Project 3 - Comcast telecom complaints

In [1]:

```
# Importing necessary libraries to the notebook

import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

```
# Code to view multiple outputs at one go

from IPython.core.interactiveshell import InteractiveShell
InteractiveShell.ast_node_interactivity = "all"
```

Task1 - Import Data in the Python environment

In [3]:

```
# Reading the data file

c_data = pd.read_csv('Comcast_telecom_complaints_data.csv')
```

EDA to check what the dataset is all about

In [4]:

```
c_data.head()

c_data.describe

c_data.shape

c_data.dtypes
```

Out[4]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes
4	307175	Comcast not working and no service to boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No

Out[4]:

```
<bound method NDFrame.describe of      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]>
```

Out[4]:

```
(2224, 11)
```

Out[4]:

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

The Complaints have 4 categories of Status

In [5]:

```
c_data['Status'].value_counts()
```

Out[5]:

```
Solved     973
Closed     734
Open       363
Pending    154
Name: Status, dtype: int64
```

Number of complaints registered via Internet and by calling Customer Care are almost the same

In [6]:

```
c_data['Received Via'].value_counts()
```

Out[6]:

```
Customer Care Call    1119
Internet              1105
Name: Received Via, dtype: int64
```

June 24th and 23rd has registtered maximum complaints

In [7]:

```
c_data['Date'].value_counts()
```

Out[7]:

```
24-06-15    218
23-06-15    190
25-06-15     98
26-06-15     55
```

```
30-06-15     53
           ...
05-12-15      7
05-10-15      7
04-05-15      6
04-11-15      5
05-03-15      5
Name: Date, Length: 91, dtype: int64
```

The city of Atlanta has registered the maximum Complaints

In [8]:

```
c_data['City'].value_counts()
```

Out[8]:

```
Atlanta         63
Chicago         47
Knoxville       36
Houston         33
Jacksonville    31
                ..
Woodbine         1
Fall City        1
Mount Airy       1
Dekalb           1
Thornton         1
Name: City, Length: 928, dtype: int64
```

The State of Georgia has made the maximum complaints

In [9]:

```
c_data['State'].value_counts()
```

Out[9]:

```
Georgia                 288
Florida                 240
California              220
Illinois                164
Tennessee               143
Pennsylvania            130
Michigan                115
Washington               98
Colorado                 80
Maryland                 78
New Jersey               75
Texas                    71
Massachusetts            61
Virginia                 60
Indiana                  59
Oregon                   49
Mississippi              39
Minnesota                33
Alabama                  26
Utah                     22
Arizona                  20
South Carolina           18
District Of Columbia     16
New Mexico               15
Louisiana                13
Connecticut              12
New Hampshire            12
```

```
Delaware                  12
West Virginia             11
Kentucky                   7
New York                   6
Arkansas                   6
Maine                      5
Missouri                   4
Ohio                       3
North Carolina             3
Vermont                    3
Kansas                     2
Nevada                     1
District of Columbia       1
Rhode Island               1
Montana                    1
Iowa                       1
Name: State, dtype: int64
```

Further analysis requires date and time as dependant variable, hence creating a date_index for all data

In [10]:
```
c_data["date_index"] = c_data["Date_month_year"] + " " + c_data["Time"]
```

In [11]:
```
c_data["date_index"] = pd.to_datetime(c_data["date_index"])
c_data["Date_month_year"] = pd.to_datetime(c_data["Date_month_year"])
```

In [12]:
```
c_data.head()

c_data.describe

c_data.shape

c_data.dtypes
```

Out[12]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	date_index
0	250635	Comcast Cable Internet Speeds	22-04-15	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	2015-04-22 15:53:50
1	223441	Payment disappear - service got disconnected	04-08-15	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	2015-08-04 10:22:56

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	date_index
2	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	2015-04-18 09:55:47
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes	2015-07-05 11:59:35
4	307175	Comcast not working and no service to boot	26-05-15	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No	2015-05-26 13:25:26

Out[12]:

```
<bound method NDFrame.describe of      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         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          date_index
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

[2224 rows x 12 columns]>
```

Out[12]:

```
(2224, 12)
```

Out[12]:

```
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
```

Task-2 Trend charts for the number of complaints at monthly and daily granularity levels.

Setting the index to date_index for the entire data frame

In [13]:

```
c_data = c_data.set_index(c_data["date_index"])
```

Complaints registered every month - June has the max complaints

In [14]:

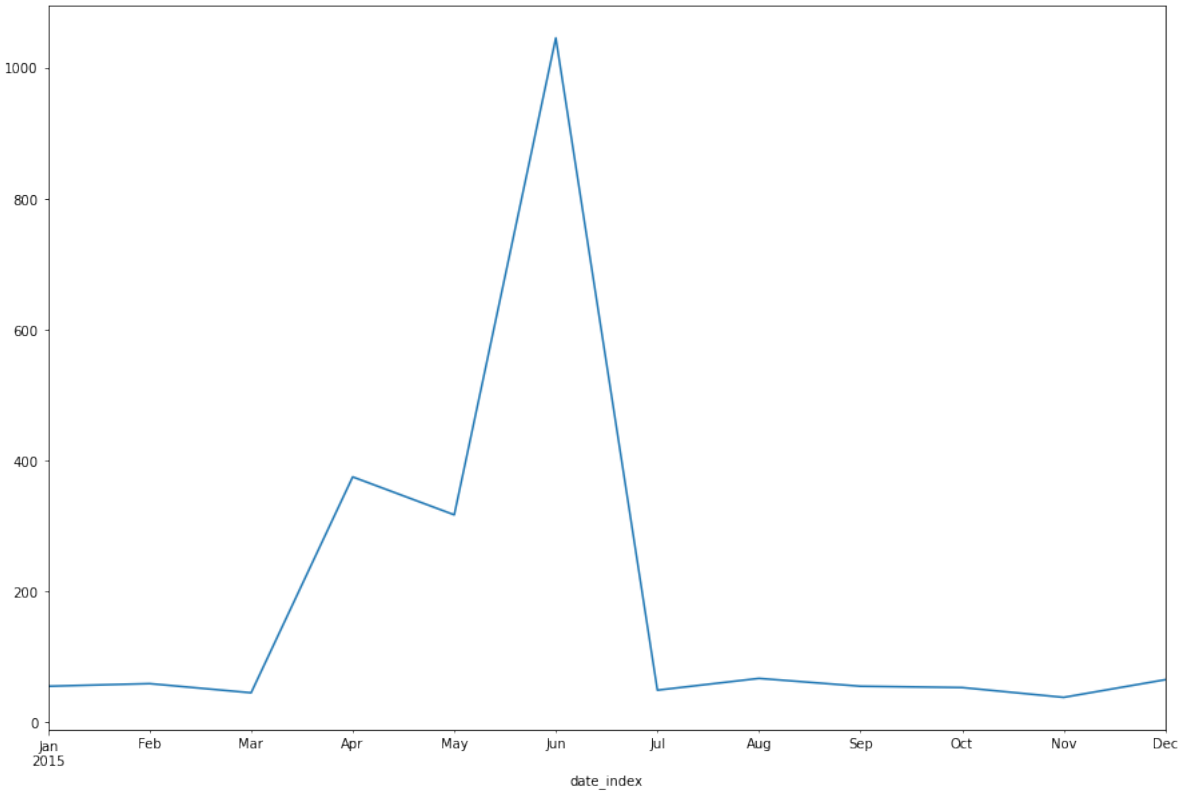
```
plt.figure(figsize=(15, 10))
c_data.groupby(pd.Grouper(freq="M")).size().plot()
```

Out[14]:

```
<Figure size 1080x720 with 0 Axes>
```

Out[14]:

```
<AxesSubplot:xlabel='date_index'>
```



Complaints registered on a daily basis - April, May and June had maximum daily complaints

In [15]:

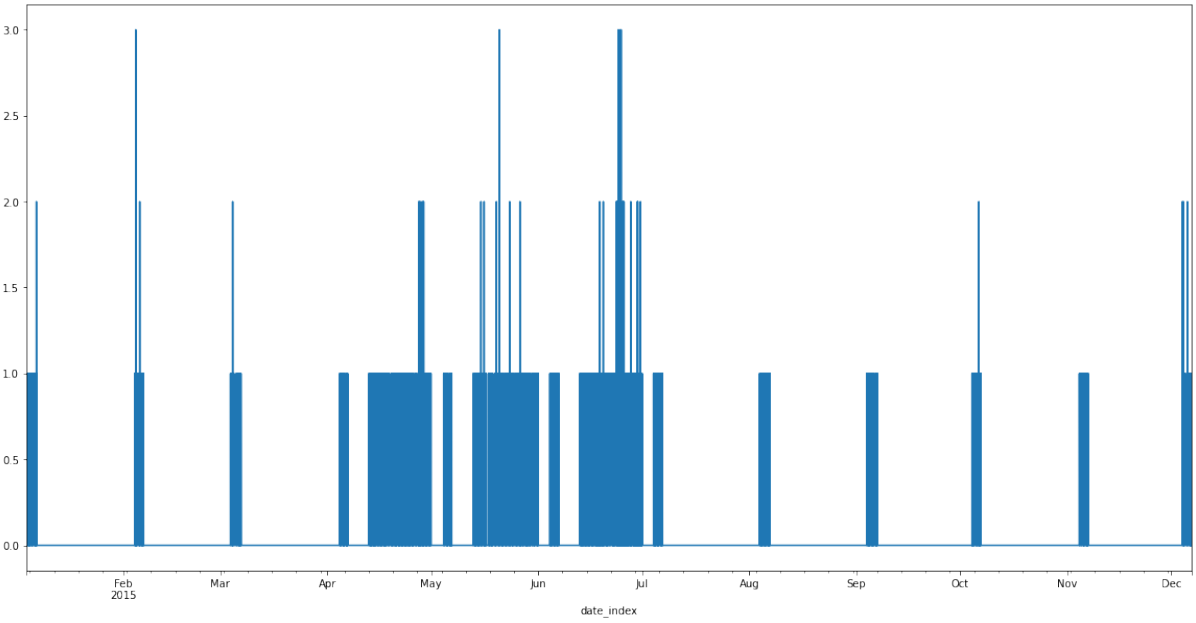
```
plt.figure(figsize=(20, 10))
c_data.groupby(pd.Grouper(freq="T")).size().plot()
```

Out[15]:

```
<Figure size 1440x720 with 0 Axes>
```

Out[15]:

```
<AxesSubplot:xlabel='date_index'>
```



Task-3 and 4 Types of complaints and the top complaints requries Text proceesing

In [16]:

```
# Importing required text processing libraries

from nltk.corpus import stopwords
from nltk.stem.wordnet import WordNetLemmatizer
import string

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

In [17]:

```
# function to clean the text used by the customers in their complaints

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
```

In [18]:

```
# converting the Customer Complaint dataframe column to list

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

In [19]:

```
# Importing dictionary for further processing of the text data

import gensim
from gensim import corpora

dictionary = corpora.Dictionary(doc_clean)
print(dictionary)
Dictionary(1412 unique tokens: ['cable', 'comcast', 'internet', 'speed', 'd
isappear']...)
```

In [20]:

```
# Creating a matrix of the document to bag of waords file

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

Out[20]:

```
[[(0, 1), (1, 1), (2, 1), (3, 1)],
 [(4, 1), (5, 1), (6, 1), (7, 1), (8, 1)],
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```

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 [(883, 1), (884, 1)],
 [(1, 1), (8, 1)],
 [(1, 1), (102, 1)],
 ...]
```

In [21]:

```
# Importing the LDA Model for text processing

from gensim.models import LdaModel

Num_Topic = 9
ldamodel = LdaModel(doc_term_matrix, num_topics= Num_Topic, id2word=
dictionary, passes= 30)
```

In [22]:

```
# Generating 9 Topic Models for the text data

topics = ldamodel.show_topics()
for topic in topics:
    print(topic)
    print()
(0, '0.129*"comcast" + 0.064*"internet" + 0.048*"cable" + 0.045*"service" +
0.021*"business" + 0.017*"home" + 0.016*"pay" + 0.016*"incorrect" + 0.015*"
bandwidth" + 0.014*"monopoly"')
```

```
(1, '0.177*"billing" + 0.112*"comcast" + 0.099*"issue" + 0.054*"service" +
0.021*"monthly" + 0.020*"day" + 0.018*"connectivity" + 0.015*"bill" + 0.014
*"installation" + 0.012*"increased"')

(2, '0.072*"comcast" + 0.055*"bill" + 0.028*"back" + 0.027*"year" + 0.026*"
paying" + 0.025*"contract" + 0.025*"equipment" + 0.023*"3" + 0.019*"call" +
0.019*"said"')

(3, '0.238*"data" + 0.192*"cap" + 0.135*"comcast" + 0.045*"usage" + 0.019*"
limit" + 0.015*"broadband" + 0.014*"connection" + 0.014*"xfinity" + 0.014*"
unreliable" + 0.013*"please"')

(4, '0.150*"service" + 0.097*"comcast" + 0.069*"customer" + 0.045*"poor" +
0.029*"charge" + 0.027*"internet" + 0.023*"refund" + 0.016*"charging" + 0.0
14*"account" + 0.014*"bad"')

(5, '0.109*"comcast" + 0.058*"charge" + 0.045*"service" + 0.035*"false" + 0
.033*"fee" + 0.028*"deceptive" + 0.023*"without" + 0.022*"charged" + 0.022*
"fraudulent" + 0.022*"sale"')

(6, '0.186*"comcast" + 0.182*"internet" + 0.084*"speed" + 0.062*"service" +
0.046*"complaint" + 0.026*"slow" + 0.021*"throttling" + 0.011*"bill" + 0.01
0*"outage" + 0.010*"high"')

(7, '0.093*"comcast" + 0.066*"practice" + 0.063*"billing" + 0.059*"unfair"
+ 0.045*"xfinity" + 0.039*"service" + 0.036*"pricing" + 0.019*"lack" + 0.01
9*"monopolistic" + 0.018*"get"')

(8, '0.085*"service" + 0.055*"internet" + 0.041*"price" + 0.037*"problem" +
0.036*"comcastxfinity" + 0.033*"comcast" + 0.033*"terrible" + 0.031*"month"
+ 0.029*"help" + 0.026*"access"')
```

In [23]:

```
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]
```

Task-3&4 Table of the most complaints and their frequencies

In [24]:

```
pd.DataFrame(word_dict)
```

Out[24]:

	Topic # 0	Topic # 1	Topic # 2	Topic # 3	Topic # 4	Topic # 5	Topic # 6	Topic # 7	Topic # 8
0	comcast	billing	comcast	data	service	comcast	comcast	comcast	service
1	internet	comcast	bill	cap	comcast	charge	internet	practice	internet
2	cable	issue	back	comcast	customer	service	speed	billing	price

	Topic # 0	Topic # 1	Topic # 2	Topic # 3	Topic # 4	Topic # 5	Topic # 6	Topic # 7	Topic # 8
3	service	service	year	usage	poor	false	service	unfair	problem
4	business	monthly	paying	limit	charge	fee	complaint	xfinity	comcastxfinity
5	home	day	contract	broadband	internet	deceptive	slow	service	comcast
6	pay	connectivity	equipment	connection	refund	without	throttling	pricing	terrible
7	incorrect	bill	3	xfinity	charging	charged	bill	lack	month
8	bandwidth	installation	call	unreliable	account	fraudulent	outage	monopolistic	help
9	monopoly	increased	said	please	bad	sale	high	get	access
10	email	several	people	overage	horrible	switch	intermittent	cramming	2
11	12	loss	hbo	plan	unauthorized	credit	promised	availability	phone
12	quality	price	charge	atlanta	option	contract	signal	provide	customer
13	overcharge	failure	go	u	information	advertising	without	scam	one
14	provider	time	fee	fee	awful	bill	rate	10	pricing
15	throttle	300gb	price	complaint	extremely	bait	show	hbogo	term
16	system	still	payment	throttling	week	xfinitycomcast	connection	disconnection	without

	Topic # 0	Topic # 1	Topic # 2	Topic # 3	Topic # 4	Topic # 5	Topic # 6	Topic # 7	Topic # 8
17	agreement	mbps	promotion	capmeter	overage	shitty	xfinity	improper	communication
18	security	every	modem	comcst	bundle	change	mb	unable	isp
19	day	last	blocking	malfeasance	excessive	refusal	throttled	inability	billed

Task 5 Open & Pending is to be categorized as Open and Closed & Solved is to be categorized as Closed.

In [25]:
```
c_data.Status.unique()
```
Out[25]:
```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

Creating a new status which has only Closed and Open as Status

In [26]:
```
c_data["newStatus"] = ["Open" if Status=="Open" or Status=="Pending" else "Closed" for Status in c_data["Status"]]
```
In [27]:
```
c_data.head()
```
Out[27]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zipcode	Status	Filing on Behalf of Someone	date_index	newStatus
date_index													
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	No	2015-04-22 15:53:50	Closed
2015-08-04	223441	Payment disappear -	04-08	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	2015-08-04	Closed

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zipcode	Status	Filing on Behalf of Someone	date_index	newStatus
date_index													
10:22:56		service got disconnected	-15									10:22:56	
2015-04-18 09:55:47	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	2015-04-18 09:55:47	Closed
2015-07-05 11:59:35	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes	2015-07-05 11:59:35	Open
2015-05-26 13:25:26	307175	Comcast not working and no service to boot	26-05-15	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No	2015-05-26 13:25:26	Closed

Task-6 State wise status of complaints in a stacked bar chart

In [28]:

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

Status_complaints
```

Out[28]:

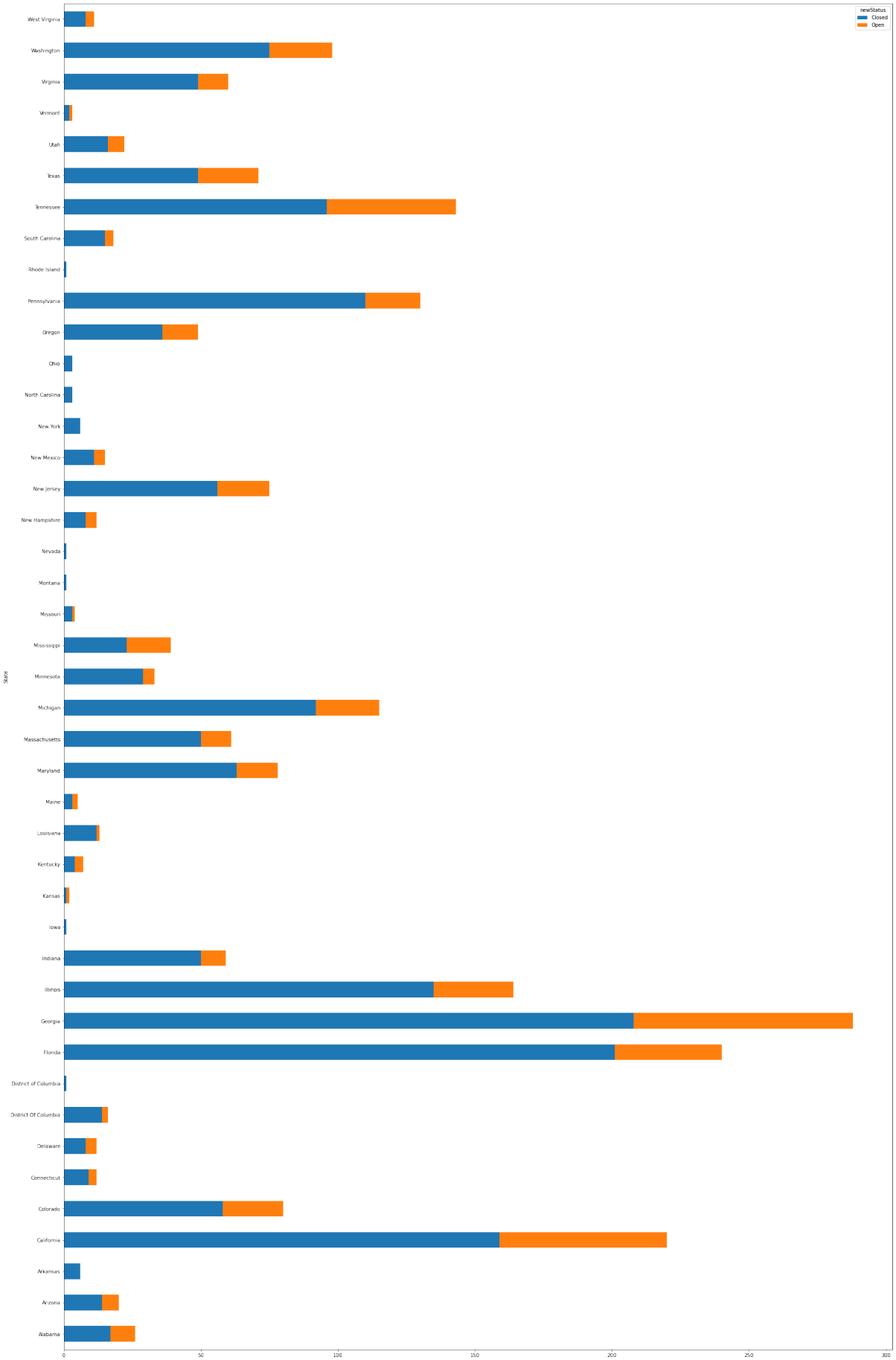
newStatus	Closed	Open
State		
Alabama	17.0	9.0
Arizona	14.0	6.0
Arkansas	6.0	0.0
California	159.0	61.0
Colorado	58.0	22.0
Connecticut	9.0	3.0
Delaware	8.0	4.0
District Of Columbia	14.0	2.0
District of Columbia	1.0	0.0
Florida	201.0	39.0
Georgia	208.0	80.0
Illinois	135.0	29.0
Indiana	50.0	9.0
Iowa	1.0	0.0
Kansas	1.0	1.0
Kentucky	4.0	3.0
Louisiana	12.0	1.0
Maine	3.0	2.0

newStatus	Closed	Open
State		
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

newStatus	Closed	Open
State		
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

In [29]:
```
Status_complaints.plot(kind="barh", figsize=(30,50), stacked=True)
```

Out[29]:
```
<AxesSubplot:ylabel='State'>
```


newStatus
Closed
Open
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
State
0
50
100
150
200
250
300

Task 7 - The State of Georgia has the highest number of Complaints = 288 complaints

In [30]:

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

Out[30]:

	State	Count
0	Georgia	288
1	Florida	240
2	California	220
3	Illinois	164
4	Tennessee	143
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

	State	Count
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

	State	Count
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

Task-8 State with maximum percentage of Unresolved Complaints is Kansas with 50% complaints Open

In [31]:

```
Open_complaints =
c_data.groupby(["State","newStatus"]).size().unstack().fillna(0)
Open_complaints['Percent'] =
(Open_complaints['Open']/(Open_complaints['Open']+Open_complaints['Closed']
))*100
Open_complaints['Percent'].sort_values(ascending=False)
```

Out[31]:

```
State
Kansas                 50.000000
Kentucky               42.857143
Mississippi            41.025641
Maine                  40.000000
Alabama                34.615385
New Hampshire          33.333333
Vermont                33.333333
Delaware               33.333333
Tennessee              32.867133
Texas                  30.985915
Arizona                30.000000
Georgia                27.777778
California             27.727273
Colorado               27.500000
West Virginia          27.272727
Utah                   27.272727
New Mexico             26.666667
Oregon                 26.530612
New Jersey             25.333333
```

```
Connecticut             25.000000
Missouri                25.000000
Washington              23.469388
Michigan                20.000000
Maryland                19.230769
Virginia                18.333333
Massachusetts           18.032787
Illinois                17.682927
South Carolina          16.666667
Florida                 16.250000
Pennsylvania            15.384615
Indiana                 15.254237
District Of Columbia    12.500000
Minnesota               12.121212
Louisiana                7.692308
Ohio                     0.000000
District of Columbia     0.000000
Rhode Island             0.000000
North Carolina           0.000000
New York                 0.000000
Montana                  0.000000
Arkansas                 0.000000
Nevada                   0.000000
Iowa                     0.000000
Name: Percent, dtype: float64
```

Task-9 Percentage of complaints resolved which were received via Internet and Cutomer Care Call

In [32]:

```
total_ = c_data['newStatus'].value_counts()
total_
```

Out[32]:

```
Closed    1707
Open       517
Name: newStatus, dtype: int64
```

In [33]:

```
dfnew = c_data.rename(columns={'Received Via': 'received'})

intdf = dfnew[(dfnew.received == "Internet")]
ccdf = dfnew[dfnew.received == "Customer Care Call"]

intdf
ccdf
```

Out[33]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	received	City	State	Zip code	Status	Filing on Behalf of Someone	date_index	newStatus
date_index													
2015-08-04 10:22:56	223441	Payment disappear - service got disconnected	04-08-15	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	2015-08-04 10:22:56	Closed
2015-04-18 09:55:47	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	2015-04-18 09:55:47	Closed
2015-07-05 11:59:35	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes	2015-07-05 11:59:35	Open
2015-05-26 13:25:26	307175	Comcast not working and no service to boot	26-05-15	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No	2015-05-26 13:25:26	Closed
2015-12-06 21:59:40	338519	ISP Charging for arbitrary data limits with ov...	06-12-15	2015-12-06	9:59:40 PM	Internet	Acworth	Georgia	30101	Solved	No	2015-12-06 21:59:40	Closed
...	...	...	...	...	...	...	...	...	...	...	...	...	...

	Ticket #	Customer Complaint	Date	Date_month_year	Time	received	City	State	Zip code	Status	Filing on Behalf of Someone	date_index	newStatus
date_index													
2015-06-06 16:01:16	326963	Internet Services	06-06-15	2015-06-06	4:01:16 PM	Internet	Wyoming	Michigan	49509	Closed	No	2015-06-06 16:01:16	Closed
2015-04-24 17:05:36	256002	i had sent out a check payment comcast	24-04-15	2015-04-24	5:05:36 PM	Internet	York	Pennsylvania	17401	Closed	No	2015-04-24 17:05:36	Closed
2015-05-28 08:56:14	310847	Comcast Internet Service quality	28-05-15	2015-05-28	8:56:14 AM	Internet	York	Pennsylvania	17403	Solved	No	2015-05-28 08:56:14	Closed
2015-04-24 05:05:25	254488	problems with internet service	24-04-15	2015-04-24	5:05:25 AM	Internet	York Haven	Pennsylvania	17370	Closed	No	2015-04-24 05:05:25	Closed
2015-09-06 17:28:41	331188	complaint about comcast	06-09-15	2015-09-06	5:28:41 PM	Internet	Ypsilanti	Michigan	48197	Solved	No	2015-09-06 17:28:41	Closed

1105 rows × 13 columns

Out[33]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	received	City	State	Zipcode	Status	Filing on Behalf of Someone	date_index	newStatus
date_index													
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	No	2015-04-22 15:53:50	Closed
2015-06-24 10:13:55	361148	Throttling service and unreasonable data caps	24-06-15	2015-06-24	10:13:55 AM	Customer Care Call	Acworth	Georgia	30101	Pending	No	2015-06-24 10:13:55	Open
2015-01-06 23:46:30	318072	Comcast extended outages	06-01-15	2015-01-06	11:46:30 PM	Customer Care Call	Alameda	California	94502	Closed	No	2015-01-06 23:46:30	Closed
2015-06-28 18:46:31	371214	Comcast Raising Prices and Not Being Available...	28-06-15	2015-06-28	6:46:31 PM	Customer Care Call	Alameda	California	94501	Open	Yes	2015-06-28 18:46:31	Open
2015-06-05 15:09:49	276409	YAHOO FAILURE TO RESTORE EMAIL SEARCH	05-06-15	2015-06-05	3:09:49 PM	Customer Care Call	Albuquerque	New Mexico	87109	Closed	No	2015-06-05 15:09:49	Closed

	Ticket #	Customer Complaint	Date	Date_month_year	Time	received	City	State	Zip code	Status	Filing on Behalf of Someone	date_index	newStatus
date_index													
		FEATURE											
...	...	...	...	...	...	...	...	...	...	...	...	...	...
2015-12-06 18:35:59	338192	Speed throttling, speeds not at promised output	06-12-15	2015-12-06	6:35:59 PM	Customer Care Call	Yorkville	Illinois	60560	Open	Yes	2015-12-06 18:35:59	Open
2015-02-04 09:13:18	213550	Service Availability	04-02-15	2015-02-04	9:13:18 AM	Customer Care Call	Youngstown	Florida	32466	Closed	No	2015-02-04 09:13:18	Closed
2015-02-06 13:24:39	318775	Comcast Monthly Billing for Returned Modem	06-02-15	2015-02-06	1:24:39 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No	2015-02-06 13:24:39	Closed
2015-06-23 23:13:30	360489	Extremely unsatisfied Comcast customer	23-06-15	2015-06-23	11:13:30 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No	2015-06-23 23:13:30	Closed
2015-06-24	363614	Comcast, Ypsilanti MI	24-06	2015-06-24	10:28:33 PM	Customer	Ypsilanti	Michigan	48198	Open	Yes	2015-06-24	Open

	Ticket #	Customer Complaint	Date	Date_month_year	Time	received	City	State	Zip code	Status	Filing on Behalf of Someone	date_index	newStatus	date_index
22:28:33		Internet Speed	-15			Care Call						22:28:33		

1119 rows × 13 columns

In [34]:

```
ci = intdf['newStatus'].value_counts()
ci
```

Out[34]:

```
Closed    843
Open      262
Name: newStatus, dtype: int64
```

Percentage of Total Internet complaints closed = 76.28%

In [35]:

```
Percent1 = (ci.Closed/(ci.Closed + ci.Open))*100
Percent1
```

Out[35]:

```
76.289592760181
```

In [36]:

```
cc = ccdf['newStatus'].value_counts()
cc
```

Out[36]:

```
Closed    864
Open      255
Name: newStatus, dtype: int64
```

Percentage of Total Customer Care Call complaints closed = 77.21%

In [37]:

```
Percent2 = (cc.Closed/(cc.Closed + cc.Open))*100
Percent2
```

Out[37]:

```
77.21179624664879
```