Comcast Telecom Consumer Complaints

September 3, 2022

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

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

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

[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

  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

   Zip code  Status Filing on Behalf of Someone
0     21009  Closed                         No
1     30102  Closed                         No
2     30101  Closed                        Yes
```

[4]:
```
df["date_index"] = df["Date_month_year"] + " " + df["Time"]
```

[5]:
```
df["date_index"] = pd.to_datetime(df["date_index"])
df["Date_month_year"] = pd.to_datetime(df["Date_month_year"])
```

[6]:
```
df.dtypes
```

[6]:
```
Ticket #                             object
Customer Complaint                   object
Date                                 object
Date_month_year              datetime64[ns]
Time                                 object
Received Via                         object
City                                 object
```

```
State                                object
Zip code                              int64
Status                               object
Filing on Behalf of Someone          object
date_index                   datetime64[ns]
dtype: object
```

[7]:
```
df = df.set_index(df["date_index"])
```

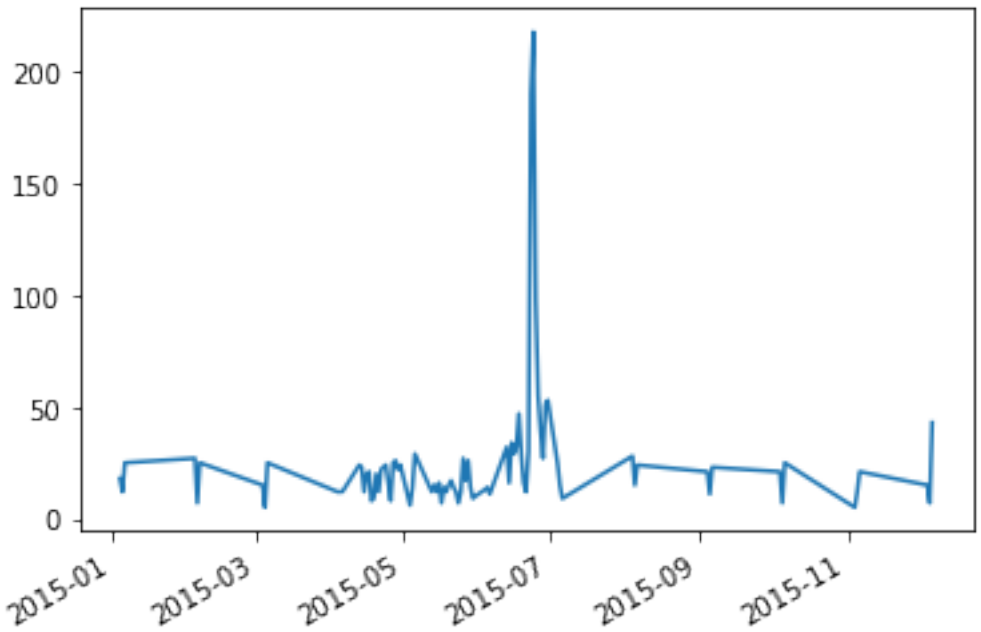
[8]:
```
df.head(3)
```

[8]:
```
                     Ticket #                           Customer Complaint  \
date_index
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

                         Date Date_month_year         Time  \
date_index
2015-04-22 15:53:50  22-04-15      2015-04-22   3:53:50 PM
2015-08-04 10:22:56  04-08-15      2015-08-04  10:22:56 AM
2015-04-18 09:55:47  18-04-15      2015-04-18   9:55:47 AM

                           Received Via      City     State  Zip code  Status  \
date_index
2015-04-22 15:53:50  Customer Care Call  Abingdon  Maryland     21009  Closed
2015-08-04 10:22:56            Internet   Acworth   Georgia     30102  Closed
2015-04-18 09:55:47            Internet   Acworth   Georgia     30101  Closed

                     Filing on Behalf of Someone          date_index
date_index
2015-04-22 15:53:50                           No 2015-04-22 15:53:50
2015-08-04 10:22:56                           No 2015-08-04 10:22:56
2015-04-18 09:55:47                          Yes 2015-04-18 09:55:47
```

[9]:
```
df["Date_month_year"].value_counts()[:3]
```

[9]:
```
2015-06-24    218
2015-06-23    190
2015-06-25     98
Name: Date_month_year, dtype: int64
```

[10]:
```
df["Date_month_year"].value_counts().plot();
```



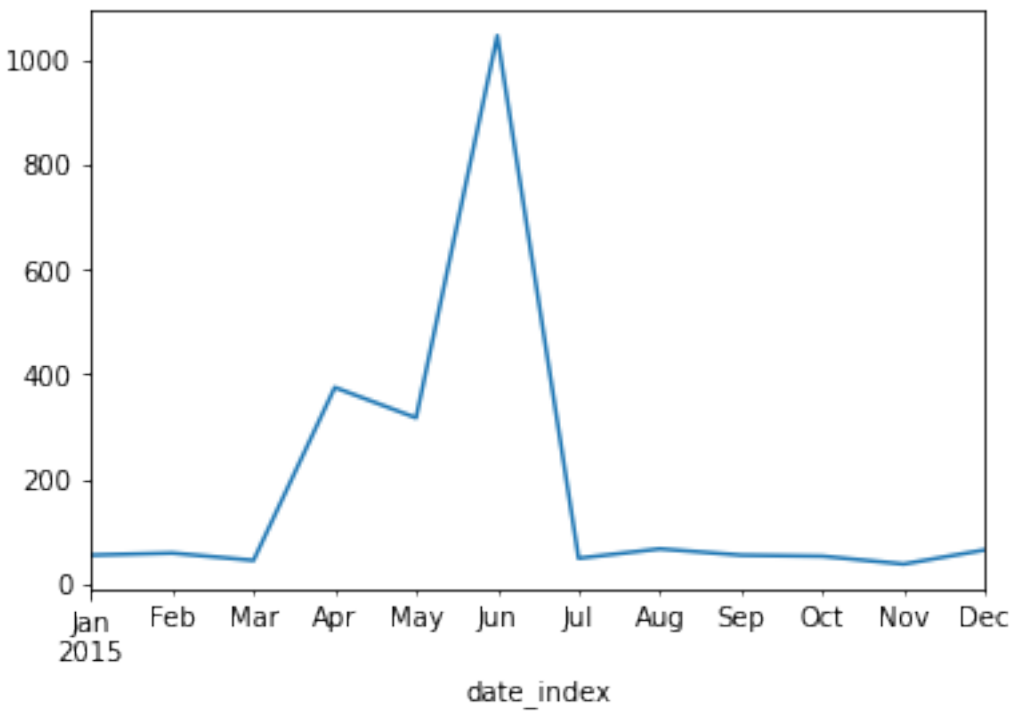
[11]:
```
f = df.groupby(pd.Grouper(freq="M")).size()
```

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

[12]:
```
date_index
2015-01-31     55
2015-02-28     59
2015-03-31     45
2015-04-30    375
2015-05-31    317
Freq: M, dtype: int64
```

[13]:
```
df.groupby(pd.Grouper(freq="M")).size().plot()
```

[13]:
```
<AxesSubplot:xlabel='date_index'>
```



[14]:
```
df.Status.unique()
```

[14]:
```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

[15]:
```
df["newStatus"] = ["Open" if Status=="Open" or Status=="Pending" else "Closed"␣
↪for Status in df["Status"]]
```

[16]:
```
df.head(3)
```

[16]:

date_index	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status
2015-04-22 15:53:50	250635	Comcast Cable Internet Speeds	22-04-15	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed
2015-08-04 10:22:56	223441	Payment disappear - service got disconnected	04-08-15	2015-08-04	10:22:56 AM					
2015-04-18 09:55:47	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM					

```
2015-08-04 10:22:56            Internet   Acworth   Georgia     30102  Closed
2015-04-18 09:55:47            Internet   Acworth   Georgia     30101  Closed

                     Filing on Behalf of Someone          date_index newStatus
date_index
2015-04-22 15:53:50                           No 2015-04-22 15:53:50    Closed
2015-08-04 10:22:56                           No 2015-08-04 10:22:56    Closed
2015-04-18 09:55:47                          Yes 2015-04-18 09:55:47    Closed
```

[17]:
```
df.groupby(["State"]).size().sort_values(ascending=False).to_frame().
↪reset_index().rename({0: "Count"}, axis=1)[:5]
```

[17]:
```
         State  Count
0      Georgia    288
1      Florida    240
2   California    220
3     Illinois    164
4    Tennessee    143
```

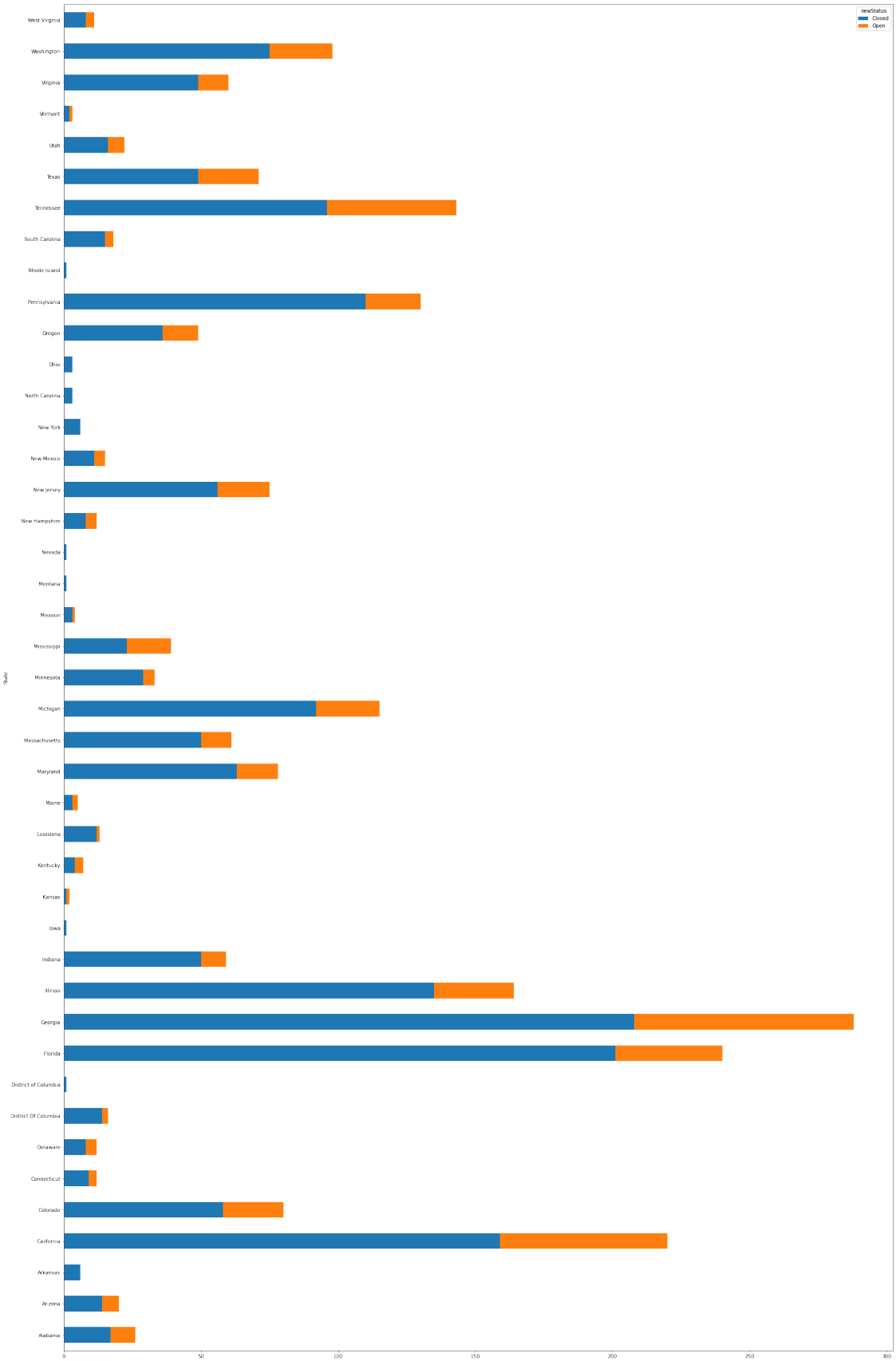
[18]:
```
Status_complaints = df.groupby(["State","newStatus"]).size().unstack().fillna(0)
Status_complaints
```

[18]:
```
newStatus             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
```

[19]:
```
Status_complaints.plot(kind="barh", figsize=(30,50), stacked=True)
```

[19]:
```
<AxesSubplot:ylabel='State'>
```


newStatus
Closed
Open
State
West Virginia
Washington
Virginia
Vermont
Utah
Texas
Tennessee
South Carolina
Rhode Island
Pennsylvania
Oregon
Ohio
North Carolina
New York
New Mexico
New Jersey
New Hampshire
Nevada
Montana
Missouri
Mississippi
Minnesota
Michigan
Massachusetts
Maryland
Maine
Louisiana
Kentucky
Kansas
Iowa
Indiana
Illinois
Georgia
Florida
District of Columbia
District Of Columbia
Delaware
Connecticut
Colorado
California
Arkansas
Arizona
Alabama
0
50
100
150
200
250
300

[20]:
```
df.groupby(["State"]).size().sort_values(ascending=False).to_frame().
↪reset_index().rename({0: "Count"}, axis=1).max()
```

[20]:
```
State    West Virginia
Count              288
dtype: object
```

[21]:
```
df.groupby(["State","newStatus"]).size().unstack().fillna(0).max()
```

[21]:
```
newStatus
Closed    208.0
Open       80.0
dtype: float64
```

[22]:
```
!pip install wordcloud
```

```
Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: wordcloud in /usr/local/lib/python3.7/site-
packages (1.6.0)
Requirement already satisfied: numpy>=1.6.1 in /usr/local/lib/python3.7/site-
packages (from wordcloud) (1.21.5)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.7/site-
packages (from wordcloud) (3.5.1)
Requirement already satisfied: pillow in /usr/local/lib/python3.7/site-packages
(from wordcloud) (7.1.1)
Requirement already satisfied: kiwisolver>=1.0.1 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (1.2.0)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.7/site-
packages (from matplotlib->wordcloud) (21.0)
Requirement already satisfied: pyparsing>=2.2.1 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (2.4.6)
Requirement already satisfied: python-dateutil>=2.7 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (2.8.1)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.7/site-
packages (from matplotlib->wordcloud) (0.10.0)
Requirement already satisfied: fonttools>=4.22.0 in
/usr/local/lib/python3.7/site-packages (from matplotlib->wordcloud) (4.28.5)
Requirement already satisfied: six in /usr/local/lib/python3.7/site-packages
(from cycler>=0.10->matplotlib->wordcloud) (1.14.0)
```

```
WARNING: You are using pip version 22.0.3; however, version 22.2.2 is
available.
You should consider upgrading via the '/usr/local/bin/python3 -m pip install
--upgrade pip' command.
```

[23]:
```
from nltk.corpus import stopwords
from nltk.stem.wordnet import WordNetLemmatizer
import string

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

[24]:
```
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])
    normalised = " ".join(lemma.lemmatize(word) for word in punc_free.split())
    return normalised
```

[25]:
```
doc_complete = df["Customer Complaint"].tolist()
doc_clean = [clean(doc).split() for doc in doc_complete]
```

[26]:
```
import gensim
from gensim import corpora
```

[27]:
```
dictionary = corpora.Dictionary(doc_clean)
print(dictionary)
```

```
Dictionary(1412 unique tokens: ['cable', 'comcast', 'internet', 'speed',
'disappear']…)
```

[28]:
```
doc_term_matrix = [dictionary.doc2bow(doc) for doc in doc_clean]
doc_term_matrix
```

[28]:
```
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 (660, 1),
 (747, 1),
 (871, 1),
 (872, 1)],
[(8, 1),
 (38, 1),
 (72, 1),
 (82, 1),
 (271, 1),
 (572, 1),
 (873, 1),
 (874, 1),
 (875, 1),
 (876, 1)],
[(1, 1), (38, 1), (159, 1), (877, 1)],
[(10, 1), (20, 1), (35, 1), (289, 1)],
[(12, 1), (193, 1), (294, 1), (393, 1), (878, 1), (879, 1)],
[(1, 1), (880, 1)],
[(1, 1), (8, 1), (71, 1), (72, 1), (283, 1), (411, 1), (559, 1), (881, 1)],
[(1, 1), (8, 1), (71, 1), (72, 1), (283, 1), (411, 1), (559, 1), (881, 1)],
[(1, 1), (8, 1), (72, 1), (197, 1), (875, 1)],
[(38, 1), (112, 1)],
[(0, 1), (1, 1)],
[(258, 1), (443, 1), (539, 1), (588, 1), (882, 1)],
[(883, 1), (884, 1)],
[(1, 1), (8, 1)],
[(1, 1), (102, 1)],
…]
```

[29]:
```
from gensim.models import LdaModel
```

[30]:
```
Num_Topic = 9
ldamodel = LdaModel(doc_term_matrix, num_topics= Num_Topic, id2word=␣
 ↪dictionary, passes= 30)
```

[31]:
```
topics = ldamodel.show_topics()
for topic in topics:
    print(topic)
    print()
```

```
(0, '0.093*"comcast" + 0.070*"service" + 0.069*"charge" + 0.028*"switch" +
0.025*"false" + 0.021*"payment" + 0.019*"bill" + 0.019*"bait" + 0.019*"email" +
0.018*"increased"')
```

```
(1, '0.072*"bill" + 0.071*"comcast" + 0.069*"cable" + 0.030*"charged" +
0.024*"charging" + 0.020*"paying" + 0.019*"xfinitycomcast" + 0.017*"several" +
0.017*"sale" + 0.016*"fee"')

(2, '0.061*"comcast" + 0.043*"without" + 0.039*"service" + 0.032*"contract" +
0.026*"fee" + 0.024*"access" + 0.024*"month" + 0.024*"2" + 0.020*"day" +
0.018*"appointment"')

(3, '0.225*"internet" + 0.142*"speed" + 0.109*"comcast" + 0.045*"xfinity" +
0.041*"throttling" + 0.036*"slow" + 0.018*"connection" + 0.017*"high" +
0.016*"monopoly" + 0.011*"pay"')

(4, '0.288*"service" + 0.146*"internet" + 0.083*"comcast" + 0.056*"customer" +
0.037*"poor" + 0.017*"terrible" + 0.017*"connectivity" + 0.014*"intermittent" +
0.012*"signal" + 0.010*"availability"')

(5, '0.226*"comcast" + 0.084*"issue" + 0.049*"billing" + 0.041*"service" +
0.017*"refund" + 0.017*"help" + 0.014*"limit" + 0.012*"bandwidth" +
0.010*"slowing" + 0.010*"rate"')

(6, '0.154*"billing" + 0.140*"comcast" + 0.061*"practice" + 0.051*"service" +
0.048*"unfair" + 0.030*"pricing" + 0.025*"complaint" + 0.022*"charge" +
0.022*"problem" + 0.022*"deceptive"')

(7, '0.115*"comcast" + 0.073*"complaint" + 0.039*"price" +
0.029*"comcastxfinity" + 0.024*"bill" + 0.023*"outage" + 0.019*"back" +
0.017*"billed" + 0.017*"phone" + 0.016*"installation"')

(8, '0.161*"data" + 0.130*"cap" + 0.125*"comcast" + 0.051*"internet" +
0.031*"usage" + 0.014*"overage" + 0.010*"broadband" + 0.010*"charge" +
0.010*"business" + 0.010*"xfinity"')
```

[32]:
```
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]
```

[33]:
```
pd.DataFrame(word_dict)
```

[33]:

	Topic # 0	Topic # 1	Topic # 2	Topic # 3	Topic # 4	\
0	comcast	bill	comcast	internet	service	
1	service	comcast	without	speed	internet	
2	charge	cable	service	comcast	comcast	
3	switch	charged	contract	xfinity	customer	
4	false	charging	fee	throttling	poor	

5	payment	paying	access	slow	terrible
6	bill	xfinitycomcast	month	connection	connectivity
7	bait	several	2	high	intermittent
8	email	sale	day	monopoly	signal
9	increased	fee	appointment	pay	availability
10	shitty	loss	time	price	connection
11	option	hbo	equipment	unreliable	slow
12	lied	year	show	promised	modem
13	change	contract	said	low	inconsistent
14	one	go	12	throttled	returned
15	credit	monthly	people	300gb	fix
16	scam	tv	notice	improper	install
17	request	incorrect	information	paying	outrageous
18	term	modem	bundle	misrepresentation	ask
19	pricing	false	agreement	consistently	predatory

	Topic # 5	Topic # 6	Topic # 7	Topic # 8
0	comcast	billing	comcast	data
1	issue	comcast	complaint	cap
2	billing	practice	price	comcast
3	service	service	comcastxfinity	internet
4	refund	unfair	bill	usage
5	help	pricing	outage	overage
6	limit	complaint	back	broadband
7	bandwidth	charge	billed	charge
8	slowing	problem	phone	business
9	rate	deceptive	installation	xfinity
10	please	fraudulent	bad	day
11	provide	monopolistic	mb	horrible
12	failure	cramming	home	quality
13	overcharge	account	advertised	tucson
14	plan	misleading	credit	provider
15	claim	customer	provided	mbps
16	ps4	lack	10	awful
17	throttle	unauthorized	system	week
18	hbogo	advertising	promotion	call
19	disconnection	regarding	without	home

[ ]: