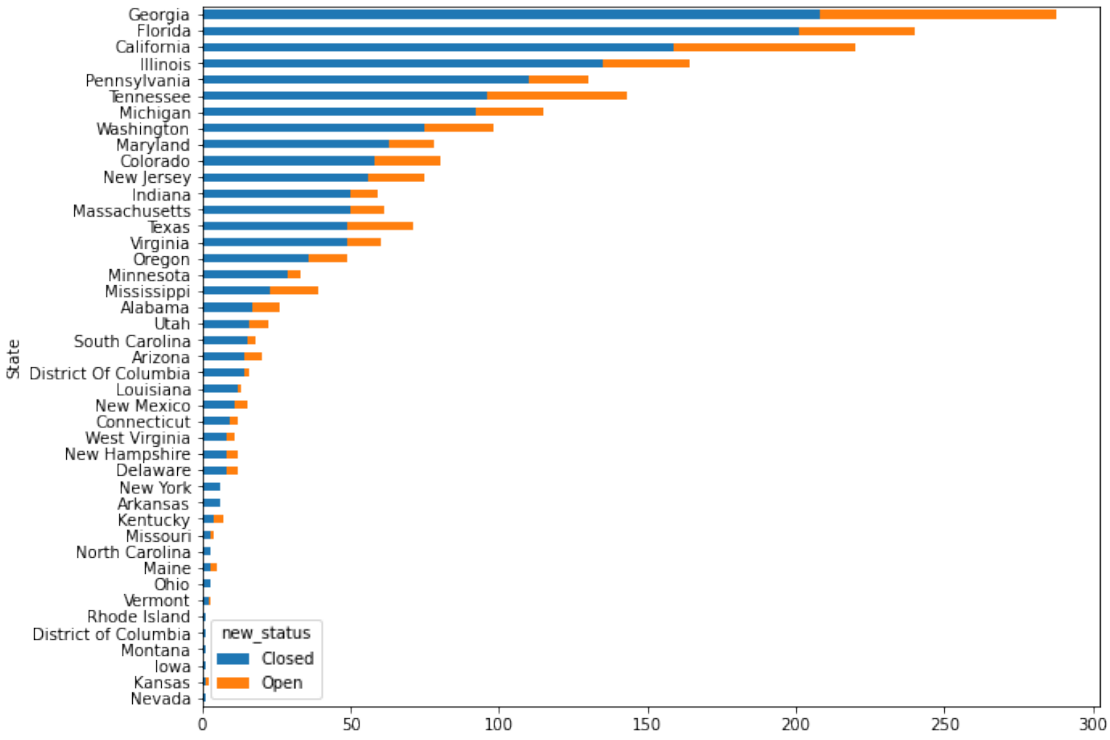
[22]:
```
state_complaints=comcast.groupby(['State','new_status']).size().unstack().
↪fillna(0)
state_complaints
```

[22]:
```
new_status            Closed  Open
State
Alabama                 17.0   9.0
Arizona                 14.0   6.0
Arkansas                 6.0   0.0
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   0.0
Florida                201.0  39.0
Georgia                208.0  80.0
Illinois               135.0  29.0
Indiana                 50.0   9.0
Iowa                     1.0   0.0
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   0.0
Nevada                   1.0   0.0
New Hampshire            8.0   4.0
New Jersey              56.0  19.0
New Mexico              11.0   4.0
New York                 6.0   0.0
North Carolina           3.0   0.0
Ohio                     3.0   0.0
Oregon                  36.0  13.0
Pennsylvania           110.0  20.0
Rhode Island             1.0   0.0
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
```

[23]:
```
state_complaints.sort_values('Closed',axis = 0,ascending=True).
↪plot(kind='barh', figsize=(10,8),stacked=True)
```

[23]: <AxesSubplot:ylabel='State'>



Which state has the maximum complaints?

Which state has the highest percentage of unresolved complaints?

[24]:
```
comcast.groupby(['State']).size().sort_values(ascending=False).to_frame().
↪reset_index().rename({0:'Count'},axis=1)[ :1]
```

[24]:

	State	Count
0	Georgia	288

1.4.1 ans. Georgia has the maximum complaints.

[25]:
```
state_complaints['Open'].mean()
```

[25]:
```
12.023255813953488
```

[26]:
```
state_complaints['Perc_Unres'] = state_complaints['Open']/␣
↪state_complaints['Open'].sum()*100
state_complaints.sort_values("Perc_Unres", axis = 0, ascending = False)[:6]
```

[26]:
```
new_status  Closed  Open  Perc_Unres
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
```

Georgia has the maximum unresolved complaints

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

[27]:
```
comcast.head()
```

[27]:
```
  Ticket #                                  Customer Complaint       Date  \
0   250635                       Comcast Cable Internet Speeds 2015-04-22
1   223441       Payment disappear - service got disconnected 2015-08-04
2   242732                                    Speed and Service 2015-04-18
3   277946  Comcast Imposed a New Usage Cap of 300GB that … 2015-07-05
4   307175         Comcast not working and no service to boot 2015-05-26

  Date_month_year         Time        Received Via      City     State  \
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4       26-May-15   1:25:26 PM            Internet   Acworth   Georgia

   Zip code  Status Filing on Behalf of Someone month_year  day new_status
0     21009  Closed                           No     4-2015   22     Closed
1     30102  Closed                           No     8-2015    4     Closed
2     30101  Closed                          Yes     4-2015   18     Closed
3     30101    Open                          Yes     7-2015    5       Open
4     30101  Solved                           No     5-2015   26     Closed
```

[28]:
```
compl_res = comcast.groupby(['Received Via','new_status']).size().unstack().
↪fillna(0)
compl_res['resolved'] = compl_res['Closed']/compl_res['Closed'].sum()*100
compl_res['resolved']
```

[28]:
```
Received Via
Customer Care Call    50.615114
Internet              49.384886
Name: resolved, dtype: float64
```

[ ]: