In [5]:
```python
#import data
df=pd.read_csv("C:\\Users\\HeyMath\\Downloads\\comcast.csv")
```

In [8]:
```python
df.head()
```

Out[8]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes
4	307175	Comcast not working and no service to boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No

In [4]:
```python
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
import seaborn as sns
```

In [16]:
```python
df.isnull().sum()
```

Out[16]:
```
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
```

In [20]:
```python
df.describe(include='all')
```

Out[20]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
count	2224	2224	2224	2224	2224	2224	2224	2224	2224.000000	2224	2224
unique	2224	1841	91	91	2190	2	928	43	NaN	4	2
top	250635	Comcast	24-06-15	24-Jun-15	12:41:14 PM	Customer Care Call	Atlanta	Georgia	NaN	Solved	No
freq	1	83	218	218	2	1119	63	288	NaN	973	2021
mean	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	47994.393435	NaN	NaN
std	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	28885.279427	NaN	NaN
min	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1075.000000	NaN	NaN
25%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	30056.500000	NaN	NaN
50%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	37211.000000	NaN	NaN
75%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	77058.750000	NaN	NaN
max	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	99223.000000	NaN	NaN

In [22]:
```python
#Cleanup the Data Set
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
```

In [23]:
```python
#Covert Object(Str) to Datetime
df['Date_month_year']=pd.to_datetime(df["Date_month_year"])
```

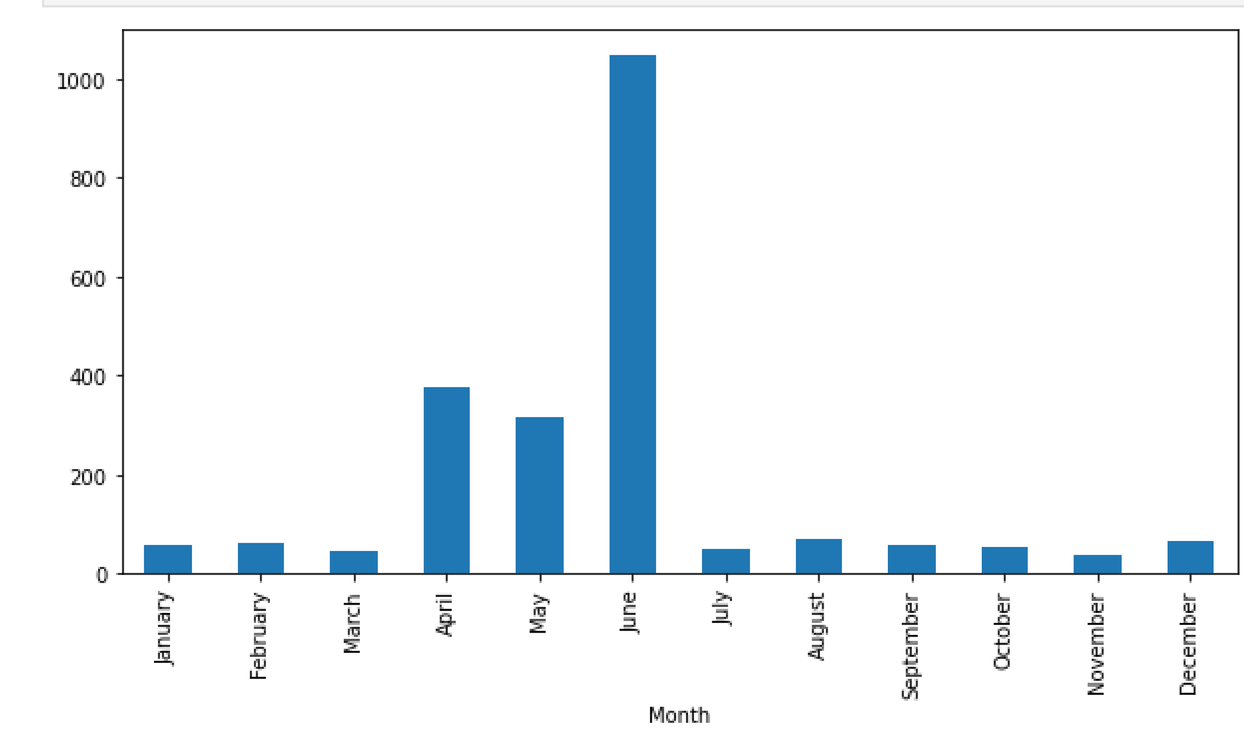
In [43]:
```python
df['Day']=df['Date_month_year'].dt.day
df['Month']=df['Date_month_year'].dt.month_name()
df['Year']=df['Date_month_year'].dt.year
df['week_day'] = df['Date_month_year'].dt.dayofweek
week = {0:'Mon',1:'Tue',2:'Wed',3:'Thur',4:'Fri',5:'Sat',6:'Sun'}
df['week_day'] = df['week_day'].map(week)
```

In [48]:
```python
df.head()
```

Out[48]:

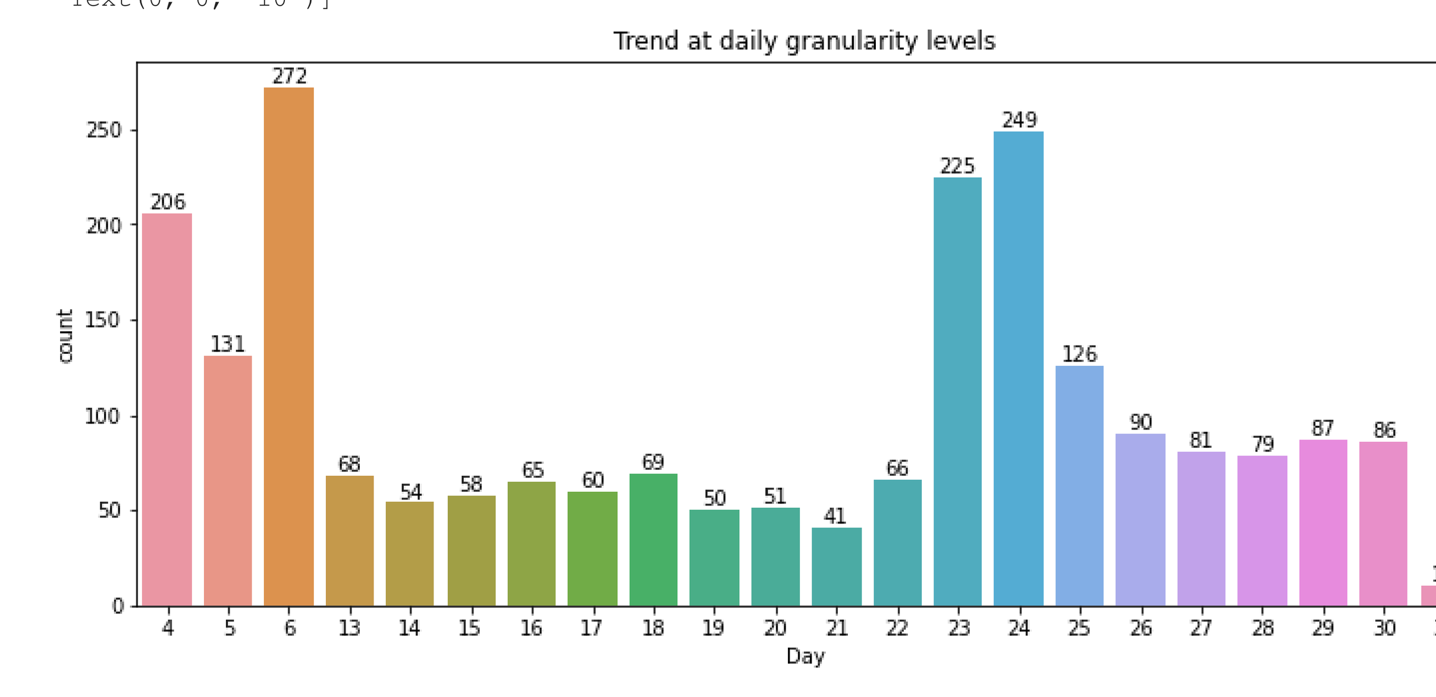
	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Day	Month	week_day	Y
0	250635	Comcast Cable Internet Speeds	22-04-15	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	22	April	Wed	20
1	223441	Payment disappear - service got disconnected	04-08-15	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	4	August	Tue	20
2	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	18	April	Sat	20
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes	5	July	Sun	20
4	307175	Comcast not working and no service to boot	26-05-15	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No	26	May	Tue	20

In [107…
```python
#Trend at monthly granularity levels

new_order = ['January', 'February', 'March', 'April', 'May', 'June', 'July', 'August', 'September', 'October',

df.groupby('Month').size().reindex(new_order).plot.bar(figsize=(10,5))

#June month has highest number of Complaints
```



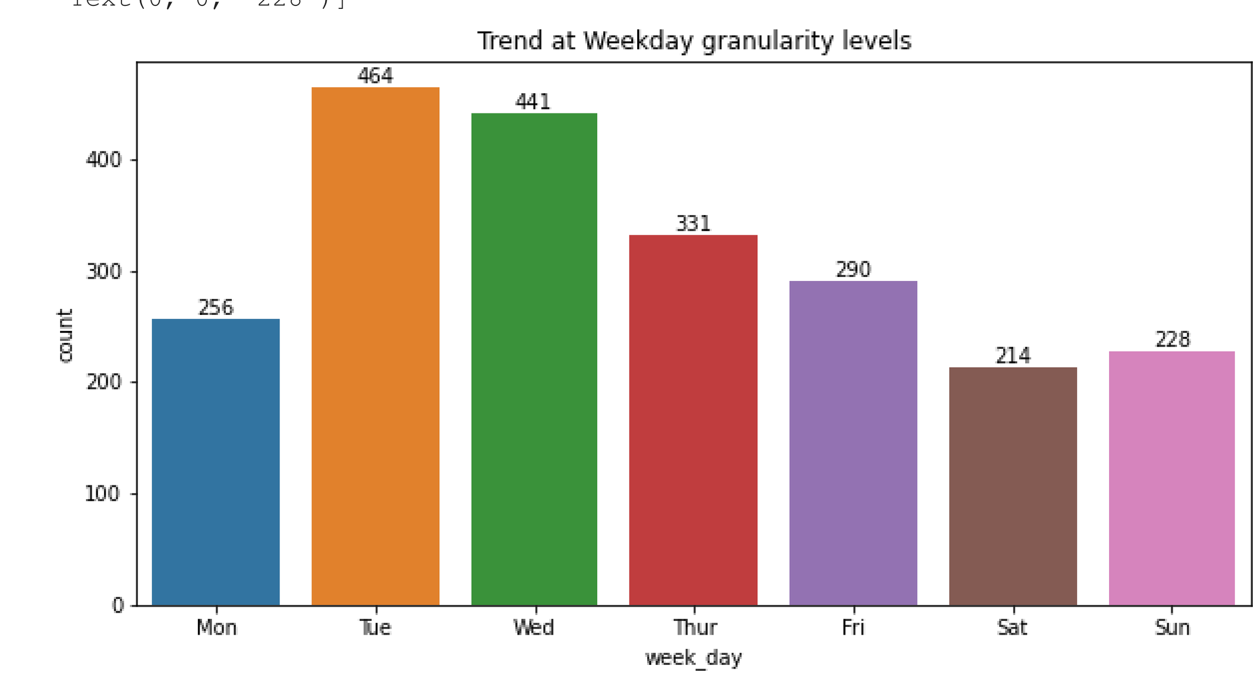
In [119…
```python
#Trend at daily granularity levels

ad=df.groupby('Day').size()
plt.figure(figsize=(12,5))
Daily_Graph=sns.countplot(x="Day",data=df)
Daily_Graph.set(title="Trend at daily granularity levels")
Daily_Graph.bar_label(container=Daily_Graph.containers[0], labels=ad)

# Maximum complaints(272) received on 6th day of the month
```

Out[119]:
```
[Text(0, 0, '206'),
 Text(0, 0, '131'),
 Text(0, 0, '272'),
 Text(0, 0, '68'),
 Text(0, 0, '54'),
 Text(0, 0, '58'),
 Text(0, 0, '65'),
 Text(0, 0, '60'),
 Text(0, 0, '69'),
 Text(0, 0, '50'),
 Text(0, 0, '51'),
 Text(0, 0, '41'),
 Text(0, 0, '66'),
 Text(0, 0, '225'),
 Text(0, 0, '249'),
 Text(0, 0, '126'),
 Text(0, 0, '90'),
 Text(0, 0, '81'),
 Text(0, 0, '79'),
 Text(0, 0, '87'),
 Text(0, 0, '86'),
 Text(0, 0, '10')]
```



In [133…
```python
#Trend at Weekday granularity levels
odr=['Mon','Tue','Wed','Thur','Fri','Sat','Sun']
lbl=df.groupby('week_day').size().reindex(odr)
plt.figure(figsize=(10,5))
weekgraph=sns.countplot(x='week_day',data=df,order=odr)
weekgraph.set(title='Trend at Weekday granularity levels')
weekgraph.bar_label(container=weekgraph.containers[0], labels=lbl)
#Maximum complaints are received on Tuesday follwed by wednesday
```

Out[133]:
```
[Text(0, 0, '256'),
 Text(0, 0, '464'),
 Text(0, 0, '441'),
 Text(0, 0, '331'),
 Text(0, 0, '290'),
 Text(0, 0, '214'),
 Text(0, 0, '228')]
```



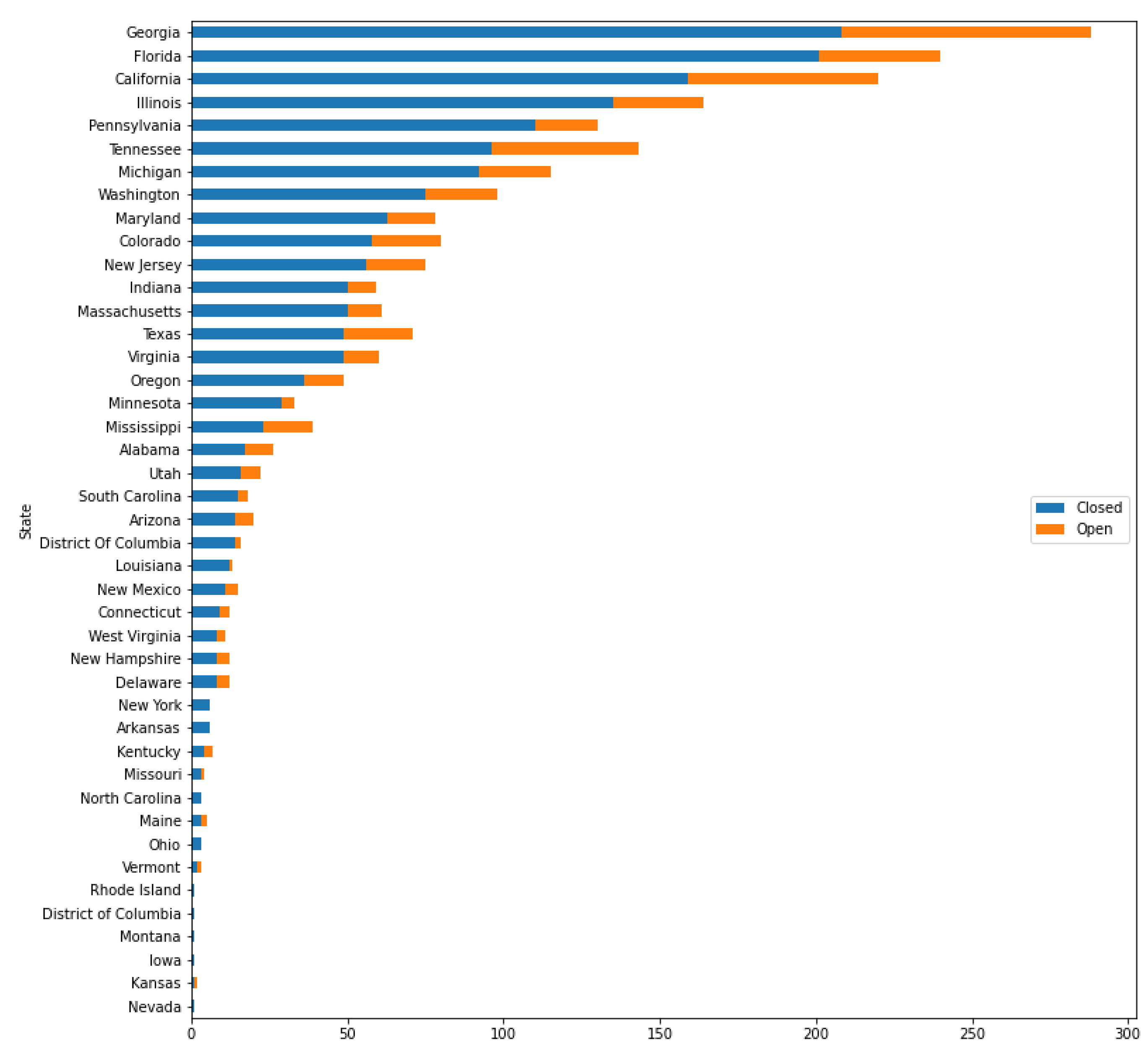
In [142…
```python
#Creating new column to categorise Open & Pending as "Open" and Closed & Solved as "Closed"

df['New_Status']=['Open' if x == 'Open' or x == 'Pending' else 'Closed' for x in df['Status']]
df[['Ticket #','Status','New_Status']].sample(10)
```

Out[142]:

	Ticket #	Status	New_Status
958	222146	Closed	Closed
276	354359	Open	Open
1412	337000	Solved	Closed
1774	375439	Solved	Closed
981	291385	Solved	Closed
59	342435	Solved	Closed
220	347973	Closed	Closed
1416	218108	Closed	Closed
1663	293685	Open	Open
542	304759	Closed	Closed

In [168…
```python
#Stacked bar chart for state wise status of complaints
St_wise=df.groupby(['State','New_Status']).size().unstack().fillna(0)
St_wise.sort_values('Closed',ascending=True).plot.barh(figsize=(12,13), stacked=True).legend(loc='center right'
```

Out[168]:
```
<matplotlib.legend.Legend at 0x2612c0bba00>
```



In [171…
```python
#state with maximum complaints

df.groupby('State').size().sort_values(ascending=False)[:1]
#Georgia has highest(288) number of complaints
```

Out[171]:
```
State
Georgia    288
dtype: int64
```

In [180…
```python
#State with highest percentage of unresolved complaints
St_wise['Unresolved%']=(St_wise['Open']/St_wise['Open'].sum())*100
St_wise.sort_values('Unresolved%',ascending=False)[:1]
#Georgia has highest(15.46) Unresolved %
```

Out[180]:

New_Status	Closed	Open	Unresolved%
State			
Georgia	208.0	80.0	15.473888

In [191…
```python
# percentage of complaints resolved till date, which were received through the Internet and customer care calls

com_res=df.groupby(['Received Via','New_Status']).size().unstack()
com_res['Resolved%']=(com_res['Closed']/(com_res['Closed'].sum()))*100
com_res
```

Out[191]:

New_Status	Closed	Open	Resolved%
Received Via			
Customer Care Call	864	255	50.615114
Internet	843	262	49.384886

In [6]:
```python
### Provide a table with the frequency of complaint types.
df['Customer Complaint'].str.lower().value_counts()
```

Out[6]:
```
comcast                                                              102
comcast data cap                                                      30
comcast internet                                                      29
comcast data caps                                                     21
comcast billing                                                       18
                                                                    ... 
monthly data caps                                                      1
comcast/xfinity poor service, fraudulent billing and collection       1
lost emails/billing                                                    1
improper billing and non resolution of issues                          1
comcast, ypsilanti mi internet speed                                   1
Name: Customer Complaint, Length: 1740, dtype: int64
```

In [7]:
```python
from wordcloud import WordCloud, STOPWORDS
common_complaints = df['Customer Complaint'].dropna().tolist()
common_complaints =''.join(common_complaints).lower()
```

In [8]:
```python
list_stops = ('Comcast','Now','Company','Day','Someone','Thing','Also','Got','Way','Call','Called','One','Said'

for word in list_stops:
    STOPWORDS.add(word)
wordcloud = WordCloud(stopwords=STOPWORDS,
                      background_color='white',
                      width=1200,
                      height=1000).generate(common_complaints)

plt.figure(figsize=(10,12) )
plt.imshow(wordcloud)
plt.title('Frequent words for customer complaints')
plt.axis('off')
plt.show()
# Maximum complaints are related to internet, followed by service and billing.
```

In [ ]:

In [ ]:

In [ ]:

In [ ]: