Comcast Telecom Complaints

January 11, 2022

1 Name: Sunil Pradhan

1.1 Project: 3

1.2 Project Name: Comcast Telecom Complaints

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

[2]:
```
#importing and reading the data set
ctc=pd.read_csv("Comcast_telecom_complaints_data.csv")
ctc
```

[2]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia
3	277946	Comcast Imposed a New Usage Cap of 300GB that …	05-07-15	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia
4	307175	Comcast not working and no service to boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia
…	…	…	…	…	…	…	…	…
2219	213550	Service Availability	04-02-15	04-Feb-15	9:13:18 AM	Customer Care Call	Youngstown	Florida
2220	318775	Comcast Monthly Billing for Returned Modem	06-02-15	06-Feb-15	1:24:39 PM	Customer Care Call	Ypsilanti	Michigan
2221	331188	complaint about comcast	06-09-15	06-Sep-15	5:28:41 PM	Internet	Ypsilanti	Michigan
2222	360489	Extremely unsatisfied Comcast customer	23-06-15					
2223	363614	Comcast, Ypsilanti MI Internet Speed	24-06-15					

```
2222       23-Jun-15  11:13:30 PM  Customer Care Call   Ypsilanti  Michigan
2223       24-Jun-15  10:28:33 PM  Customer Care Call   Ypsilanti  Michigan

      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
…          …     …                            …
2219     32466  Closed                          No
2220     48197  Solved                          No
2221     48197  Solved                          No
2222     48197  Solved                          No
2223     48198    Open                         Yes

[2224 rows x 11 columns]
```

[3]:
```
#dropping the duplicate values
ctc.drop_duplicates(inplace=True)
```

[4]:
```
ctc
```

[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
…       …                                                    …       …
2219   213550                             Service Availability  04-02-15
2220   318775         Comcast Monthly Billing for Returned Modem  06-02-15
2221   331188                           complaint about comcast  06-09-15
2222   360489             Extremely unsatisfied Comcast customer  23-06-15
2223   363614               Comcast, Ypsilanti MI Internet Speed  24-06-15

     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
…              …          …                    …         …       …
2219       04-Feb-15   9:13:18 AM  Customer Care Call  Youngstown   Florida
2220       06-Feb-15   1:24:39 PM  Customer Care Call   Ypsilanti  Michigan
2221       06-Sep-15   5:28:41 PM            Internet   Ypsilanti  Michigan
2222       23-Jun-15  11:13:30 PM  Customer Care Call   Ypsilanti  Michigan
```

```
2223       24-Jun-15  10:28:33 PM  Customer Care Call   Ypsilanti  Michigan

      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
…          …     …                            …
2219     32466  Closed                          No
2220     48197  Solved                          No
2221     48197  Solved                          No
2222     48197  Solved                          No
2223     48198    Open                         Yes

[2224 rows x 11 columns]
```

[5]:
```
#renaming column names to lower case and replacing empty with _
ctc.columns=list(map(lambda x: x.replace(' ',"_").lower(),ctc.columns))
```

[6]:
```
ctc
```

[6]:
```
     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
…        …                                                 …       …
2219   213550                          Service Availability  04-02-15
2220   318775      Comcast Monthly Billing for Returned Modem  06-02-15
2221   331188                        complaint about comcast  06-09-15
2222   360489          Extremely unsatisfied Comcast customer  23-06-15
2223   363614            Comcast, Ypsilanti MI Internet Speed  24-06-15

     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
…              …          …                    …          …       …
2219       04-Feb-15   9:13:18 AM  Customer Care Call  Youngstown   Florida
2220       06-Feb-15   1:24:39 PM  Customer Care Call   Ypsilanti  Michigan
2221       06-Sep-15   5:28:41 PM            Internet   Ypsilanti  Michigan
2222       23-Jun-15  11:13:30 PM  Customer Care Call   Ypsilanti  Michigan
2223       24-Jun-15  10:28:33 PM  Customer Care Call   Ypsilanti  Michigan
```

```
      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
…          …     …                            …
2219     32466  Closed                          No
2220     48197  Solved                          No
2221     48197  Solved                          No
2222     48197  Solved                          No
2223     48198    Open                         Yes

[2224 rows x 11 columns]
```

[7]:
```
#renaming ticket_# to a proper column name ticket_no
ctc.rename(columns={'ticket_#':'ticket_no'}, inplace=True)
```

[8]:
```
ctc
```

[8]:
```
     ticket_no                                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
…         …                                                 …       …
2219    213550                           Service Availability  04-02-15
2220    318775     Comcast Monthly Billing for Returned Modem  06-02-15
2221    331188                       complaint about comcast  06-09-15
2222    360489        Extremely unsatisfied Comcast customer  23-06-15
2223    363614          Comcast, Ypsilanti MI Internet Speed  24-06-15

     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
…              …          …                    …         …       …
2219       04-Feb-15   9:13:18 AM  Customer Care Call  Youngstown   Florida
2220       06-Feb-15   1:24:39 PM  Customer Care Call   Ypsilanti  Michigan
2221       06-Sep-15   5:28:41 PM            Internet   Ypsilanti  Michigan
2222       23-Jun-15  11:13:30 PM  Customer Care Call   Ypsilanti  Michigan
2223       24-Jun-15  10:28:33 PM  Customer Care Call   Ypsilanti  Michigan
```

```
      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
…          …     …                            …
2219     32466  Closed                          No
2220     48197  Solved                          No
2221     48197  Solved                          No
2222     48197  Solved                          No
2223     48198    Open                         Yes

[2224 rows x 11 columns]
```

[9]:
```
ctc.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2224 entries, 0 to 2223
Data columns (total 11 columns):
 #   Column                       Non-Null Count  Dtype
---  ------                       --------------  -----
 0   ticket_no                    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: 208.5+ KB
```

[10]:
```
#dropping the entry having invalid ticket no
ctc.drop(index=ctc[ctc.ticket_no=='comcas'].index, inplace=True)
```

[11]:
```
ctc
```

[11]:
```
     ticket_no                                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
```

```
…        …                                                  …       …
2219    213550                              Service Availability  04-02-15
2220    318775      Comcast Monthly Billing for Returned Modem  06-02-15
2221    331188                           complaint about comcast  06-09-15
2222    360489          Extremely unsatisfied Comcast customer  23-06-15
2223    363614            Comcast, Ypsilanti MI Internet Speed  24-06-15

     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
…              …          …                   …          …       …
2219       04-Feb-15   9:13:18 AM  Customer Care Call  Youngstown   Florida
2220       06-Feb-15   1:24:39 PM  Customer Care Call   Ypsilanti  Michigan
2221       06-Sep-15   5:28:41 PM            Internet   Ypsilanti  Michigan
2222       23-Jun-15  11:13:30 PM  Customer Care Call   Ypsilanti  Michigan
2223       24-Jun-15  10:28:33 PM  Customer Care Call   Ypsilanti  Michigan

      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
…          …     …                       …
2219     32466  Closed                          No
2220     48197  Solved                          No
2221     48197  Solved                          No
2222     48197  Solved                          No
2223     48198    Open                         Yes

[2223 rows x 11 columns]
```

[12]:
```
#converting column datatypes
ctc.ticket_no=ctc.ticket_no.astype(int)
ctc.zip_code=ctc.zip_code.astype(int)
ctc.customer_complaint=ctc.customer_complaint.astype(str)
```

[13]:
```
#creating a new column with 'full_date' and converting date column to datetime␣
 ↪format
ctc['full_date']=ctc['date_month_year'] + " " + ctc['time']
ctc['date_month_year'] = pd.to_datetime(ctc['date_month_year'])
ctc['full_date'] = pd.to_datetime(ctc['full_date'])
```

[14]:
```
ctc.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2223 entries, 0 to 2223
Data columns (total 12 columns):
 #   Column                       Non-Null Count  Dtype
---  ------                       --------------  -----
 0   ticket_no                    2223 non-null   int32
 1   customer_complaint           2223 non-null   object
 2   date                         2223 non-null   object
 3   date_month_year              2223 non-null   datetime64[ns]
 4   time                         2223 non-null   object
 5   received_via                 2223 non-null   object
 6   city                         2223 non-null   object
 7   state                        2223 non-null   object
 8   zip_code                     2223 non-null   int32
 9   status                       2223 non-null   object
 10  filing_on_behalf_of_someone  2223 non-null   object
 11  full_date                    2223 non-null   datetime64[ns]
dtypes: datetime64[ns](2), int32(2), object(8)
memory usage: 208.4+ KB
```

[15]:
```
ctc
```

[15]:

	ticket_no	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	
…	…	…	…	
2219	213550	Service Availability	04-02-15	
2220	318775	Comcast Monthly Billing for Returned Modem	06-02-15	
2221	331188	complaint about comcast	06-09-15	
2222	360489	Extremely unsatisfied Comcast customer	23-06-15	
2223	363614	Comcast, Ypsilanti MI Internet Speed	24-06-15	

	date_month_year	time	received_via	city	state	\
0	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	
1	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	
2	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	
3	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	
4	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	
…	…	…	…	…	…	
2219	2015-02-04	9:13:18 AM	Customer Care Call	Youngstown	Florida	
2220	2015-02-06	1:24:39 PM	Customer Care Call	Ypsilanti	Michigan	
2221	2015-09-06	5:28:41 PM	Internet	Ypsilanti	Michigan	
2222	2015-06-23	11:13:30 PM	Customer Care Call	Ypsilanti	Michigan	
2223	2015-06-24	10:28:33 PM	Customer Care Call	Ypsilanti	Michigan	

```
      zip_code  status filing_on_behalf_of_someone           full_date
0        21009  Closed                          No 2015-04-22 15:53:50
1        30102  Closed                          No 2015-08-04 10:22:56
2        30101  Closed                         Yes 2015-04-18 09:55:47
3        30101    Open                         Yes 2015-07-05 11:59:35
4        30101  Solved                          No 2015-05-26 13:25:26
…          …     …                      …                 …
2219     32466  Closed                          No 2015-02-04 09:13:18
2220     48197  Solved                          No 2015-02-06 13:24:39
2221     48197  Solved                          No 2015-09-06 17:28:41
2222     48197  Solved                          No 2015-06-23 23:13:30
2223     48198    Open                         Yes 2015-06-24 22:28:33

[2223 rows x 12 columns]
```

[16]:
```
#making 'full_date' column as index of the dataset
ctc1=ctc.set_index(ctc["full_date"])
ctc1
```

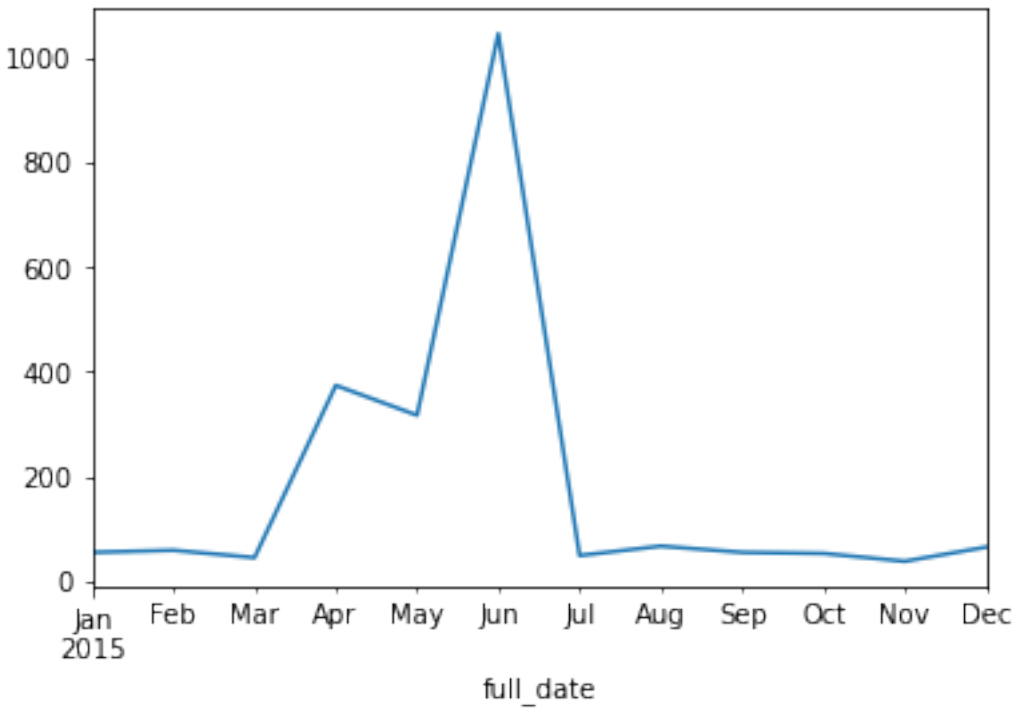
[16]:
```
                     ticket_no  \
full_date
2015-04-22 15:53:50     250635
2015-08-04 10:22:56     223441
2015-04-18 09:55:47     242732
2015-07-05 11:59:35     277946
2015-05-26 13:25:26     307175
…                         …
2015-02-04 09:13:18     213550
2015-02-06 13:24:39     318775
2015-09-06 17:28:41     331188
2015-06-23 23:13:30     360489
2015-06-24 22:28:33     363614

                                                    customer_complaint  \
full_date
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
…                                                                    …
2015-02-04 09:13:18                                Service Availability
2015-02-06 13:24:39         Comcast Monthly Billing for Returned Modem
2015-09-06 17:28:41                             complaint about comcast
2015-06-23 23:13:30             Extremely unsatisfied Comcast customer
2015-06-24 22:28:33               Comcast, Ypsilanti MI Internet Speed
```

```
                        date date_month_year         time  \
full_date
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
…                       …             …          …
2015-02-04 09:13:18  04-02-15      2015-02-04   9:13:18 AM
2015-02-06 13:24:39  06-02-15      2015-02-06   1:24:39 PM
2015-09-06 17:28:41  06-09-15      2015-09-06   5:28:41 PM
2015-06-23 23:13:30  23-06-15      2015-06-23  11:13:30 PM
2015-06-24 22:28:33  24-06-15      2015-06-24  10:28:33 PM

                           received_via        city     state  zip_code  \
full_date
2015-04-22 15:53:50  Customer Care Call    Abingdon  Maryland     21009
2015-08-04 10:22:56            Internet     Acworth   Georgia     30102
2015-04-18 09:55:47            Internet     Acworth   Georgia     30101
2015-07-05 11:59:35            Internet     Acworth   Georgia     30101
2015-05-26 13:25:26            Internet     Acworth   Georgia     30101
…                                   …         …       …        …
2015-02-04 09:13:18  Customer Care Call  Youngstown   Florida     32466
2015-02-06 13:24:39  Customer Care Call   Ypsilanti  Michigan     48197
2015-09-06 17:28:41            Internet   Ypsilanti  Michigan     48197
2015-06-23 23:13:30  Customer Care Call   Ypsilanti  Michigan     48197
2015-06-24 22:28:33  Customer Care Call   Ypsilanti  Michigan     48198

                     status filing_on_behalf_of_someone           full_date
full_date
2015-04-22 15:53:50  Closed                          No 2015-04-22 15:53:50
2015-08-04 10:22:56  Closed                          No 2015-08-04 10:22:56
2015-04-18 09:55:47  Closed                         Yes 2015-04-18 09:55:47
2015-07-05 11:59:35    Open                         Yes 2015-07-05 11:59:35
2015-05-26 13:25:26  Solved                          No 2015-05-26 13:25:26
…                     …                           …                 …
2015-02-04 09:13:18  Closed                          No 2015-02-04 09:13:18
2015-02-06 13:24:39  Solved                          No 2015-02-06 13:24:39
2015-09-06 17:28:41  Solved                          No 2015-09-06 17:28:41
2015-06-23 23:13:30  Solved                          No 2015-06-23 23:13:30
2015-06-24 22:28:33    Open                         Yes 2015-06-24 22:28:33

[2223 rows x 12 columns]
```

[17]:
```
#creating monthwise trend chart
chart_monthly=ctc1.groupby(pd.Grouper(freq="M"))
```

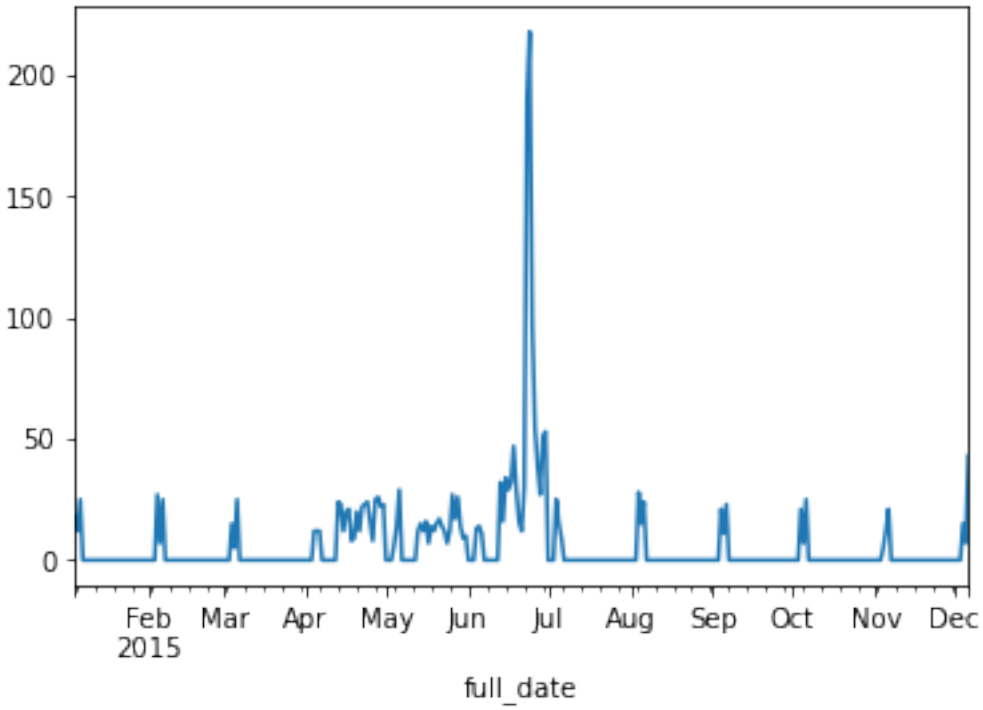
```
chart_monthly.size().plot()
```

[17]: <AxesSubplot:xlabel='full_date'>



[18]:
```
#creating daywise trend chart
chart_daily=ctc1.groupby(pd.Grouper(freq="D"))
chart_daily.size().plot()
```

[18]: <AxesSubplot:xlabel='full_date'>



[19]:
```
#creating a new categorical value new_status with value open and close
ctc1['new_status']=['Open' if status=='Open' or status=='Pending' else 'Closed'␣
 ↪for status in ctc1['status']]
ctc1
```

[19]:

full_date	ticket_no	customer_complaint
2015-04-22 15:53:50	250635	Comcast Cable Internet Speeds
2015-08-04 10:22:56	223441	Payment disappear - service got disconnected
2015-04-18 09:55:47	242732	Speed and Service
2015-07-05 11:59:35	277946	
2015-05-26 13:25:26	307175	
…	…	
2015-02-04 09:13:18	213550	
2015-02-06 13:24:39	318775	
2015-09-06 17:28:41	331188	
2015-06-23 23:13:30	360489	
2015-06-24 22:28:33	363614	

```
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
…                                                                   …
2015-02-04 09:13:18                                Service Availability
2015-02-06 13:24:39         Comcast Monthly Billing for Returned Modem
2015-09-06 17:28:41                              complaint about comcast
2015-06-23 23:13:30             Extremely unsatisfied Comcast customer
2015-06-24 22:28:33               Comcast, Ypsilanti MI Internet Speed

                        date date_month_year         time  \
full_date
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
…                       …             …           …
2015-02-04 09:13:18  04-02-15      2015-02-04   9:13:18 AM
2015-02-06 13:24:39  06-02-15      2015-02-06   1:24:39 PM
2015-09-06 17:28:41  06-09-15      2015-09-06   5:28:41 PM
2015-06-23 23:13:30  23-06-15      2015-06-23  11:13:30 PM
2015-06-24 22:28:33  24-06-15      2015-06-24  10:28:33 PM

                           received_via        city     state  zip_code  \
full_date
2015-04-22 15:53:50  Customer Care Call    Abingdon  Maryland     21009
2015-08-04 10:22:56            Internet     Acworth   Georgia     30102
2015-04-18 09:55:47            Internet     Acworth   Georgia     30101
2015-07-05 11:59:35            Internet     Acworth   Georgia     30101
2015-05-26 13:25:26            Internet     Acworth   Georgia     30101
…                                   …           …       …        …
2015-02-04 09:13:18  Customer Care Call  Youngstown   Florida     32466
2015-02-06 13:24:39  Customer Care Call   Ypsilanti  Michigan     48197
2015-09-06 17:28:41            Internet   Ypsilanti  Michigan     48197
2015-06-23 23:13:30  Customer Care Call   Ypsilanti  Michigan     48197
2015-06-24 22:28:33  Customer Care Call   Ypsilanti  Michigan     48198

                     status filing_on_behalf_of_someone           full_date  \
full_date
2015-04-22 15:53:50  Closed                          No 2015-04-22 15:53:50
2015-08-04 10:22:56  Closed                          No 2015-08-04 10:22:56
2015-04-18 09:55:47  Closed                         Yes 2015-04-18 09:55:47
2015-07-05 11:59:35    Open                         Yes 2015-07-05 11:59:35
2015-05-26 13:25:26  Solved                          No 2015-05-26 13:25:26
…                     …                         …                 …
2015-02-04 09:13:18  Closed                          No 2015-02-04 09:13:18
2015-02-06 13:24:39  Solved                          No 2015-02-06 13:24:39
```

```
2015-09-06 17:28:41  Solved                          No 2015-09-06 17:28:41
2015-06-23 23:13:30  Solved                          No 2015-06-23 23:13:30
2015-06-24 22:28:33    Open                         Yes 2015-06-24 22:28:33

                     new_status
full_date
2015-04-22 15:53:50     Closed
2015-08-04 10:22:56     Closed
2015-04-18 09:55:47     Closed
2015-07-05 11:59:35       Open
2015-05-26 13:25:26     Closed
…                          …
2015-02-04 09:13:18     Closed
2015-02-06 13:24:39     Closed
2015-09-06 17:28:41     Closed
2015-06-23 23:13:30     Closed
2015-06-24 22:28:33       Open

[2223 rows x 13 columns]
```

[20]:
```
#distribution of statewise complaint
state_complaint=ctc1.groupby(['state']).size().sort_values(ascending=False)
state_complaint=state_complaint.reset_index()
state_complaint=state_complaint.rename({0:'count'}, axis=1)
state_complaint
```

[20]:

	state	count
0	Georgia	288
1	Florida	240
2	California	220
3	Illinois	164
4	Tennessee	142
5	Pennsylvania	130
6	Michigan	115
7	Washington	98
8	Colorado	80
9	Maryland	78
10	New Jersey	75
11	Texas	71
12	Massachusetts	61
13	Virginia	60
14	Indiana	59
15	Oregon	49
16	Mississippi	39
17	Minnesota	33
18	Alabama	26
19	Utah	22

```
20                Arizona     20
21         South Carolina     18
22   District Of Columbia     16
23             New Mexico     15
24              Louisiana     13
25          New Hampshire     12
26            Connecticut     12
27               Delaware     12
28          West Virginia     11
29               Kentucky      7
30               New York      6
31               Arkansas      6
32                  Maine      5
33               Missouri      4
34         North Carolina      3
35                Vermont      3
36                   Ohio      3
37                 Kansas      2
38   District of Columbia      1
39           Rhode Island      1
40                Montana      1
41                   Iowa      1
42                 Nevada      1
```

[21]:
```
#state with maximum complaints
print(state_complaint.max()['state'], "has maximum complains with count: ",␣
↪state_complaint.max()['count'])
```

```
West Virginia has maximum complains with count:  288
```

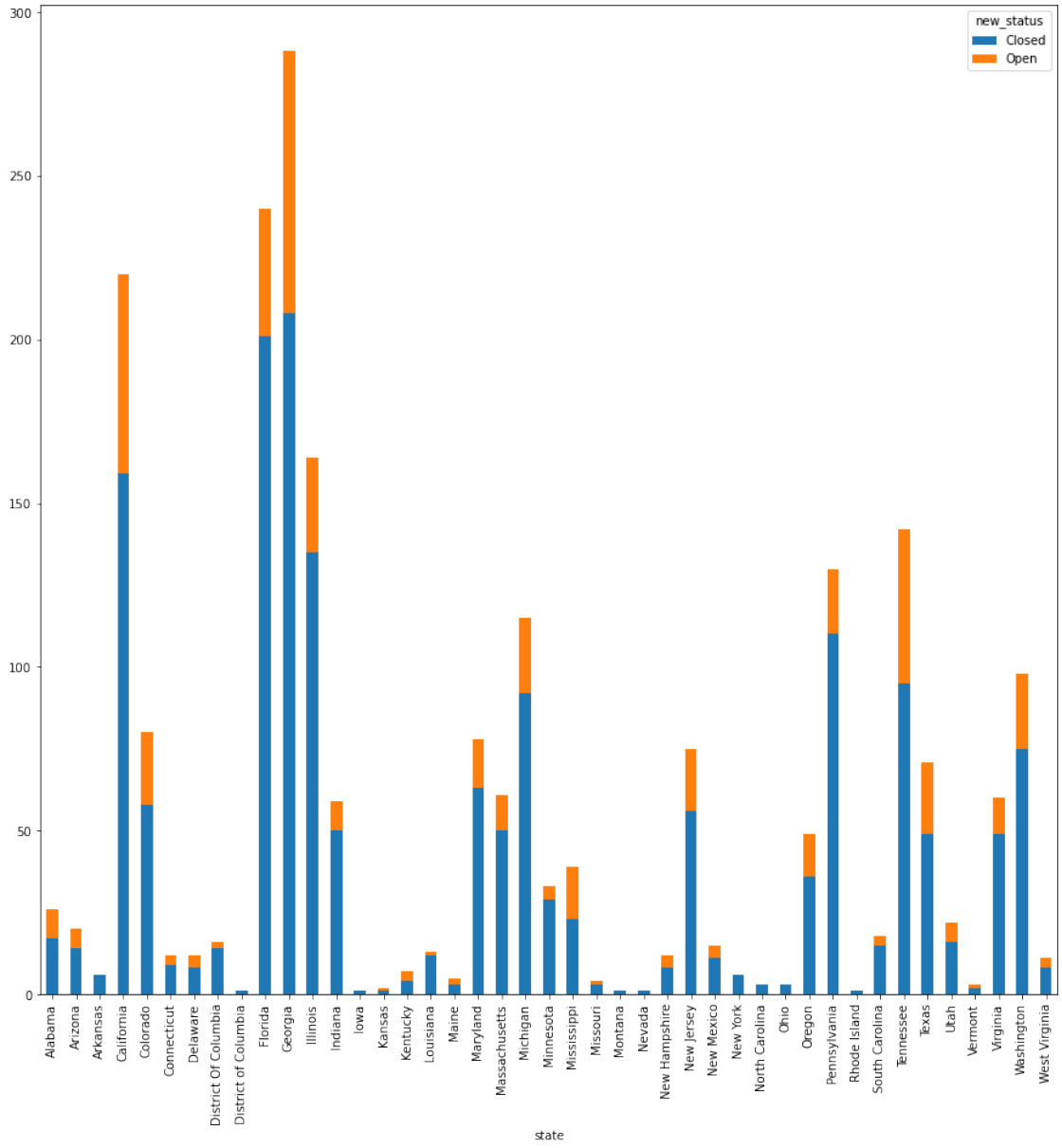
[22]:
```
#distribution of statewise complain based on the new status
state_complaint_new=ctc1.groupby(['state', 'new_status']).size().unstack().
↪fillna(0)
state_complaint_new
```

[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               95.0  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]:
```
#visualizing the statewise complaints
state_complaint_new.plot(kind='bar', stacked=True, figsize=(15,15))
```

[23]:
```
<AxesSubplot:xlabel='state'>
```



[24]:
```
#statewise all complaint percentage
state_complaint['cummulative_sum']=state_complaint['count'].cumsum()
state_complaint['percentage']=(100*state_complaint['count']/
 ↪state_complaint['cummulative_sum'].max()).round(2)
state_complaint
```

[24]:

	state	count	cummulative_sum	percentage
0	Georgia	288	288	12.96
1	Florida	240	528	10.80
2	California	220	748	9.90

3	Illinois	164	912	7.38
4	Tennessee	142	1054	6.39
5	Pennsylvania	130	1184	5.85
6	Michigan	115	1299	5.17
7	Washington	98	1397	4.41
8	Colorado	80	1477	3.60
9	Maryland	78	1555	3.51
10	New Jersey	75	1630	3.37
11	Texas	71	1701	3.19
12	Massachusetts	61	1762	2.74
13	Virginia	60	1822	2.70
14	Indiana	59	1881	2.65
15	Oregon	49	1930	2.20
16	Mississippi	39	1969	1.75
17	Minnesota	33	2002	1.48
18	Alabama	26	2028	1.17
19	Utah	22	2050	0.99
20	Arizona	20	2070	0.90
21	South Carolina	18	2088	0.81
22	District Of Columbia	16	2104	0.72
23	New Mexico	15	2119	0.67
24	Louisiana	13	2132	0.58
25	New Hampshire	12	2144	0.54
26	Connecticut	12	2156	0.54
27	Delaware	12	2168	0.54
28	West Virginia	11	2179	0.49
29	Kentucky	7	2186	0.31
30	New York	6	2192	0.27
31	Arkansas	6	2198	0.27
32	Maine	5	2203	0.22
33	Missouri	4	2207	0.18
34	North Carolina	3	2210	0.13
35	Vermont	3	2213	0.13
36	Ohio	3	2216	0.13
37	Kansas	2	2218	0.09
38	District of Columbia	1	2219	0.04
39	Rhode Island	1	2220	0.04
40	Montana	1	2221	0.04
41	Iowa	1	2222	0.04
42	Nevada	1	2223	0.04

[25]:
```
#statewise open complaint percentage
total_open_complaint=state_complaint_new['Open'].sum()
total_open_complaint
```

[25]: 517.0

[26]:
```
print("Total Open Complaints: ", total_open_complaint)
```

```
Total Open Complaints:  517.0
```

[27]:
```
state_complaint_new['percentage_open_complaint']=(100*state_complaint_new['Open']/
↪total_open_complaint).round(2)
state_complaint_new
```

[27]:

new_status	Closed	Open	percentage_open_complaint
state			
Alabama	17.0	9.0	1.74
Arizona	14.0	6.0	1.16
Arkansas	6.0	0.0	0.00
California	159.0	61.0	11.80
Colorado	58.0	22.0	4.26
Connecticut	9.0	3.0	0.58
Delaware	8.0	4.0	0.77
District Of Columbia	14.0	2.0	0.39
District of Columbia	1.0	0.0	0.00
Florida	201.0	39.0	7.54
Georgia	208.0	80.0	15.47
Illinois	135.0	29.0	5.61
Indiana	50.0	9.0	1.74
Iowa	1.0	0.0	0.00
Kansas	1.0	1.0	0.19
Kentucky	4.0	3.0	0.58
Louisiana	12.0	1.0	0.19
Maine	3.0	2.0	0.39
Maryland	63.0	15.0	2.90
Massachusetts	50.0	11.0	2.13
Michigan	92.0	23.0	4.45
Minnesota	29.0	4.0	0.77
Mississippi	23.0	16.0	3.09
Missouri	3.0	1.0	0.19
Montana	1.0	0.0	0.00
Nevada	1.0	0.0	0.00
New Hampshire	8.0	4.0	0.77
New Jersey	56.0	19.0	3.68
New Mexico	11.0	4.0	0.77
New York	6.0	0.0	0.00
North Carolina	3.0	0.0	0.00
Ohio	3.0	0.0	0.00
Oregon	36.0	13.0	2.51
Pennsylvania	110.0	20.0	3.87
Rhode Island	1.0	0.0	0.00
South Carolina	15.0	3.0	0.58
Tennessee	95.0	47.0	9.09

```
Texas                  49.0  22.0                    4.26
Utah                   16.0   6.0                    1.16
Vermont                 2.0   1.0                    0.19
Virginia               49.0  11.0                    2.13
Washington             75.0  23.0                    4.45
West Virginia           8.0   3.0                    0.58
```

[28]:
```
#top 3 states with open complaint percentage
state_complaint_new.sort_values(by='percentage_open_complaint',␣
↪ascending=False, inplace=True)
state_complaint_new.head(3)
```

[28]:
```
new_status  Closed  Open  percentage_open_complaint
state
Georgia      208.0  80.0                      15.47
California   159.0  61.0                      11.80
Tennessee     95.0  47.0                       9.09
```

[29]:
```
print(state_complaint_new.iloc[0].name, "has the maximum open complain of",␣
↪state_complaint_new.iloc[0]['Open'])
```

```
Georgia has the maximum open complain of 80.0
```

[30]:
```
#percentage of complain resolved till date which are recieved through internet␣
↪and customer care calls
call_internet=ctc1.groupby(['received_via','new_status']).size().unstack().
↪fillna(0)
total_closed= call_internet['Closed'].sum()
call_internet['percentage_closed']=(100*call_internet['Closed']/total_closed).
↪round(2)
call_internet
```

[30]:
```
new_status          Closed  Open  percentage_closed
received_via
Customer Care Call     863   255              50.59
Internet               843   262              49.41
```

[31]:
```
print("Complaint recieved by ", call_internet.iloc[0].name, "has maximum␣
↪complaint closed percentage of ", call_internet.iloc[0]['percentage_closed'])
```

```
Complaint recieved by  Customer Care Call has maximum complaint closed
percentage of  50.59
```

[32]:
```
#making a table with frequency of complaint type
#adding a new categorical value 'complaint_type'
ctc1.customer_complaint=ctc1.customer_complaint.str.lower()
wordcounts=ctc1.customer_complaint.str.split(expand=True).stack().value_counts()
```

```
wordcounts
```

[32]:
```
comcast          1160
internet          508
service           411
and               277
billing           273
                  …
interruption        1
edge                1
continue            1
paper               1
speed/              1
Length: 1806, dtype: int64
```

[33]:
```
import nltk
!pip install wordcloud
```

```
Requirement already satisfied: wordcloud in c:\users\sssun\anaconda3\lib\site-
packages (1.8.1)
Requirement already satisfied: pillow in c:\users\sssun\anaconda3\lib\site-
packages (from wordcloud) (8.0.1)
Requirement already satisfied: matplotlib in c:\users\sssun\anaconda3\lib\site-
packages (from wordcloud) (3.3.2)
Requirement already satisfied: numpy>=1.6.1 in
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Requirement already satisfied: python-dateutil>=2.1 in
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Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.3 in
c:\users\sssun\anaconda3\lib\site-packages (from matplotlib->wordcloud) (2.4.7)
Requirement already satisfied: cycler>=0.10 in
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Requirement already satisfied: kiwisolver>=1.0.1 in
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Requirement already satisfied: certifi>=2020.06.20 in
c:\users\sssun\anaconda3\lib\site-packages (from matplotlib->wordcloud)
(2020.6.20)
Requirement already satisfied: six>=1.5 in c:\users\sssun\anaconda3\lib\site-
packages (from python-dateutil>=2.1->matplotlib->wordcloud) (1.15.0)
```
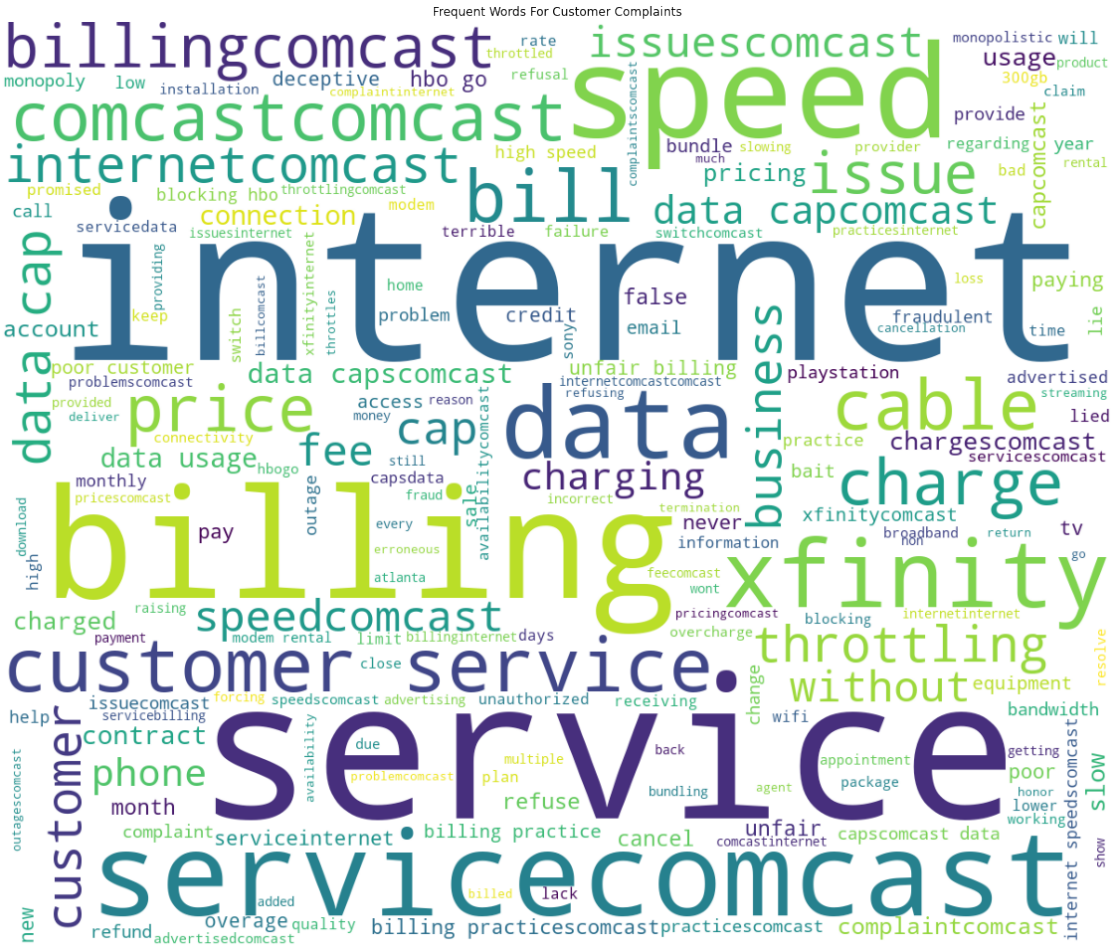

[34]:
```
from wordcloud import WordCloud, STOPWORDS
common_complaints=ctc1['customer_complaint'].dropna().tolist()
common_complaints=''.join(common_complaints)
list_stop=('comcast', 'now','company', 'day', 'someone', 'thing', 'also',␣
 ↪'got', 'way', 'called', 'one', 'said', 'tell')
for word in list_stop:
    STOPWORDS.add(word)
```

[35]:
```
wordcloud=WordCloud(stopwords=STOPWORDS,
                    background_color='white',
                    width=1200,
                    height=1000).generate(common_complaints)
plt.figure(figsize=(20,20))
plt.imshow(wordcloud)
plt.title("Frequent Words For Customer Complaints")
plt.axis('off')
plt.show()
```



[36]:
```
nltk.download('wordnet')
nltk.download('stopwords')
```

```
[nltk_data] Downloading package wordnet to
[nltk_data]     C:\Users\sssun\AppData\Roaming\nltk_data…
[nltk_data]   Package wordnet is already up-to-date!
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\sssun\AppData\Roaming\nltk_data…
```

```
[nltk_data]   Package stopwords is already up-to-date!
```

[36]:
```
True
```

[37]:
```
from nltk.corpus import stopwords
from nltk.stem.wordnet import WordNetLemmatizer
import string

stop=set(stopwords.words('english'))
exclude=set(string.punctuation)
lemma=WordNetLemmatizer()
```

[38]:
```
def clean(doc):
    stop_free=" ".join([i for i in doc.lower().split() if i not in stop])
    punc_free="".join(ch for ch in stop_free if ch not in exclude)
    normalized=" ".join(lemma.lemmatize(word) for word in punc_free.split())
    return normalized
```

[39]:
```
doc_complete=ctc1['customer_complaint'].tolist()
doc_clean=[clean(doc).split() for doc in doc_complete]
```

[40]:
```
!pip install gensim
```

```
Requirement already satisfied: gensim in c:\users\sssun\anaconda3\lib\site-
packages (4.1.2)
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Requirement already satisfied: smart-open>=1.8.1 in
c:\users\sssun\anaconda3\lib\site-packages (from gensim) (5.2.1)
```

[41]:
```
import gensim
from gensim import corpora
```

[42]:
```
dictionary=corpora.Dictionary(doc_clean)
dictionary
```

[42]:
```
<gensim.corpora.dictionary.Dictionary at 0x1aa3cd3c070>
```

[43]:
```
doc_term_matrix=[dictionary.doc2bow(doc) for doc in doc_clean]
```

[44]:
```
doc_term_matrix
```

```
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 …]
```

[45]:
```
from gensim.models import LdaModel
```

[46]:
```
num_topic=9
```

```
ldamodel=LdaModel(doc_term_matrix, num_topics=num_topic, id2word=dictionary,␣
↪passes=10)
```

[47]:
```
topics=ldamodel.show_topics()
for topic in topics:
    print(topic)
    print()
    print()
```

```
(0, '0.213*"comcast" + 0.165*"billing" + 0.065*"issue" + 0.061*"practice" +
0.048*"unfair" + 0.038*"pricing" + 0.026*"charge" + 0.017*"fraudulent" +
0.017*"monopolistic" + 0.009*"phone"')


(1, '0.188*"internet" + 0.142*"comcast" + 0.040*"throttling" + 0.028*"issue" +
0.026*"connection" + 0.026*"pay" + 0.023*"outage" + 0.016*"unreliable" +
0.015*"connectivity" + 0.015*"several"')


(2, '0.149*"comcast" + 0.119*"complaint" + 0.052*"billing" + 0.043*"service" +
0.032*"problem" + 0.031*"comcastxfinity" + 0.021*"monthly" + 0.018*"modem" +
0.016*"increased" + 0.011*"bandwidth"')


(3, '0.037*"switch" + 0.035*"lack" + 0.034*"limit" + 0.031*"charging" +
0.024*"bait" + 0.024*"false" + 0.023*"option" + 0.022*"price" + 0.020*"comcast"
+ 0.020*"year"')


(4, '0.257*"service" + 0.109*"comcast" + 0.067*"internet" + 0.045*"customer" +
0.028*"poor" + 0.018*"charge" + 0.013*"contract" + 0.013*"cramming" +
0.011*"advertising" + 0.011*"account"')


(5, '0.182*"data" + 0.152*"cap" + 0.148*"comcast" + 0.042*"internet" +
0.035*"usage" + 0.016*"overage" + 0.013*"xfinity" + 0.013*"charge" +
0.011*"email" + 0.010*"shitty"')


(6, '0.066*"internet" + 0.062*"comcast" + 0.058*"slow" + 0.044*"cable" +
0.041*"bill" + 0.033*"fee" + 0.025*"without" + 0.024*"day" + 0.024*"charged" +
0.020*"back"')


(7, '0.100*"speed" + 0.099*"comcast" + 0.078*"internet" + 0.034*"service" +
0.034*"xfinity" + 0.022*"price" + 0.016*"bill" + 0.013*"sale" + 0.013*"promised"
+ 0.012*"high"')
```

```
(8, '0.073*"comcast" + 0.052*"service" + 0.034*"help" + 0.022*"bill" + 0.021*"2"
+ 0.019*"please" + 0.015*"claim" + 0.014*"hbo" + 0.014*"provided" +
0.014*"scam"')
```

[48]:
```
word_dict={}
for i in range(num_topic):
    words=ldamodel.show_topic(i,topn=20)
    word_dict['Topic'+"{}".format(i)]=[i[0] for i in words]
```

[49]:
```
pd.DataFrame(word_dict)
```

[49]:

	Topic0	Topic1	Topic2	Topic3	Topic4
0	comcast	internet	comcast	switch	service
1	billing	comcast	complaint	lack	comcast
2	issue	throttling	billing	limit	internet
3	practice	issue	service	charging	customer
4	unfair	connection	problem	bait	poor
5	pricing	pay	comcastxfinity	false	charge
6	charge	outage	monthly	option	contract
7	fraudulent	unreliable	modem	price	cramming
8	monopolistic	connectivity	increased	comcast	advertising
9	phone	several	bandwidth	year	account
10	deceptive	monopoly	bill	fee	month
11	one	availability	regarding	billed	bad
12	ps4	loss	charge	3	horrible
13	hbogo	home	rate	isp	unauthorized
14	improper	provider	incorrect	payment	quality
15	device	paying	competition	data	access
16	streaming	mbps	communication	refund	without
17	trade	system	refund	consumer	overcharge
18	xfinitycomcast	installation	transfer	much	refusal
19	higher	time	returned	consistently	throttle

	Topic5	Topic6	Topic7	Topic8
0	data	internet	speed	comcast
1	cap	comcast	comcast	service
2	comcast	slow	internet	help
3	internet	cable	service	bill
4	usage	bill	xfinity	2
5	overage	fee	price	please
6	xfinity	without	bill	claim
7	charge	day	sale	hbo
8	email	charged	promised	provided

9	shitty	back	high	scam
10	plan	equipment	business	go
11	300gb	intermittent	failure	customer
12	home	service	show	disconnection
13	throttling	signal	terrible	term
14	download	asking	credit	u
15	misrepresentation	throttled	appointment	blocking
16	trial	charge	contract	misleading
17	broadband	notice	said	billed
18	offer	call	false	sold
19	access	week	mb	att

[ ]: