In [36]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

In [37]:
```
df = pd.read_csv("Comcast_telecom_complaints_data.csv")
```

In [38]:
```
df.head(3)
```

Out[38]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed

In [39]:
```
df["date_index"] = df["Date_month_year"] + " " + df["Time"]
```

In [40]:
```
df["date_index"] = pd.to_datetime(df["date_index"])
df["Date_month_year"] = pd.to_datetime(df["Date_month_year"])
```

In [41]:
```
df.dtypes
```

Out[41]:
```
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
```

In [42]:
```
df = df.set_index(df["date_index"])
```

In [43]:
```
df.head(3)
```

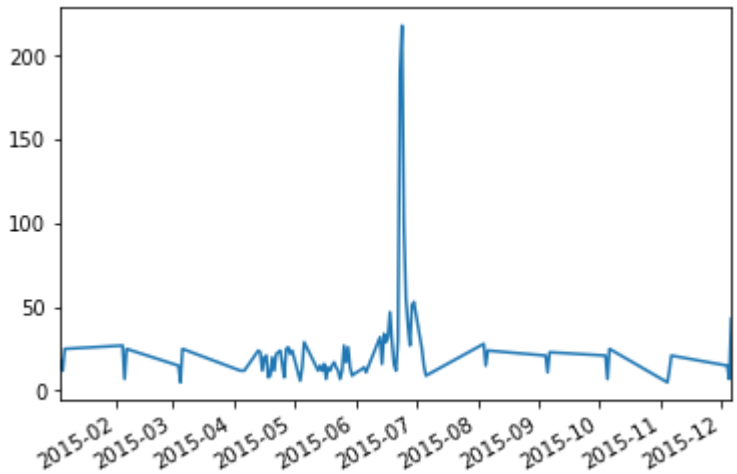
Out[43]:

date_index	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code
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
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
2015-04-18 09:55:47	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101

In [44]:
```
df["Date_month_year"].value_counts()[:3]
```

Out[44]:
```
2015-06-24    218
2015-06-23    190
2015-06-25     98
Name: Date_month_year, dtype: int64
```

In [45]:
```
df["Date_month_year"].value_counts().plot();
```



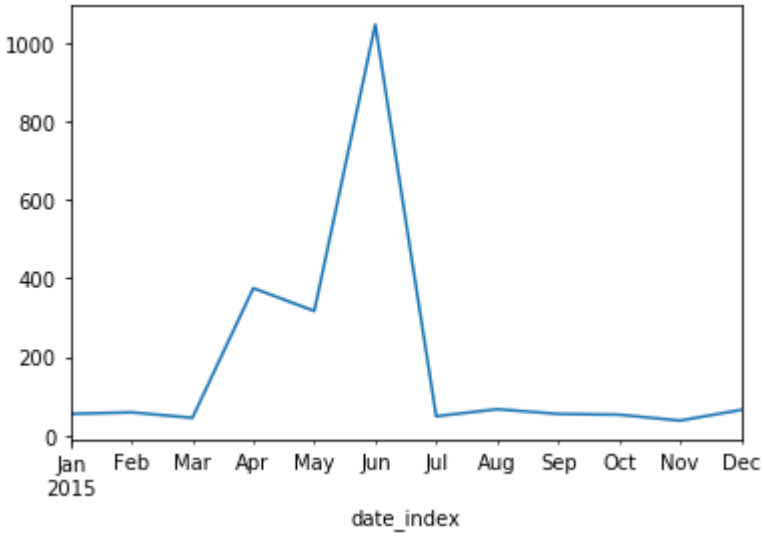
In [46]:
```
f = df.groupby(pd.Grouper(freq="M")).size()
```

In [47]:
```
f.head()
```

Out[47]:
```
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
```

In [48]:
```
df.groupby(pd.Grouper(freq="M")).size().plot()
```

Out[48]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f183083c6d8>
```



In [49]:
```
df.Status.unique()
```

Out[49]:
```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

In [50]:
```
df["newStatus"] = ["Open" if Status=="Open" or Status=="Pending" else "Closed"
for Status in df["Status"]]
```

In [51]:
```
df.head(3)
```

Out[51]:

date_index	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code
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
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
2015-04-18 09:55:47	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101

In [52]:
```
df.groupby(["State"]).size().sort_values(ascending=False).to_frame().reset_ind
ex().rename({0: "Count"}, axis=1)[:5]
```

Out[52]:

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

In [53]:
```
Status_complaints = df.groupby(["State","newStatus"]).size().unstack().fillna(
0)
Status_complaints
```

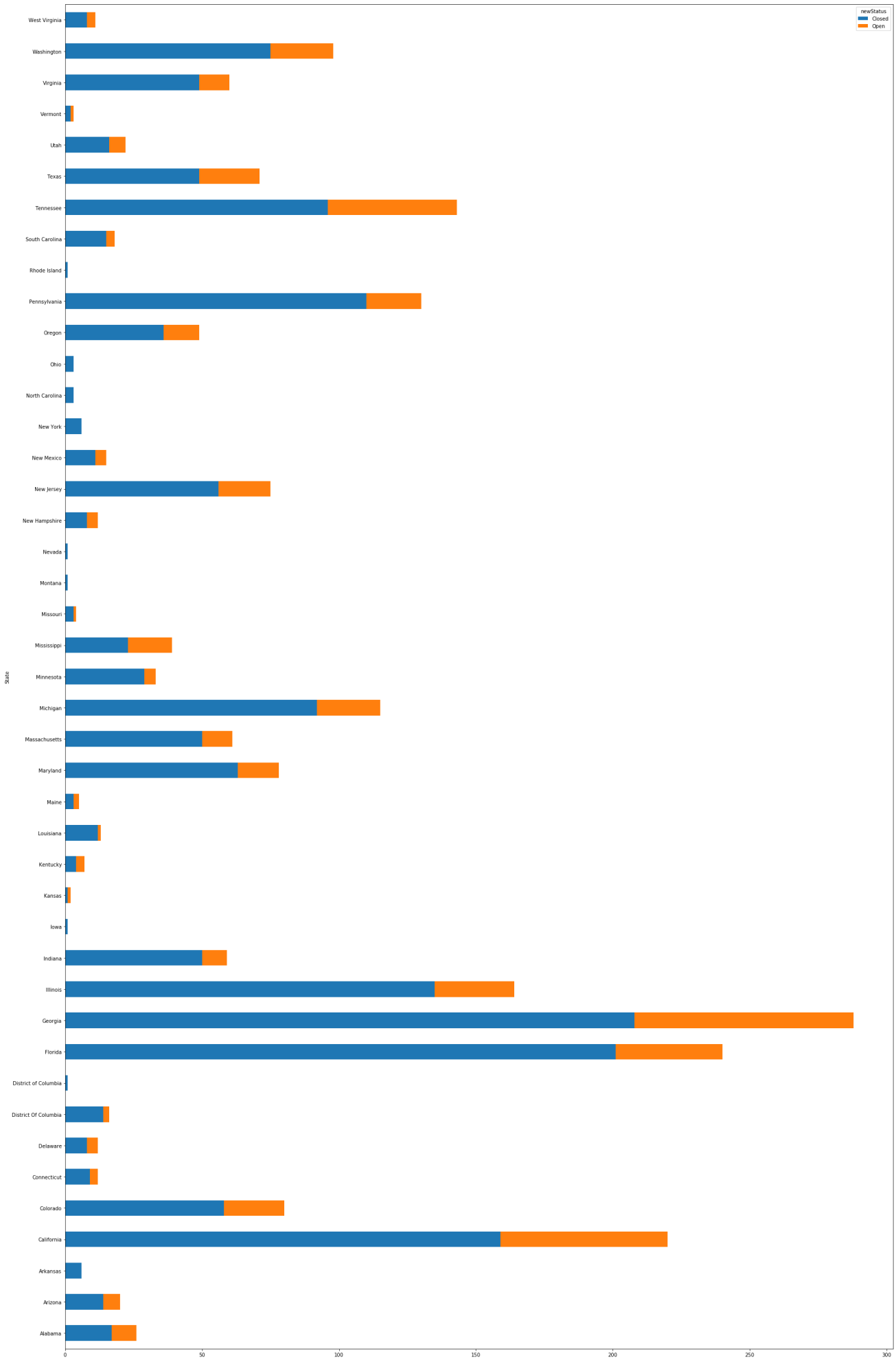
Out[53]:

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

newStatus	Closed	Open
State		
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 [54]:
```
Status_complaints.plot(kind="barh", figsize=(30,50), stacked=True)
```

Out[54]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f18307f7940>
```



In [55]:
```
df.groupby(["State"]).size().sort_values(ascending=False).to_frame().reset_index().rename({0: "Count"}, axis=1).max()
```

Out[55]:
```
State    West Virginia
Count              288
dtype: object
```

In [56]:
```
df.groupby(["State","newStatus"]).size().unstack().fillna(0).max()
```

Out[56]:
```
newStatus
Closed    208.0
Open       80.0
dtype: float64
```

In [57]:
```
!pip install wordcloud
```

```
Requirement already satisfied: wordcloud in /opt/anaconda3/lib/python3.7/site-packages (1.5.0)
Requirement already satisfied: numpy>=1.6.1 in /opt/anaconda3/lib/python3.7/site-packages (from wordcloud) (1.16.3)
Requirement already satisfied: pillow in /opt/anaconda3/lib/python3.7/site-packages (from wordcloud) (6.0.0)
```

In [58]:
```
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 [59]:
```
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 [60]:
```
doc_complete = df["Customer Complaint"].tolist()
doc_clean = [clean(doc).split() for doc in doc_complete]
```

In [61]:
```
import gensim
from gensim import corpora
```

In [62]:
```
dictionary = corpora.Dictionary(doc_clean)
print(dictionary)
```

```
Dictionary(1416 unique tokens: ['cable', 'comcast', 'internet', 'speed', 'disappear']...)
```

In [63]:
```
doc_term_matrix = [dictionary.doc2bow(doc) for doc in doc_clean]
doc_term_matrix
```

Out[63]:
```
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In [64]:
```
from gensim.models import LdaModel
```

In [65]:
```
Num_Topic = 9
ldamodel = LdaModel(doc_term_matrix, num_topics= Num_Topic, id2word= dictionar
y, passes= 30)
```

In [66]:
```
topics = ldamodel.show_topics()
for topic in topics:
    print(topic)
    print()
```

```
(0, '0.144*"billing" + 0.084*"service" + 0.074*"practice" + 0.066*"unfair" +
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+ 0.019*"high"')

(4, '0.041*"comcast" + 0.040*"speed" + 0.029*"credit" + 0.024*"payment" + 0.0
23*"promised" + 0.023*"service" + 0.021*"bill" + 0.021*"charge" + 0.020*"char
ged" + 0.020*"slowing"')

(5, '0.275*"comcast" + 0.125*"service" + 0.078*"internet" + 0.063*"billing" +
0.047*"issue" + 0.023*"customer" + 0.020*"xfinity" + 0.018*"charge" + 0.011
*"fraudulent" + 0.010*"failure"')

(6, '0.193*"internet" + 0.143*"speed" + 0.055*"slow" + 0.053*"comcast" + 0.01
9*"connectivity" + 0.014*"issue" + 0.013*"business" + 0.012*"call" + 0.010*"a
dvertised" + 0.010*"charge"')

(7, '0.140*"comcast" + 0.126*"data" + 0.102*"cap" + 0.045*"complaint" + 0.033
*"service" + 0.030*"internet" + 0.024*"usage" + 0.016*"customer" + 0.012*"cha
rge" + 0.012*"help"')

(8, '0.124*"comcast" + 0.063*"service" + 0.061*"internet" + 0.042*"bill" + 0.
037*"throttling" + 0.036*"cable" + 0.023*"problem" + 0.022*"without" + 0.022
*"comcastxfinity" + 0.014*"cramming"')
```

In [67]:
```
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]
```

In [68]:
```
pd.DataFrame(word_dict)
```

Out[68]:

	Topic # 0	Topic # 1	Topic # 2	Topic # 3	Topic # 4	Topic # 5	Topic # 6	Topic # 7
0	billing	fee	comcast	price	comcast	comcast	internet	comcast
1	service	equipment	service	false	speed	service	speed	data
2	practice	comcast	bill	connection	credit	internet	slow	cap
3	unfair	xfinitycomcast	month	paying	payment	billing	comcast	complaint
4	internet	charge	sale	switch	promised	issue	connectivity	service
5	pricing	asking	deceptive	bait	service	customer	issue	internet
6	poor	throttle	access	unreliable	bill	xfinity	business	usage
7	outage	bandwidth	account	low	charge	charge	call	customer
8	monopolistic	broadband	charging	home	charged	fraudulent	advertised	charge c
9	incorrect	day	without	high	slowing	failure	charge	help
10	complaint	improper	refund	service	unauthorized	contract	scam	2
11	option	last	wont	speed	throttled	terrible	disconnection	limit
12	quality	deceptive	email	monopoly	change	provide	mbps	year
13	claim	sold	back	xfinity	billed	shitty	promotion	fee
14	provided	violation	12	advertising	hbogo	300gb	time	modem
15	provider	extortion	mb	system	week	monopoly	overage	monthly
16	inability	comcasts	pay	contract	download	refusal	much	xfinity
17	xfinity	cable	one	security	device	regarding	complaint	intermittent
18	get	advertising	practice	information	inconsistent	lack	consistently	contract
19	signal	unreturned	10	supervisor	every	still	refusing	day

In [ ]:

In [ ]:

In [ ]: