

# Comcast project

January 12, 2022

## 1 NAME –PAPU SWAIN

### DOMAIN-TELECOMMUNICATION

#### PROJECT-Comcast Telecom Consumer Complaints

OBJECTIVE OF THE PROJECT- 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. Therefore, I have to analyse what is wrong with Comcast's customer service and solve the problem accordingly.

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

Import data into python

```
[2]: dt=pd.read_csv("Comcast_telecom_complaints_data.csv")
```

```
[3]: dt.head()
```

```
[3]: 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

Checking null values

```
[4]: dt.isna().sum()
```

```
[4]: 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
```

```
[5]: dt.describe(include="all")
```

```
[5]:
```

	Ticket #	Customer Complaint	Date	Date_month_year	Time	\
count	2224	2224	2224	2224	2224	
unique	2224	1841	91	91	2190	
top	250635	Comcast	24-06-15	24-Jun-15	12:41:14 PM	
freq	1	83	218	218	2	
mean	NaN	NaN	NaN	NaN	NaN	
std	NaN	NaN	NaN	NaN	NaN	
min	NaN	NaN	NaN	NaN	NaN	
25%	NaN	NaN	NaN	NaN	NaN	
50%	NaN	NaN	NaN	NaN	NaN	
75%	NaN	NaN	NaN	NaN	NaN	
max	NaN	NaN	NaN	NaN	NaN	

	Received Via	City	State	Zip code	Status	\
count	2224	2224	2224	2224.000000	2224	
unique	2	928	43	NaN	4	
top	Customer Care Call	Atlanta	Georgia	NaN	Solved	
freq	1119	63	288	NaN	973	
mean	NaN	NaN	NaN	47994.393435	NaN	
std	NaN	NaN	NaN	28885.279427	NaN	
min	NaN	NaN	NaN	1075.000000	NaN	
25%	NaN	NaN	NaN	30056.500000	NaN	

50%	NaN	NaN	NaN	37211.000000	NaN
75%	NaN	NaN	NaN	77058.750000	NaN
max	NaN	NaN	NaN	99223.000000	NaN

```

    Filing on Behalf of Someone
count                2224
unique                 2
top                   No
freq                 2021
mean                 NaN
std                  NaN
min                  NaN
25%                  NaN
50%                  NaN
75%                  NaN
max                  NaN

```

```
[6]: dt.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

```

```
[7]: dt["Date_Time"] = dt["Date_month_year"] + " " + dt["Time"]
```

```
[8]: dt["Date_Time"] = pd.to_datetime(dt["Date_Time"])
     dt["Date_month_year"] = pd.to_datetime(dt["Date_month_year"])
```

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

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2224 entries, 0 to 2223

```

Data columns (total 12 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	datetime64[ns]
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
11	Date_Time	2224 non-null	datetime64[ns]

dtypes: datetime64[ns](2), int64(1), object(9)

memory usage: 208.6+ KB

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

```
[10]: 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    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

Zip code  Status  Filing on Behalf of Someone      Date_Time
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
```

Set Date\_Time as index column

```
[11]: dt=dt.set_index(dt["Date_Time"])
```

```
[12]: dt.head()
```

[12]: Ticket # \

Date_Time	
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_Time	
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_Time				
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_Time						
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_Time
Date_Time		
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

From Date\_month\_year column, Create Month,Day,Year and Day of week columns

```
[13]: dt["Month"]=dt["Date_month_year"].apply(lambda x:x.month)
```

```
[14]: dt.head()
```

[14]: Ticket # \

Date_Time	
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_Time	
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_Time				
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_Time						
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_Time	Month
Date_Time			
2015-04-22 15:53:50	No	2015-04-22 15:53:50	4
2015-08-04 10:22:56	No	2015-08-04 10:22:56	8
2015-04-18 09:55:47	Yes	2015-04-18 09:55:47	4
2015-07-05 11:59:35	Yes	2015-07-05 11:59:35	7
2015-05-26 13:25:26	No	2015-05-26 13:25:26	5

```
[15]: dt["Day"]=dt["Date_month_year"].apply(lambda x:x.day)
```

```
[16]: dt.head()
```

[16]: Ticket # \

Date_Time	
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_Time	
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_Time	Date	Date_month_year	Time	\
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	

Date_Time	Received Via	City	State	Zip code	Status	\
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	

Date_Time	Filing on Behalf of Someone	Date_Time	Month	\
2015-04-22 15:53:50	No	2015-04-22 15:53:50	4	
2015-08-04 10:22:56	No	2015-08-04 10:22:56	8	
2015-04-18 09:55:47	Yes	2015-04-18 09:55:47	4	
2015-07-05 11:59:35	Yes	2015-07-05 11:59:35	7	
2015-05-26 13:25:26	No	2015-05-26 13:25:26	5	

Date_Time	Day
2015-04-22 15:53:50	22
2015-08-04 10:22:56	4
2015-04-18 09:55:47	18
2015-07-05 11:59:35	5
2015-05-26 13:25:26	26

```
[17]: dt["Year"]=dt["Date_month_year"].apply(lambda x:x.year)
```

```
[18]: dt.head()
```

```
[18]: Ticket # \
```

```
Date_Time
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_Time
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_Time
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_Time
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_Time Month \
```

```
Date_Time
2015-04-22 15:53:50 No 2015-04-22 15:53:50 4
2015-08-04 10:22:56 No 2015-08-04 10:22:56 8
2015-04-18 09:55:47 Yes 2015-04-18 09:55:47 4
2015-07-05 11:59:35 Yes 2015-07-05 11:59:35 7
2015-05-26 13:25:26 No 2015-05-26 13:25:26 5
```

```
Day Year
```

```
Date_Time
2015-04-22 15:53:50 22 2015
2015-08-04 10:22:56 4 2015
2015-04-18 09:55:47 18 2015
```



```
2015-07-05 11:59:35    5  2015
2015-05-26 13:25:26   26  2015
```

```
[19]: dt["Day of Week"] = dt["Date_month_year"].apply(lambda x:x.dayofweek)
```

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

```
[20]:
Ticket # \
Date_Time
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_Time
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_Time
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_Time
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_Time    Month \
Date_Time
2015-04-22 15:53:50    No    2015-04-22 15:53:50    4
2015-08-04 10:22:56    No    2015-08-04 10:22:56    8
2015-04-18 09:55:47    Yes    2015-04-18 09:55:47    4
2015-07-05 11:59:35    Yes    2015-07-05 11:59:35    7
2015-05-26 13:25:26    No    2015-05-26 13:25:26    5
```

Date_Time	Day	Year	Day of Week
2015-04-22 15:53:50	22	2015	2
2015-08-04 10:22:56	4	2015	1
2015-04-18 09:55:47	18	2015	5
2015-07-05 11:59:35	5	2015	6
2015-05-26 13:25:26	26	2015	1

```
[21]: dt["Day of Week"].value_counts()
```

```
[21]: 1    464
      2    441
      3    331
      4    290
      0    256
      6    228
      5    214
      Name: Day of Week, dtype: int64
```

Give names of Day of Week instead of numbers

```
[22]: dict={0:"Mon",1:"Tue",2:"Wed",3:"Thur",4:"Fri",5:"Sat",6:"Sun"}
```

```
[23]: dt["Day of Week"]=dt["Day of Week"].map(dict)
```

```
[24]: dt.head()
```

```
[24]:          Ticket # \
Date_Time
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
```

Date_Time	Customer Complaint \
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_Time	Date	Date_month_year	Time \
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

Date_Time	Received Via	City	State	Zip code	Status	\
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	

Date_Time	Filing on Behalf of Someone	Date_Time	Month	\
2015-04-22 15:53:50	No	2015-04-22 15:53:50	4	
2015-08-04 10:22:56	No	2015-08-04 10:22:56	8	
2015-04-18 09:55:47	Yes	2015-04-18 09:55:47	4	
2015-07-05 11:59:35	Yes	2015-07-05 11:59:35	7	
2015-05-26 13:25:26	No	2015-05-26 13:25:26	5	

Date_Time	Day	Year	Day of Week
2015-04-22 15:53:50	22	2015	Wed
2015-08-04 10:22:56	4	2015	Tue
2015-04-18 09:55:47	18	2015	Sat
2015-07-05 11:59:35	5	2015	Sun
2015-05-26 13:25:26	26	2015	Tue

Give names of Months instead of numbers

```
[25]: dict1={1:"Jan",2:"Feb",3:"Mar",4:"Apr",5:"May",6:"Jun",7:"Jul",8:"Aug",9:
      ↪ "Sep",10:"Oct",11:"Nov",12:"Dec"}
```

```
[26]: dt["Month Name"]=dt["Month"]
```

```
[27]: dt["Month Name"]=dt["Month Name"].map(dict1)
```

```
[28]: dt.head()
```

```
[28]: Ticket # \
Date_Time
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
```

Date_Time	Customer Complaint \
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_Time	Date	Date_month_year	Time \
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

Date_Time	Received Via	City	State	Zip code	Status \
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

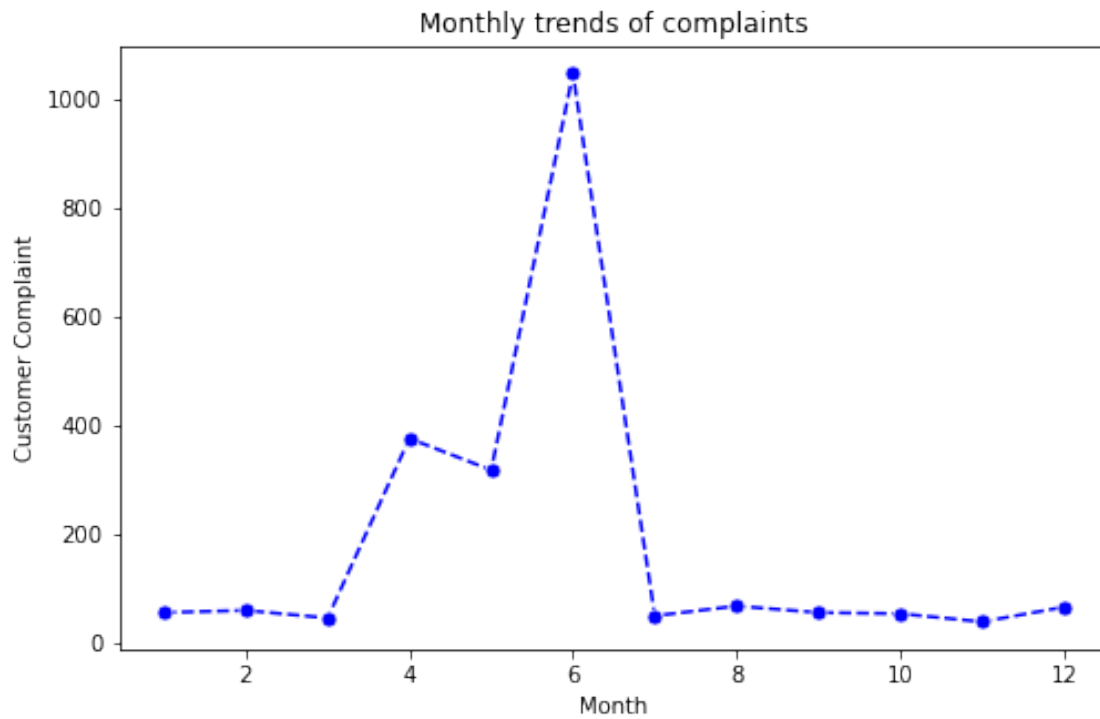
Date_Time	Filing on Behalf of Someone	Date_Time	Month \
2015-04-22 15:53:50	No	2015-04-22 15:53:50	4
2015-08-04 10:22:56	No	2015-08-04 10:22:56	8
2015-04-18 09:55:47	Yes	2015-04-18 09:55:47	4
2015-07-05 11:59:35	Yes	2015-07-05 11:59:35	7
2015-05-26 13:25:26	No	2015-05-26 13:25:26	5

Date_Time	Day	Year	Day of Week	Month	Name
2015-04-22 15:53:50	22	2015	Wed	Apr	
2015-08-04 10:22:56	4	2015	Tue	Aug	
2015-04-18 09:55:47	18	2015	Sat	Apr	
2015-07-05 11:59:35	5	2015	Sun	Jul	
2015-05-26 13:25:26	26	2015	Tue	May	

Trend chart for the number of complaints at monthly levels

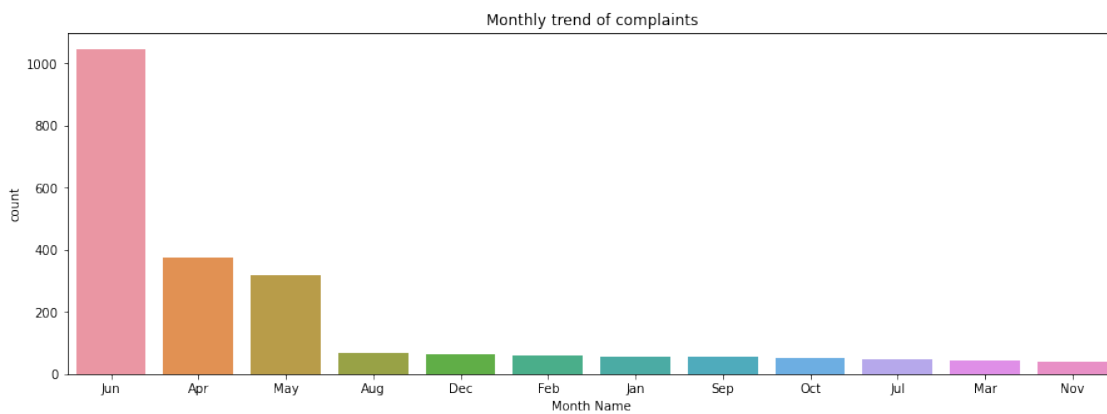
```
[29]: plt.figure(figsize=(8,5))
dt1=dt.groupby("Month").count()
sns.lineplot(x="Month", y= "Customer_
↳Complaint",data=dt1,sort=False,marker="o",color="b",legend=False,linestyle="--",ms=7)
plt.title("Monthly trends of complaints")
```

```
[29]: Text(0.5, 1.0, 'Monthly trends of complaints')
```



```
[30]: plt.figure(figsize=(15,5))
sns.countplot(x="Month Name",data=dt,order=dt["Month Name"].value_counts().
↪index)
plt.title("Monthly trend of complaints")
```

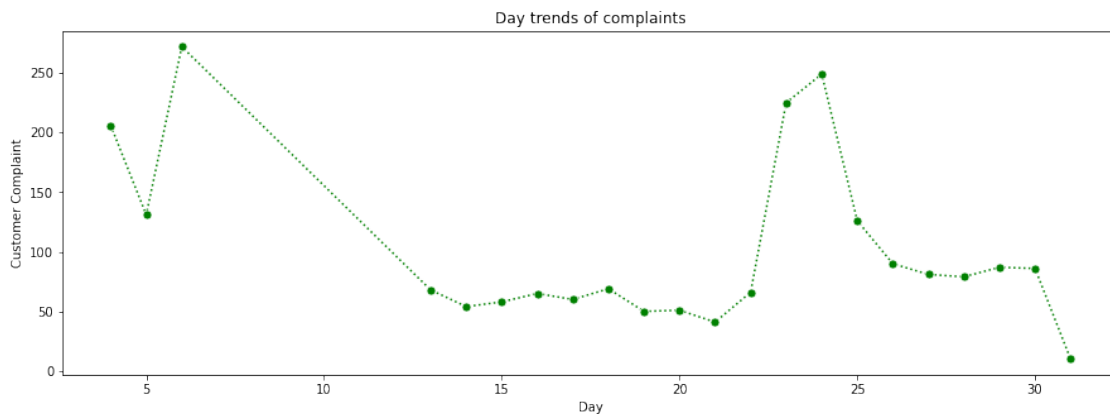
```
[30]: Text(0.5, 1.0, 'Monthly trend of complaints')
```



Trend chart for the number of complaints at daily levels

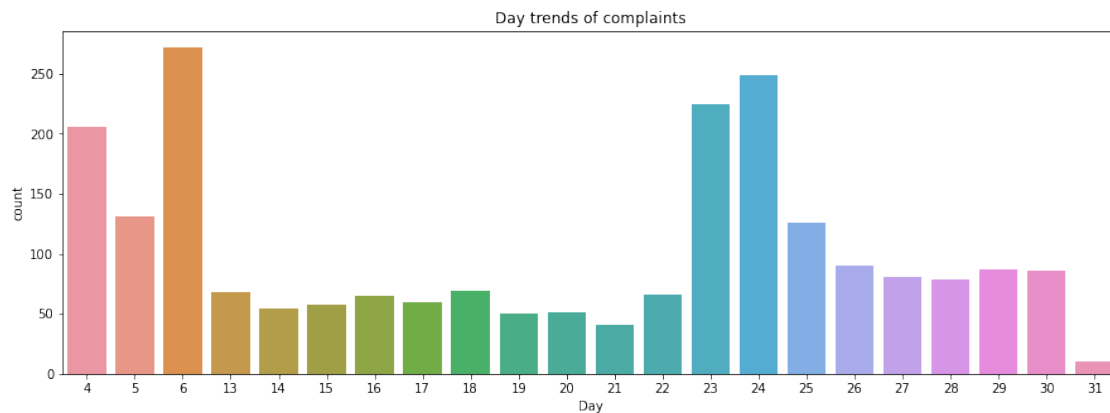
```
[31]: plt.figure(figsize=(15,5))
dt2=dt.groupby("Day").count()
sns.lineplot(x="Day", y= "Customer_
↪Complaint",data=dt2,sort=False,marker="o",color="g",legend=False,linestyle=":
↪",ms=7)
plt.title("Day trends of complaints")
```

```
[31]: Text(0.5, 1.0, 'Day trends of complaints')
```



```
[32]: plt.figure(figsize=(15,5))
sns.countplot(x="Day",data=dt)
plt.title("Day trends of complaints")
```

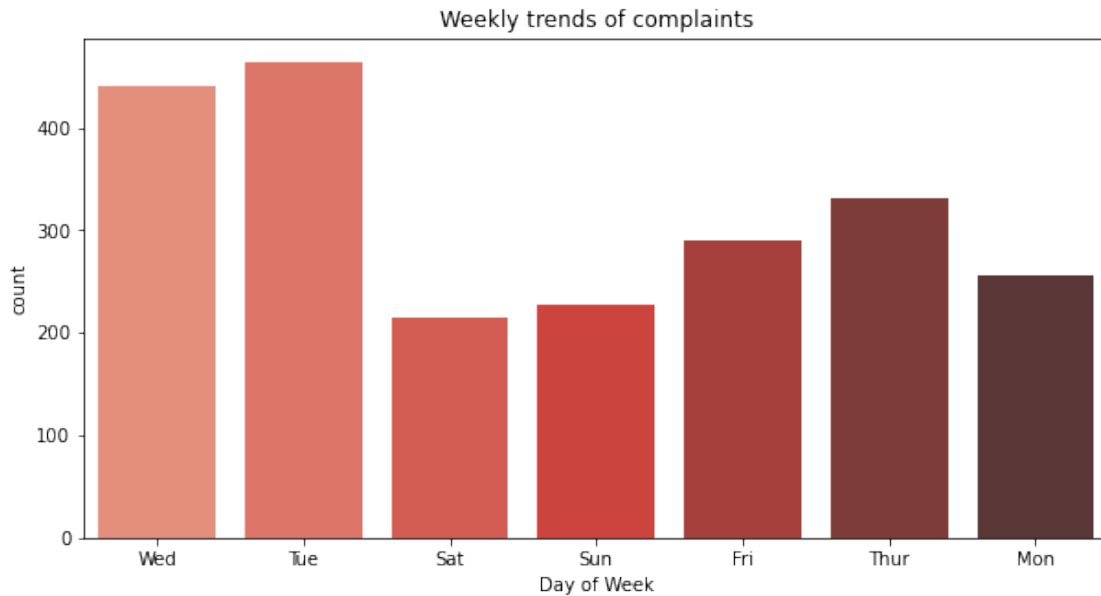
```
[32]: Text(0.5, 1.0, 'Day trends of complaints')
```



Trend chart for the number of complaints at weekly levels

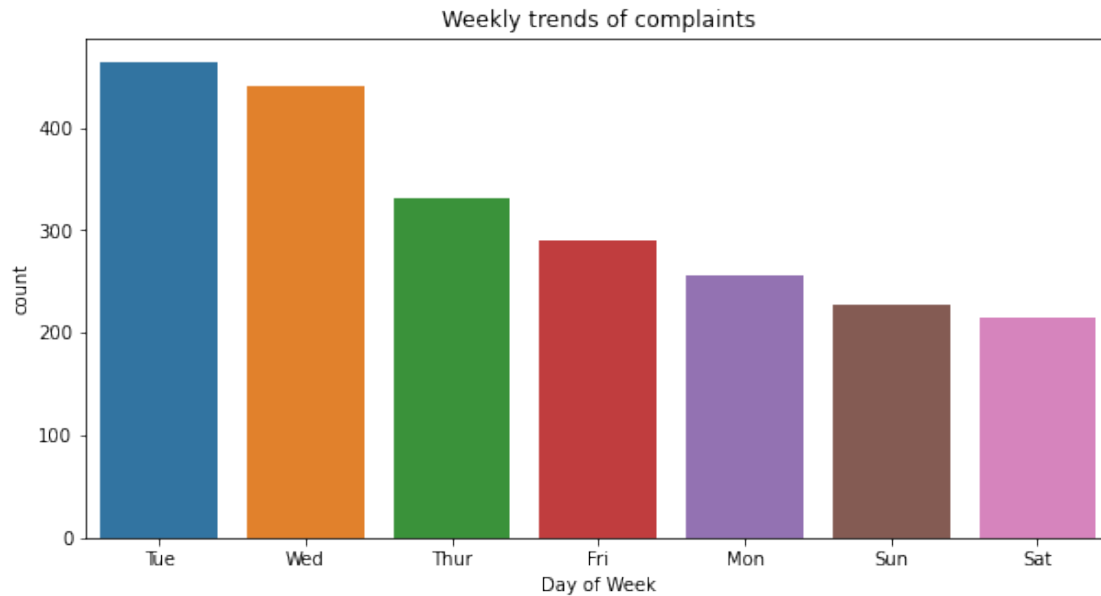
```
[33]: plt.figure(figsize=(10,5))
sns.countplot(x="Day of Week",data=dt,palette ="Reds_d")
plt.title("Weekly trends of complaints")
```

```
[33]: Text(0.5, 1.0, 'Weekly trends of complaints')
```



```
[34]: plt.figure(figsize=(10,5))
sns.countplot(x="Day of Week",data=dt,order=dt["Day of Week"].value_counts().
↪index)
plt.title("Weekly trends of complaints")
```

```
[34]: Text(0.5, 1.0, 'Weekly trends of complaints')
```



Provide a table with the frequency of complaint types and to know Which complaint types are maximum i.e., around internet, network issues, or across any other domains.

```
[35]: %pip install wordcloud
```

```
Requirement already satisfied: wordcloud in c:\users\hp\anaconda3\lib\site-
packages (1.8.1)
Requirement already satisfied: numpy>=1.6.1 in c:\users\hp\anaconda3\lib\site-
packages (from wordcloud) (1.22.0)
Requirement already satisfied: matplotlib in c:\users\hp\anaconda3\lib\site-
packages (from wordcloud) (3.3.2)
Requirement already satisfied: pillow in c:\users\hp\anaconda3\lib\site-packages
(from wordcloud) (8.0.1)
Requirement already satisfied: certifi>=2020.06.20 in
c:\users\hp\anaconda3\lib\site-packages (from matplotlib->wordcloud) (2020.6.20)
Requirement already satisfied: cycler>=0.10 in c:\users\hp\anaconda3\lib\site-
packages (from matplotlib->wordcloud) (0.10.0)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.3 in
c:\users\hp\anaconda3\lib\site-packages (from matplotlib->wordcloud) (2.4.7)
Requirement already satisfied: python-dateutil>=2.1 in
c:\users\hp\anaconda3\lib\site-packages (from matplotlib->wordcloud) (2.8.1)
Requirement already satisfied: kiwisolver>=1.0.1 in
c:\users\hp\anaconda3\lib\site-packages (from matplotlib->wordcloud) (1.3.0)
Requirement already satisfied: six in c:\users\hp\anaconda3\lib\site-packages
(from cycler>=0.10->matplotlib->wordcloud) (1.15.0)
Note: you may need to restart the kernel to use updated packages.
```



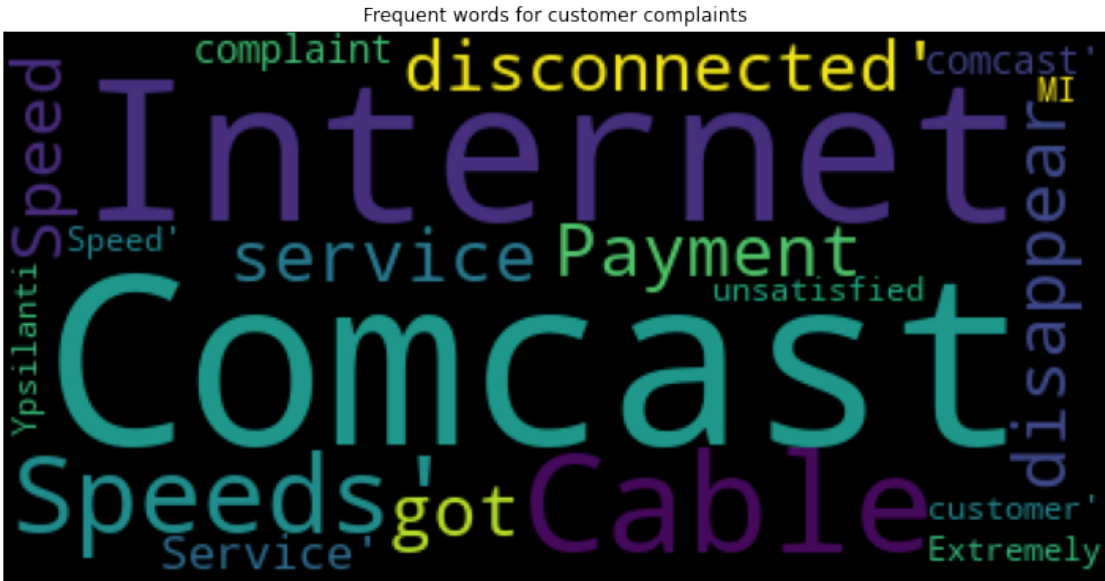
```
from wordcloud import WordCloud, STOPWORDS
```

```
text=dt["Customer Complaint"].values
text
```

```
array(['Comcast Cable Internet Speeds',
      'Payment disappear - service got disconnected',
      'Speed and Service', ..., 'complaint about comcast',
      'Extremely unsatisfied Comcast customer',
      'Comcast, Ypsilanti MI Internet Speed'], dtype=object)
```

```
wordcloud = WordCloud(width=400,height=200,background_color="black",stopwords=STOPWORDS).  
generate(str(text))
```

```
plt.figure(figsize=(10,10))
plt.imshow(wordcloud,interpolation="kaiser")
plt.title("Frequent words for customer complaints")
plt.axis("off")
plt.tight_layout()
```



```
import nltk
```

```
nlTK.download("wordnet")
```

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

[41]: True

```
[42]: nltk.download("stopwords")
```

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

[42]: True

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

```
[44]: stop = set(stopwords.words("english"))  
exclude = set(string.punctuation)  
lemma = WordNetLemmatizer()
```

```
[45]: 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
```

```
[46]: doc_complete = dt['Customer Complaint'].tolist()  
doc_clean = [clean(doc).split() for doc in doc_complete]  
doc_complete
```

```
[46]: ['Comcast Cable Internet Speeds',  
      'Payment disappear - service got disconnected',  
      'Speed and Service',  
      'Comcast Imposed a New Usage Cap of 300GB that punishes streaming.',  
      'Comcast not working and no service to boot',  
      'ISP Charging for arbitrary data limits with overage fees',  
      'Throttling service and unreasonable data caps',  
      'Comcast refuses to help troubleshoot and correct my service.',  
      'Comcast extended outages',  
      'Comcast Raising Prices and Not Being Available To Ask Why',  
      'Billing after service was asked to be disconnected',  
      'YAHOO FAILURE TO RESTORE EMAIL SEARCH FEATURE',  
      'Comcast Violating Open Internet Rules by Blocking HBO Go Access on Sony  
Consoles',  
      'Internet speed',  
      'Internet Disconnects Every Night',  
      'Internet complaint',  
      'Internet Availability and Speed',  
      'Comcast owes me $65 and claims I need to return equipment I never had',
```

'Horrible Internet Service',  
 'Failure to provide services that I am billed for.',  
 'Internet out all the time but they have a monopoly',  
 'horrible cable service and customer service',  
 'Speed',  
 'Comcast monopoly bundling practices',  
 'COMCAST!',  
 'bait and switch',  
 'Comcast Customer Service',  
 'Apartment Management's Exclusivity Contract with Comcast",  
 'Unable to reach a Comcast agent for internet and billing issues.',  
 'Wifi internet not working as well',  
 'Comcast data caps',  
 'Comcast Internet Data Cap',  
 'XFINITY Movers Edge program',  
 'Comcast Data Internet Usage',  
 'Comcast not refunding my credit',  
 'Comcast',  
 'No Service',  
 'Comcast',  
 'INTERNET , BILLING AND SERVICE ISSUES',  
 'Comcast blocking DirecTv signals',  
 'pmts',  
 'Slow Internet Speed',  
 'not getting what I am paying for with internet',  
 'Comcast bandwidth every evening drops to 10% of what is promised to our  
 business',  
 'isp dishonest about speeds',  
 'Deceptive sales- change in billing amount etc.',  
 'Comcast Billing Dispute',  
 'Comcast',  
 'Comcast Billing and Service Issues',  
 'Cable prices rising',  
 'service issues',  
 'HBO GO on Playstation 4',  
 'internet connectivity',  
 'Email issues',  
 'Monopoly',  
 'Complaint against Xfinity/Comcast',  
 'Comcast credit after cancellation has not been received after more than a  
 year',  
 'Comcast False Promises',  
 'Comcast Blocking UDP Port 443',  
 'Issues with Comcast',  
 'Comcast Refuses to Schedule a Future Service Stoppage',  
 'Comcast',  
 'Overbilling',

'Comcast - failure to provide service, refusal to void contract',  
 'Spotty Comcast service',  
 'without service despite willingness to pay',  
 'Issues with Xfinity/Comcast',  
 'Cable Modem rent for Internet access',  
 'Comcast/Xfinity',  
 'Speed issues',  
 'AT&T',  
 'Fraudulent claims reported to collections agency',  
 'Comcast using a Data Cap to take however much money they like',  
 'Comcast Data Cap',  
 'Speed of service',  
 'Comcast's Monopolistic Practices and Data Capping',  
 'Comcast data cap "trials"',  
 'Comcast billing problem',  
 'Comcast Needs Competition',  
 'Comcast services/billing issues',  
 'Incorrect Bill',  
 'Legality of data caps',  
 'Data caps',  
 'Comcast Added Service After I Declined It',  
 'Comcast Misled With Overage Policy',  
 'Cable service and telephone connect not complete',  
 'Comcast data cap',  
 'Comcast Won't Cancel My Service',  
 'Data Caps',  
 'Comcast disconnecting service before due date',  
 'comcast data cap',  
 'Comcast',  
 'Unbelievable Treatment',  
 'Denial of Comcast Business (Phone and internet) Service to my dental practice',  
 'Comcast's Terrible Service - How are they still in business?',  
 'they are forcing me for my bank account information by suspending my services for no reason (I also feel like they are committing corporate theft).',  
 'Comcast discontinuation of service issue',  
 'Comcast customer service',  
 'Comcast',  
 'Comcast bandwidth data caps in Atlanta, GA',  
 'Comcast won't quit charging me for modem rental',  
 'Comcast download caps',  
 'Horrible Comcast Customer Service',  
 'Data Cap',  
 'Bad Customer Service',  
 'disconnection of service',  
 'Comcast Data Usage Charges',  
 'Comcast refuses service to my address',

'Comcast will not let me discuss my bill or service with a representative',  
'Comcast billing frauds',  
'Comcast TV/Internet hookup',  
'no service for 5+ days',  
'Comcast - Billing',  
'Comcast Internet',  
'Comcast speed integrity',  
'Data cap',  
'Comcast Atlanta Data Caps',  
'Comcast Atlanta Data Caps',  
'COMCAST Poor Customer Service',  
'Overage on 300GB data plan with Comcast',  
'Comcast bill',  
'Comcast Data Cap',  
'Unfair Billing Practices',  
'Comcast data caps',  
'Comcast Refusing to Honor Internet Rate',  
'speed',  
'Not Acceptable Internet Additional Charge.',  
'Comcast internet and cable service',  
'Comcast deceptive advertising, overage charges',  
'Comcast Data Caps',  
'Comcast: Xfinity Slamming',  
'Comcast Support Unable to Provide Accurate Information',  
'Comcast Data Usage Limits',  
'Repeated Erroneous Modem Rental Charge',  
'Xfinity pricing',  
'Comcast monopoly',  
'Internet connection both upload and download speeds',  
'Internet Availability',  
'Comcast "50 mb/s" speed and throttling',  
'Complaint against Comcast',  
'Comcast',  
'Comcast (Xfinity) Monopolistic Billing Practices',  
'Internet Throttling',  
'Data Usage Overage',  
'double billing after change of service',  
'Bandwidth Caps becoming excessive',  
'Comcast data limits',  
'Unable to cancel xfinity home security',  
'Comcast trying to setup stuff we didn't order",  
'Terrible waiting times',  
'Incorrect prices for new customers',  
'Comcast is throttling my internet',  
'Internet Pricing',  
'MISC. CHARGES',  
'Comast data cap',

'Comcast throttles internet',  
'throttling',  
'Forced Bundling of Internet Service with CATV',  
'Comcast Internet',  
'Failure to deliver service',  
'Comcast HBO Go PS4 app',  
"Comcast's refusal to recognize written notice of termination of service",  
'Rates',  
'Termination Fee',  
'Comcast internet/cable',  
'I AM BEING CHARGE DOUBLE FOR MY CABLE BILL.',  
'REPEATED Comcast billing issues',  
'unauthorized comcast username setup',  
'Services turned off in retaliation for complaints',  
"Comcast does not disclose the Internet speed I'm paying for anywhere on my bill or online",  
'Internet speeds disclosure on bill',  
'Internet speed not disclosed',  
'Intermittent Service',  
'Comcast billing practices',  
'monopoly',  
'Consistently Slow and Throttled Internet Speeds',  
'Paying for high speed internet with Comcast. Consistently getting slow service.',  
'Comcast Monopoly on Packages is costing me more money for same service',  
'hidden fees, dropped internet connection',  
'COMCAST HIGH SPEED INTERNET MONOPOLY',  
'ComCast cable In Maryland',  
'Billing Dispute & Poor Customer Service',  
'Comcast change contract',  
'Comcast throttle',  
'Xfinity WiFi access',  
'No internet, no cable',  
'Internet service slow and intermittent',  
'Comcast Account',  
'Week long issues with speed and no help from comcast',  
'Data Usage Cap Maine',  
'Comcasts Shady Business Practices',  
'Comcast cable',  
'Comcast Pricing',  
'Comcast Complaint',  
'CABLE',  
'Comcast Charges',  
'Comcast',  
'Internet needed!',  
'Deceptive Practices',  
'Comcast fraud',

'Complaint CR Comcast Problem - VOIP Phone not working for days',  
'Comcast',  
'Double-billing',  
'download speeds slower than dial-up but paying for 25 Mbps',  
'Comcast billing error',  
'Comcast Internet Technical Support',  
'Comcast Blocking HBOGo on PS4',  
'Residentail Broadband Data Caps',  
'Comcast',  
'Monthly Charges Increased without any notice',  
'Comcast internet for low income families',  
'Comcast internet for low income families',  
'Comcast Service and customer service representative',  
'Poor internet connection/dropped connection since installation of new modem',  
'Comcast Billing',  
'Bank Fee Refund Reques',  
'COMCAST Unfair Charge',  
'Wrongful Billing',  
'Billing problem',  
'Service refusal and lower than advertised speeds.',  
'COMCAST - MAJOR COMPLAINT 1ST TIME CUSTOMER - AGGRAVATED HEALTH ISSUES',  
'Connecting the service',  
'Over Charge by lying',  
'Comcast keeps changing bill and every time gives new reasons!!',  
'Ad in craigslist was a scam for selling product not owned',  
'Comcast Internet',  
'Comcast billing after discontinuation of service',  
'COMPLAINT AGAINST COMCAST',  
'Comcast data cap',  
'Comcast Issues',  
'Comcast charging a fee without disclosing',  
'increased bill',  
'Incorrect charges, and would not fix',  
'Suspected Throttling',  
'constant disruption of internet service',  
'Comcast Unfair Billing Practices',  
'Incorrect Billing and Service from Comcast',  
'Comcast reduced my internet speed',  
'Keep getting charged rental fees for modem I already own',  
'Dealing with Comcast/Xfinity',  
'Over Billing',  
'Billing',  
'Awful Service!',  
'Comcast bad practices',  
'Billing for equipment that was not provided to me',  
'Comcast Speed Issues',  
'Technical Support',

'Failure to supply the proper Internet service',  
 'Comcast disconnected my account without reason or notice',  
 'Bad Service/drop calls/no support',  
 'Modem rental fees',  
 'Comcast - issues galore',  
 'Monopolistic behavior',  
 'bait and switch pricing',  
 'hbo go comcast',  
 'Comcast Slow Internet',  
 'Slow Internet Speeds',  
 'Comcast Billing pratice',  
 'Comcast overbilled me and added numerous hidden charges',  
 'Unfair billing practices of Comcast',  
 'HBO GO blocked on Amazon Fire TV',  
 'Comcast Outage/poor service 6/1',  
 'Comcast Agreement',  
 'False contract repersentation',  
 'Extremely low speeds, and no help',  
 'Comcast throttling download speed.',  
 'broadband interuption',  
 'low internet speed',  
 'Incorrect Billing',  
 'Comcast - Diversified Consultants',  
 'COMCAST BILLING FOR LAST @18 mos for services they are unable or unwilling to  
 provide',  
 'Comcast blocks HBO GO on PS4',  
 'Comcast data usage charges',  
 'Comcast Bandwidth Billing Issue',  
 'Comcast Internet speeds',  
 'Comcast slow internet service',  
 'Comcast Slow Internet',  
 'Comcast internet freezes up',  
 'Comcast changed my account plan after i said no about 2-3 times',  
 'lack of service from comcast',  
 'Comcast',  
 'Comcast',  
 'credit for service outage 6/23/15',  
 'Unauthorized billing',  
 'Billing overcharges',  
 'internet/phone',  
 'Comcast Throttling My Internet',  
 'Double billing from Comcast',  
 'Billing Over Charges',  
 'Internet Only',  
 'Continuing overcharges',  
 'Home Security Forgery/Fraud',  
 '2+ Day Degraded Services',



'Internet Bill too high',  
 'Over paying for my Comcast Services',  
 'Fees not disclosed before service was installed',  
 'comcast service',  
 'Poor customer service',  
 'Billed for service never received',  
 'Comcast',  
 'disrupted internet service',  
 'Comcast Billing / Speed Issues',  
 'Have to bundle services to get advertised proce.',  
 'Comcast policies',  
 'Internet Throttling',  
 'Unfair Billing Practices',  
 'Cocmast billing issues',  
 "Comcast service that didn't work",  
 'Data Limit',  
 'Pricing is not competitive',  
 'comcast billing practices-unfair',  
 'Comcast',  
 'Slow Internet',  
 'Internet Service',  
 'Xfinity False Advertisement',  
 "Comcast - constantly low speeds, 'miscommunication' about billing errors. Not  
 responding to complaints.",  
 'Comcast HBO-Go Application and Sony Products',  
 'Never resolved problem with Comcast',  
 'Slow Speed with the entire connection',  
 'Comcast Possibly Throttling my Internet',  
 'Comcast sucks',  
 'Issues with Comcast regarding service, billing, etc',  
 'Internet/TV Billing',  
 'difficulty to cancel services before moving',  
 'Comcast Incompetence/Lies/Robbery',  
 'Comcast is "forcing" bundles on me while silently raising my bill',  
 'Internet Slowdown',  
 'Comcast price',  
 'Comcast fails to fulfill request for Internet service',  
 'Hidden Product Installation Fee',  
 '2 months and Comcast has not fixed problem',  
 'FCC Complaint against comcast/xfinity on providing false information.',  
 'Comcast internet',  
 'Comcast internet',  
 'service issues',  
 'Comcast Xfinity 300G over charge',  
 'Internet Availability',  
 'Comcast Usage Caps',  
 'Comcast Data Usage Caps',

'Data Caps and the Extortion Methods of Comcast',  
'No internet service',  
'No service',  
'Billing discrepancies and service termination hurdles',  
'Billing & Data Usage',  
'Bait and switch, unfulfilled incentives',  
'internet speed',  
'Comcast wont refund me for over charge',  
'comcast internet debacle',  
'Price and performance manipulation by Comcast for ISP',  
'Complaint against Comcast',  
'Comcast Internet Speed',  
'Comcast complaint',  
'Data Caps',  
'comcast unwilling to resolve data usage issue',  
'comcast unwilling to resolve data usage issue',  
'comcast data cap',  
'Comcast Data usage meter',  
'Comcast Internet Data Cap LIES',  
'Comcast promised \$60 a month no fees, charged \$70 + \$8 in fees',  
'Comcast Cable connection from street is underwater and structure is too high',  
'West Coast Service Issues - Comcast',  
'Comcast refuses to uphold contract for 2 years phone/internet',  
'Comcast business internet is much more expensive than home internet.',  
'Comcast Internet Usage Cap',  
'Comcast poor service',  
'Comcast Corporation Data Caps',  
'comcast throttling my internet service',  
'billing/service issues',  
'Unethical Charges',  
'Comcast Data Cap',  
'Comcast wrongfully autodrafted a final bill that was not yet adjusted',  
'Comcast Internet',  
'Comcast data cap at 300GB',  
'Internet speeds are throttled',  
'Complex situation prevents bundling discounts and drives service price up',  
'Comcast Internet prices & speeds',  
'Comcast overcharging',  
'Reimbursement I've never received',  
'constant internet issues',  
'Xfinity',  
'Xfinity/Comcast',  
'Comcast Hard Inquiries',  
'comcast jamming signal',  
'Comcast lied to me',  
'Terrible customer service and process',  
'Comcast & HBO GO on PS4',

'Run around',  
 'Comcast Service and Customer service issues',  
 'Comcast pricing scam',  
 'Comcast Disconnect',  
 'COMCAST THROTTLING SPEEDS AND DATA CAPS',  
 'Closed Captioning of Online Videos',  
 'Comcast problems',  
 'Removed discount after I complained about an unauthorized charge',  
 'complaint regarding Comcast',  
 'COMCAST INTERNET CONNECTION CHEAT',  
 'Wireless Signal issues/frequent connection drop',  
 "Comcast is ripping me off, and I can't be quiet anymore",  
 'Billing Dispute',  
 'complaint about Comcast',  
 'Comcast',  
 'Internet Speeds Not as Advertised',  
 'Comcast & Sony Playstation Devices',  
 'Comcast Wifi Issues',  
 'Comcast Internet',  
 'comcast',  
 'Comcast is giving me poor quality customer service.',  
 'Comcast no show tech',  
 'Comcast internet',  
 'horrible service charges for tech/installation applied when they shouldnt have',  
 'Slow Internet/ Billing/ poor customer service of your complaints',  
 'no service',  
 'Comcast Outages',  
 'comcast internet connection and speed',  
 'Comcast Cable & Internet',  
 'comcast: no service for one month',  
 'Comcast',  
 'Comcast did not remove charge for over a year',  
 'Comcast charging for services not rendered',  
 'price inflation due to monopoly of Comcast',  
 'Double charge my internet service every month',  
 'Unfair Billing Practices',  
 'Comcast Billing/Monopoly/Service',  
 'Tricked into upgrade',  
 'Comcast Unfair Business Practices',  
 'internet speeds slow',  
 'Faulty Service and False Advertisement',  
 'Comcast started charging a lease fee for equipment I own after enabling automatic bill payment',  
 'Comcast/Xfinity Service Manipulation',  
 'unsatisfactory speed with disorganized service',  
 'Comcast billing and service',

'Unfair Billing Practices',  
'Xfinity Price and not 16Mbps when paying for 50Mbps',  
'Xfinity Order Status',  
'Comcast violating Open Internet rules',  
'Billing/Customer Service',  
'Comcast is double billing me and not processing my credit back to me',  
'Comcast internet speeds',  
'Comcast lies and deception',  
'Comcast over billing',  
'Comcast Internet, cable, and phone outtages',  
'Internet connection outage',  
'Comcast Throttling Internet Speed',  
'Comcast Xfinity Overage Charges, No Assistance',  
'Service outages (Comcast)',  
'Comcast Billing',  
'Charges not authorized',  
'comcast/xfinity',  
'Cocmast (internet)',  
'Comcast/Xfinity',  
'XFINITY/COMCAST TETHERING CONNECTION',  
'Xfinity "Comcast" CLOSED SCHEDULED APPT AND SAID IT WAS OPEN',  
'Service Issues',  
'ComCast Internet Outage',  
'Comcast',  
'Additional Usage @\$10/50GB',  
'Comcast data caps',  
'Comcast billing practices',  
'very poor customer service',  
'internet speed',  
'Another Fraudulencnt collection claim from Comcast',  
'Comcast and CenturyLink failing Wissler Ranch Colorado Community',  
'Tried to cancel, was lied to about change in service',  
'Xfinity Throttling Apple TV bitrate',  
'Comcast Termination Fee',  
'Unresolved Issues',  
'no warning before price increase',  
'Comcast unfair billing',  
'Comcast overbilling and overcharging',  
'COMCAST SERVICE COMPLAINT',  
'Charge to my bill unknowingly',  
'billing',  
'Internet and phone pricing',  
'Worst speed, no competition, and billing does not match the service.',  
'Comcast bundled service',  
'Charged for equipment that I didn't have",  
'Comcast misrepresented their service area, then charged me for attempting to use it.',

'Comcast Xfinity',  
'Comcast Does Not Deliver Service',  
'Slow internet speeds on Comcast',  
'Comcast service',  
'Nonsensical Raise in my Internet Bill',  
'Comcast service billing',  
'Comcast Runaround',  
'Cruel and Illegal Practices - Comcast',  
'Throttled speed',  
'Transfer services',  
'Comcast agent lied about service upgrade',  
'Customer Service Representative Lied About Rates and Promotions',  
'Comcast service Corvallis, OR.',  
'Unexplained Billing',  
'Comcast/Xfinity Internet',  
'Lack of availability',  
'Comcast bill problems',  
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'Comcast Data Caps',  
'Comcast Internet is unbelievably slow',  
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'Extorted into signing up for multi-year contract',  
'Comcast Selectively Enforcing Data Caps',  
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'Comcast Internet Service Bad Quality',  
'Ping spikes and packet loss',  
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'Comcast Xfinity charging rental fee for personally owned modem',  
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 and Billing Practices',  
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 'Xfinity Comcast hbogo on ps4',  
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 'xfinity tv and exfinity alarm',  
 'Internet speed and price of bundle',  
 'RE: Comcast Internet Illegal charges',  
 'Possible Internet Speed Throttling by my Comcast Internet Provider',  
 'Slow speed',  
 'Inaccurate billing',  
 'Comcast Internet Pricing',  
 'Billing/contract issue related to data cap',  
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 'Improper billing from Comcast',  
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 'Misrepresentation of terms',  
 'Consumer Fraud - Sell at One Price, Then Advise Price is Higher',  
 'Misleading communication.',  
 'Comcast Chat Agent Help',  
 'Fees',  
 'Comcast cable company Florida',  
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 'Comcast refusal to cancel service under false contract claims',  
 'Terrible Service and Ripped off by Comcast',  
 'Extremely slow internet speeds; Horrible support',  
 'Promissed a package and then denied',  
 'HBO GO on Playstation 3',

'Comcast secretly raising my bill for services I never agreed to. Again.',  
'Lied about \$70 technician fee',  
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'Internet Speed Drops & Signal on Borderline',  
'Comcast Service for EXTERIOR Line Replacement Billed to customer',  
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'Internet Prices in U.S.A',  
'Comcast throttling my speeds for streaming video',  
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'Internet Speeds nowhere close to what I pay for',  
'Billed without service',  
'Slow Internet',  
'Billed for modem rental for several years, Comcast refuses to refund under  
"caveat emptor"',  
'Misleading information given',  
'Contract Cancellation Fees and Unauthorized Changes',  
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system protected by THEIR AV',  
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 'Terrible Comcast service',  
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 'Misrepresentation of billing',  
 'Constant non response, or passing to other operator. Supervisors inability to  
 resolve of help. Numerous lies told.',  
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 Location',  
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 '95 Palmer Road, Enfield NH Internet Pricing',  
 'Overpriced, low quality service',  
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'Comcast (Chicago IL)',  
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'Internet Connection and Speed Issues',  
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'Comcast Will Not Provide Online Content Without Cable Box',  
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'Deceptive Trade',  
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'Raising my Rate',  
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'Ridiculous Charges',  
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'Internet Speed on Wireless Connection',  
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'Improper Billing and non resolution of issues',  
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'Xfinity Internet Speed',

'Comcast Billing',  
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 'Comcast/Xfinity- Paying for High speed service',  
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 'Wrongful billing - repeated since December 2013',  
 "Comcast has charged me invalid fee's and wont re-imburse me for them.",  
 'Comcast/Xfinity service',  
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 'INTERNET VIRUS POP UP SCAM CLAIMING TO BE WITH COMCAST',  
 'Intermittent internet connection',  
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 make a 24 month agreement',  
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 'Hearsts Magazine contest scam',  
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 'Still Overcharged',

'Charged for speeds they can not provide',  
 'Comcast deception',  
 'COMCAST - Slow Down Internet Speed',  
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 'Comcast billing complaint',  
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 'Comcast Overbilling',  
 'Throttling by Comcast/Xfinity',  
 'no internet last 4 days even after more than 10 calls and spending 10 hours  
 with comcast on phone',  
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 'Comcast throttling speeds',  
 'Comcast Billing',  
 'Fraudulent Billing by ComCast',  
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 'Throttle of my Internet access speeds by Comcast',  
 'Comcast Overcharge for Internet Service for over One Year',  
 'Not receiving refund of service from Comcast, for over 90 days',  
 'Unfair and Deceptive Trade Practices',  
 'Comcast Bill Internet Usage',  
 'Comcast Data Cap',  
 'Over Billing Issues',  
 'Comcast Billing Practices',  
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 unlimited',  
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 'Comcast blocking services',  
 'Fake charges',  
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 'Comcast Charging Fee without warning',  
 'Comcast service levels',  
 'One Sided Contracts',  
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'Phone Internet Cable Alarm',  
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'Overcharge/ promo end',  
'Hang-ups, Lies, Bill more than 2x higher & more',  
'Lies and deception',  
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'MONTHLY BILL',  
'Deceptive business practice with "Service Protection Plan"',  
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'Unreliable Service',  
'Billing and threats',  
'Horrible Internet Speed not what I pay for',  
'Comcast Service Failure',  
'Incomplete billing cycle',  
'Internet System Reliability',  
'Faulty Bill for More Profit',  
'Comcast - Overcharging/Unnecessary Charges',  
'Throttling by Comcast',  
'Billed for internet service that was never installed',  
'Billing and New Account Issues',  
'Comcast high prices and throttling speeds',  
'Comcast Predatory Pricing forcing purchase of cable.',  
'Comcast Billing',  
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'Comcast Internet Slow',  
'The monthly bill for my internet service has become too expensive.',  
'Throttling',

'Comcast Internet Service Complaint',  
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after I have made payments still got disconnected multiple times',  
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'Comcast Service Issues',  
'Comcast bundles useless services to charge more.',  
'Comcast Failed to deliver service that was advertised',  
'Comcast wont honor discount, bill higher than what was agreed',  
'Poor customer service, terrible Internet speeds, prices are way too high.',  
'Comcast Bundle Promotion Bait and Switch',  
'COMCAST INTERNET SERVICE LARGE INCREASES & IMPROPER BILLINGS ON PROMTIONS FOR  
ONE YR',  
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'Text on Facebook',  
'Comcast (customer.xfinity.com)',  
'Low internet speed complaint against Comcast Xfinity Houston, Texas',  
'Billing and false advertising',  
'Comcast Charging Service Fee To Customer--Customer Didn't Cause Issue',  
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'Unable to get in touch with anyone that has the power to cancel my services',  
'Comcast's data caps are anti-consumer."',  
'HBOGO on PS4',  
'Throttled Speed During Peak Hours',  
'Customer Service lied about extra fees',  
'Xfinity Data Cap',  
'Comcast Services',  
'Charged for activation kit that was never sent, needed or used',  
'Adding services Not Requested and Increasing fees without notification.',  
'Renewed contract without my permission or consent',  
'Ongoing issue with bill, Supervisors, Issue Not Fixed',  
'Comcast',  
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'assessing unjustified late fees',  
'Unable to fully use services and high bills',  
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'HBO shouldn't have a load time",  
'Comcast customer service agents lie about offers to switch',  
'Comcast technical/customer service and billing problems',  
'Comcast/Xfinity Internet Gouging',  
'Pricing Problems Even After Promises',

'Comcast Business Services-Email Accounts',  
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 'Internet Service Provider Comcast harassing me to return equipment I already  
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 'Continued Calls from Comcast',  
 'Installation',  
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 'Service connection issues, increased billing, bad service, unfair trade  
 practices',  
 'Comcast - Virtually no service since October 2014',  
 'recurring billing discrepancy regarding modem',  
 'Comcast Data Usage robbing us',  
 'False advertising and overcharging',  
 'xfinity Internet',  
 'Overcharged/excessive bill',  
 'Internet Fraud',  
 'COMCAST INTERNET PROVIDER-JACKSONVILLE, FLORIDA',  
 'Internet Service Changes between Comcast Business & Comcast Residential',  
 'Cannot Access OnlineBilling Account to pay bill. Account info changed without  
 Authorization',  
 'Continued issue',  
 'Internet Only Deal',  
 'Customer Service from Comcast',  
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 'COMCAST REFUSES TO SERVE MY ADDRESS',  
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'Lack of Service and Misleading Promises',
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'Comcast charging ridiculous prices',
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'Comcast internet performance',
'Comcast internet claiming 25 mbps internet but i get only 3 mbps and customer
service representative hung up call repeateadly',
'Long term billing issue with rude customer service caused depression and
trauma',
'Comcast incorrect and confusing billing',
'Data caps & Monthly prices',
'Installation Request - New Subdivision - Jesup, GA',
'Comcast Grievance',
'Comcast -Exfinity customer service errors, lies and wasted time',
'Comcast -Exfinity customer service errors, lies and wasted time',
'Comcast Very Bad /Rude customer service',
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```

```
[48]: %pip install -U gensim
```

```

Requirement already up-to-date: gensim in c:\users\hp\anaconda3\lib\site-
packages (4.1.2)
Requirement already satisfied, skipping upgrade: smart-open>=1.8.1 in
c:\users\hp\anaconda3\lib\site-packages (from gensim) (5.2.1)
Requirement already satisfied, skipping upgrade: scipy>=0.18.1 in
c:\users\hp\anaconda3\lib\site-packages (from gensim) (1.5.2)
Requirement already satisfied, skipping upgrade: numpy>=1.17.0 in
c:\users\hp\anaconda3\lib\site-packages (from gensim) (1.22.0)
Requirement already satisfied, skipping upgrade: Cython==0.29.23 in
c:\users\hp\anaconda3\lib\site-packages (from gensim) (0.29.23)
Note: you may need to restart the kernel to use updated packages.

```

```
[49]: import gensim
```

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

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

```
[51]: <gensim.corpora.dictionary.Dictionary at 0x1fb1160f9d0>
```

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

```
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```
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...]
```

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

```
[54]: num_topic = 9
ldamodel = LdaModel(doc_term_matrix,num_topics=num_topic,id2word =
↳dictionary,passes=10)
```

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

```
(0, '0.070*"pricing" + 0.064*"cable" + 0.045*"false" + 0.037*"switch" +
0.029*"installation" + 0.028*"day" + 0.025*"bait" + 0.023*"12" + 0.020*"unfair"
+ 0.018*"billed"')
```

```
(1, '0.184*"billing" + 0.125*"comcast" + 0.089*"issue" + 0.077*"service" +
0.059*"practice" + 0.042*"unfair" + 0.031*"customer" + 0.017*"connectivity" +
0.013*"intermittent" + 0.013*"get"')
```

```
(2, '0.099*"comcast" + 0.059*"service" + 0.045*"xfinity" + 0.039*"bill" +
0.027*"deceptive" + 0.025*"contract" + 0.023*"monthly" + 0.022*"connection" +
0.021*"sale" + 0.015*"modem"')
```

```
(3, '0.160*"service" + 0.084*"comcast" + 0.040*"poor" + 0.036*"customer" +
0.033*"billing" + 0.025*"monopolistic" + 0.020*"monopoly" + 0.020*"fraudulent" +
0.019*"price" + 0.018*"terrible"')
```

```
(4, '0.220*"data" + 0.178*"cap" + 0.132*"comcast" + 0.041*"usage" + 0.018*"lack"
+ 0.017*"limit" + 0.014*"pay" + 0.014*"xfinity" + 0.012*"option" +
0.011*"tucson"')
```

```
(5, '0.272*"comcast" + 0.124*"complaint" + 0.019*"payment" + 0.018*"broadband" +
0.015*"several" + 0.014*"mb" + 0.014*"low" + 0.011*"hbo" + 0.011*"bandwidth" +
0.011*"ps4"')
```

```
(6, '0.241*"internet" + 0.121*"comcast" + 0.084*"speed" + 0.070*"service" +
0.026*"slow" + 0.021*"throttling" + 0.017*"bill" + 0.014*"price" +
0.013*"problem" + 0.012*"comcastxfinity"')
```

```
(7, '0.142*"comcast" + 0.069*"charge" + 0.040*"service" + 0.032*"fee" +
0.031*"without" + 0.020*"equipment" + 0.018*"promised" + 0.017*"charged" +
0.016*"show" + 0.015*"account"')
```

```
(8, '0.034*"incorrect" + 0.029*"help" + 0.025*"time" + 0.022*"plan" +
0.022*"loss" + 0.021*"overcharge" + 0.019*"10" + 0.018*"disconnection" +
0.018*"mbps" + 0.017*"refund"')
```

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

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

```
[57]:
```

	Topic 0	Topic 1	Topic 2	Topic 3	Topic 4 \
0	pricing	billing	comcast	service	data
1	cable	comcast	service	comcast	cap
2	false	issue	xfinity	poor	comcast
3	switch	service	bill	customer	usage
4	installation	practice	deceptive	billing	lack
5	day	unfair	contract	monopolistic	limit
6	bait	customer	monthly	monopoly	pay
7	12	connectivity	connection	fraudulent	xfinity
8	unfair	intermittent	sale	price	option
9	billed	get	modem	terrible	tucson
10	home	bad	unreliable	2	one
11	service	horrible	increased	failure	isp
12	line	connection	email	availability	improper
13	fix	internet	credit	provide	cost
14	sold	provider	advertising	lied	trial
15	60	regarding	change	paying	pricing
16	att	extremely	false	month	outrageous
17	egregious	help	fee	still	extortion
18	unreturned	transfer	year	term	refund
19	ecobill	resolution	charge	promotion	throttling

	Topic 5	Topic 6	Topic 7	Topic 8
0	comcast	internet	comcast	incorrect
1	complaint	comcast	charge	help
2	payment	speed	service	time
3	broadband	service	fee	plan
4	several	slow	without	loss
5	mb	throttling	equipment	overcharge
6	low	bill	promised	10
7	hbo	price	charged	disconnection
8	bandwidth	problem	show	mbps
9	ps4	comcastxfinity	account	refund
10	scam	outage	charging	month
11	go	back	bill	paying

12	hbogo	cramming	appointment	misrepresentation
13	device	cable	overage	xfinitycomcast
14	streaming	business	shitty	day
15	refusing	phone	asking	install
16	ordered	said	rate	50
17	blocking	high	unauthorized	per
18	please	xfinity	home	check
19	committing	throttled	refusal	significant

```
[58]: %pip install pyldavis
```

```
Requirement already satisfied: pyldavis in c:\users\hp\anaconda3\lib\site-
packages (3.3.1)
Requirement already satisfied: funcy in c:\users\hp\anaconda3\lib\site-packages
(from pyldavis) (1.17)
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(from pyldavis) (2.11.2)
Requirement already satisfied: scikit-learn in c:\users\hp\anaconda3\lib\site-
packages (from pyldavis) (0.23.2)
Requirement already satisfied: gensim in c:\users\hp\anaconda3\lib\site-packages
(from pyldavis) (4.1.2)
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packages (from pyldavis) (1.3.5)
Requirement already satisfied: setuptools in c:\users\hp\anaconda3\lib\site-
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Requirement already satisfied: sklearn in c:\users\hp\anaconda3\lib\site-
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Requirement already satisfied: threadpoolctl>=2.0.0 in
c:\users\hp\anaconda3\lib\site-packages (from scikit-learn->pyldavis) (2.1.0)
Requirement already satisfied: Cython==0.29.23 in
c:\users\hp\anaconda3\lib\site-packages (from gensim->pyldavis) (0.29.23)
Requirement already satisfied: smart-open>=1.8.1 in
c:\users\hp\anaconda3\lib\site-packages (from gensim->pyldavis) (5.2.1)
Requirement already satisfied: pytz>=2017.3 in c:\users\hp\anaconda3\lib\site-
packages (from pandas>=1.2.0->pyldavis) (2020.1)
```

Requirement already satisfied: python-dateutil>=2.7.3 in  
c:\users\hp\anaconda3\lib\site-packages (from pandas>=1.2.0->pyldavis) (2.8.1)  
Requirement already satisfied: six>=1.5 in c:\users\hp\anaconda3\lib\site-  
packages (from python-dateutil>=2.7.3->pandas>=1.2.0->pyldavis) (1.15.0)  
Note: you may need to restart the kernel to use updated packages.

```
[59]: import pyLDavis  
import pyLDavis.gensim_models  
pyLDavis.enable_notebook()
```

C:\Users\hp\anaconda3\lib\site-packages\sklearn\decomposition\\_lda.py:28:  
DeprecationWarning: `np.float` is a deprecated alias for the builtin `float`. To  
silence this warning, use `float` by itself. Doing this will not modify any  
behavior and is safe. If you specifically wanted the numpy scalar type, use  
`np.float64` here.  
Deprecated in NumPy 1.20; for more details and guidance:  
<https://numpy.org/devdocs/release/1.20.0-notes.html#deprecations>  
EPS = np.finfo(np.float).eps

```
[60]: Lda_display = pyLDavis.gensim_models.  
      ↳prepare(ldamodel,doc_term_matrix,dictionary,sort_topics=False)  
pyLDavis.display(Lda_display)
```

C:\Users\hp\anaconda3\lib\site-packages\ipykernel\ipkernel.py:287:  
DeprecationWarning: `should\_run\_async` will not call `transform\_cell`  
automatically in the future. Please pass the result to `transformed\_cell`  
argument and any exception that happen during thetransform in  
`preprocessing\_exc\_tuple` in IPython 7.17 and above.  
and should\_run\_async(code)  
C:\Users\hp\anaconda3\lib\site-packages\pyLDavis\\_prepare.py:246: FutureWarning:  
In a future version of pandas all arguments of DataFrame.drop except for the  
argument 'labels' will be keyword-only  
default\_term\_info = default\_term\_info.sort\_values(

```
[60]: <IPython.core.display.HTML object>
```

Create a new categorical variable with value as Open and Closed.

```
[61]: dt["Status"].unique()
```

C:\Users\hp\anaconda3\lib\site-packages\ipykernel\ipkernel.py:287:  
DeprecationWarning: `should\_run\_async` will not call `transform\_cell`  
automatically in the future. Please pass the result to `transformed\_cell`  
argument and any exception that happen during thetransform in  
`preprocessing\_exc\_tuple` in IPython 7.17 and above.  
and should\_run\_async(code)

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

```
[62]: dt["New status"]=["open" if status=="Open" or status=="Pending" else "closed"]
      ↪for status in dt["Status"]]
```

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 and should\_run\_async(code)

```
[63]: dt["New status"].unique()
```

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 `preprocessing\_exc\_tuple` in IPython 7.17 and above.  
 and should\_run\_async(code)

```
[63]: array(['closed', 'open'], dtype=object)
```

state wise status of complaints in a stacked bar chart

```
[64]: data1=dt.groupby(["State","New status"]).size().unstack().fillna(0)
      data1
```

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 and should\_run\_async(code)

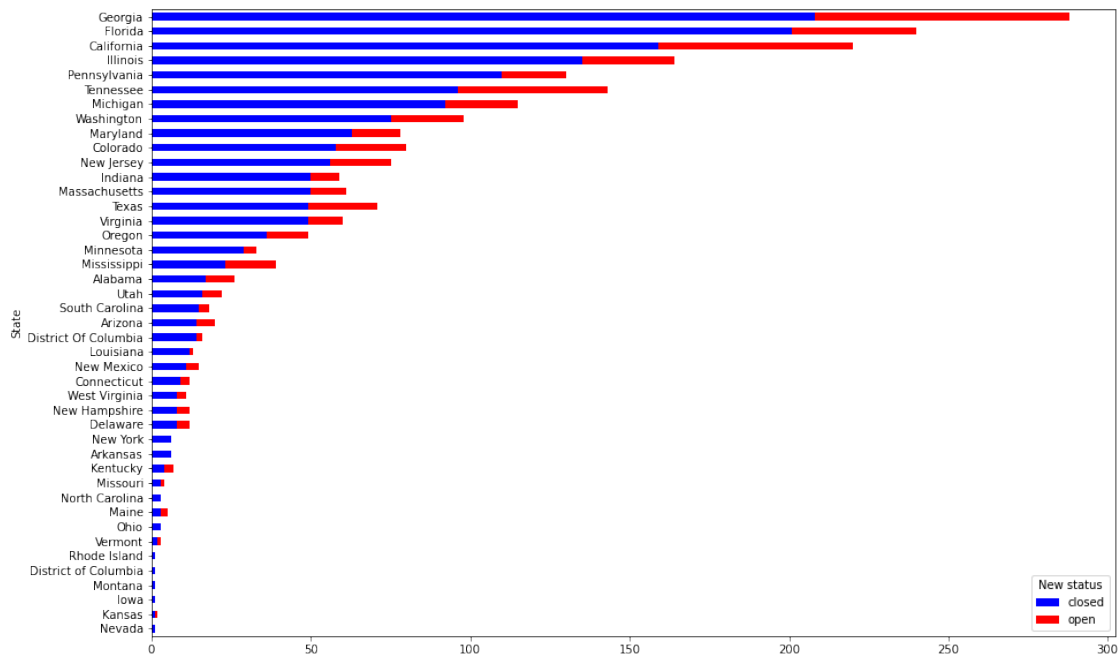
```
[64]: New status      closed  open
      State
Alabama              17.0   9.0
Arizona              14.0   6.0
Arkansas              6.0   0.0
California           159.0  61.0
Colorado             58.0  22.0
Connecticut           9.0   3.0
Delaware              8.0   4.0
District Of Columbia 14.0   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

```
[65]: data1.sort_values("closed",axis=0,ascending=True).
      ↪plot(kind="barh",stacked=True,figsize=(15,10),color=["blue","red"])
```

```
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and should_run_async(code)
```

```
[65]: <AxesSubplot:ylabel='State'>
```



### 1.0.1 From the stacked bar chart,i got that Georgia has maximum complaints

```
[66]: dt.groupby(["State"]).size().sort_values(ascending=False).to_frame().rename({0:
      ↳"Customer counting"},axis=1)[:1]
```

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 and should\_run\_async(code)

```
[66]:      Customer counting
      State
      Georgia          288
```

```
[67]: data2=dt.groupby(["State","New status"]).size().unstack().fillna(0).
      ↳sort_values("closed",ascending=False,axis=0)[:1]
      data2
```

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 and should\_run\_async(code)



```
[67]: New status  closed  open
      State
      Georgia      208.0  80.0
```

### 1.0.2 Georgia has maximum complaints i.e. 288

```
[68]: data2["Total"]=data2["open"]+data2["closed"]
      data2["unresolved complaint"]=data2["open"]/data2["Total"]*100
      data2["resolved complaint"]=data2["closed"]/data2["Total"]*100
      data2
```

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 `preprocessing\_exc\_tuple` in IPython 7.17 and above.  
 and should\_run\_async(code)

```
[68]: New status  closed  open  Total  unresolved complaint  resolved complaint
      State
      Georgia      208.0  80.0  288.0                27.777778                72.222222
```

### 1.0.3 Georgia has the highest percentage of unresolved complaints (27.777778%)

```
[69]: data3=dt.groupby(["Received Via","New status"]).size().unstack().fillna(0)
      data3
```

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 argument and any exception that happen during thetransform in  
 `preprocessing\_exc\_tuple` in IPython 7.17 and above.  
 and should\_run\_async(code)

```
[69]: New status          closed  open
      Received Via
      Customer Care Call      864   255
      Internet                843   262
```

```
[70]: data3["Total"]=data3["open"]+data3["closed"]
      data3["resolved_Customer Care Call"]=data3["open"]/data3["Total"]*100
      data3["resolved_Internet"]=data3["closed"]/data3["Total"]*100
      data3
```

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 automatically in the future. Please pass the result to `transformed\_cell`

argument and any exception that happen during thetransform in  
`preprocessing\_exc\_tuple` in IPython 7.17 and above.  
and should\_run\_async(code)

```
[70]: New status      closed  open  Total  resolved_Customer Care Call  \
Received Via
Customer Care Call      864    255   1119                22.788204
Internet                 843    262   1105                23.710407

New status      resolved_Internet
Received Via
Customer Care Call      77.211796
Internet                76.289593
```

1.0.4 23.710407% and 22.788204% of complaints resolved till date, which were received through the Internet and customer care calls respectively.

## 2 THANK YOU

[ ]: