

```
In [ ]: #importing necessary files
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import io
```

```
In [ ]: #setting up the directory
%cd "C:\Users\Public\Python\Project3\"
```

```
In [ ]: #importing the data into a dataframe sales
complaints = pd.read_csv("Comcast_telecom_complaints_data.csv")
```

```
In [ ]: #checking the datatype of the columns
complaints.dtypes
```

```
In [ ]: #displaying 1st 5 rows
complaints.head()
```

```
In [ ]: #Data Preprocessing
```

```
In [ ]: complaints['Date']=pd.to_datetime(complaints.Date)#fixing the date datatype from object
```

```
In [ ]: complaints['Time']=pd.to_datetime(complaints.Time)#changing the time datatype from object
```

```
In [ ]: complaints['Time']=complaints.Time.dt.time#extracting time
```

```
In [ ]: complaints.head()#displaying 1st 5 rows
```

```
In [ ]: #Dropping the column 'Date_month_year' as its duplicate
complaints=complaints.drop(['Date_month_year'],axis=1)
```

```
In [ ]: complaints.head()#displaying 1st 5 rows
```

```
In [ ]: complaints.isnull().sum().sort_values(ascending=False)#checking for null values
```

```
In [ ]: complaints.shape
```

```
In [ ]: #converting zip code to object
complaints=complaints.astype({'Zip code':object})
```

```
In [ ]: complaints.dtypes
```

```
In [ ]: # 1)Provide the trend chart for the number of complaints at monthly and daily granulari
x=complaints.Date.value_counts()
with pd.option_context('display.max_rows', None, 'display.max_columns', None):
    display(x)
```

```
In [ ]: # Plot of daily complaints
from matplotlib.pyplot import figure #importing library to change size of the plot
figure(figsize=(8, 6), dpi=80)#change size of the plot

complaints.Date.value_counts().plot()
#Labelling x & y axis
plt.xlabel("Date")
plt.ylabel("Count")
```

```
In [ ]: # monthly complaints
complaints['Month']=complaints.Date.dt.month #Extracting the month from the Date.
```

```
In [ ]: complaints.head()
```

```
In [ ]: complaints.Month.value_counts()#categorising the data by months
```

```
In [ ]: # Plot of monthly complaints
from matplotlib.pyplot import figure #importing library to change size of the plot
figure(figsize=(8, 6), dpi=80)#change size of the plot
complaints.Month.value_counts().plot(kind='barh')
#Labelling x & y axis
plt.xlabel("Count")
plt.ylabel("Month")
```

```
In [ ]: # 3) Provide a table with the frequency of complaint types.
```

```
In [ ]: complaints.head(3)#displaying just 3 rows
```

```
In [ ]: complaints['Customer Complaint'].value_counts()
```

```
In [ ]: complaints= complaints.apply(lambda x: x.astype(str).str.upper())#converting all the da
```

```
In [ ]: complaints['Customer Complaint'].value_counts()
```

```
In [ ]: #removing the duplicate COMCAST DATA CAP
```

```
complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMCAST DA
```

```
In [ ]: # checking the data and removing the duplicates as much as possible.  
complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMCAST BI
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['DATA CAPS'
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['DATA CAP']
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['BILLING'],
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMCAST BI
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMCAST BI
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['BILLING IS
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['SLOW INTER
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['NO INTERNE
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['INTERNET A
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['AVAILABILT
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['NO INTERNE
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['UNFAIR BIL
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMCAST CO
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMCAST IS
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMPLAINT
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['COMCAST BI
```

```
In [ ]: complaints['Customer Complaint'].value_counts()

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['SHADY INTE
                                             'COMCAST BIL

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['OVERCHARGE
                                             'COMCAST BIL

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['COMCAST CH
                                             'COMCAST BIL

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['BANDWIDTH

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(
    ['COMCAST USING A DATA CAP TO TAKE HOWEVER MUCH MONEY THEY LIKE'], 'COMCAST DATA CAP

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['COMCAST DA

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['COMCAST DA

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['BILLING PR

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['MONTHLY CH

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['MONTHLY BI

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(
    ['COMCAST HAS NOT APPLIED CREDIT OF CLOSE TO $400'], 'COMCAST BILLING')

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['COMCAST PR

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(
    ['COMCAST WONT REFUND ME FOR OVER CHARGE'], 'COMCAST BILLING')

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['CHARGES'],

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['COMCAST/XF

In [ ]: complaints['Customer Complaint'] = complaints['Customer Complaint'].replace(['COMCAST IN
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['INTERNET S
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace(['INTERNET']
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({'COMCAST IN
                                             'COMCAST UNFAIR BILLING
                                             'BILLING DISPUT
                                             'BILLING COM
                                             'COMCAST BILLING AND SE
                                             'UNFAIR PRICING ':'COMC
                                             })
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({'MISC. CHAR
                                             'COMCAST REFUSING TO HO
                                             'COMCAST-BILLIN
                                             'CHARGING FOR SERVICE WITH OUT FIXI
                                             'COMCAST CHARGING ME FOR ITEMS I DO NOT
                                             'COMCAST KEEPS HIKING MY BILL F
                                             })
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({'SPEED/PRIC
                                             'FEES NOT DISCLOSED BEFORE SERVICE WAS INSTALLED':'COMCAST BILLING'
                                             'COMCAST NOT REFUNDING MY CREDIT':'COMCAST BILLING',
                                             'KEEP GETTING CHARGED RENTAL FEES FOR MODEM I ALREADY
                                             'UNAUTHORIZED 2-YEAR CONTRACT WITH COMCAST':'COMCAST BILLING', 'COMCAST - UNFAIR BILLING
                                             "COMCAST'S UNFAIR PRICING":'COMCAST BILLING', 'BILLING AND SERVICE':'COMCAST BILLING',
                                             'COMCAST - UNFAIR BILLING P
                                             'SPEED/PRICING':'COMCAST BILLING', 'INCORRECT BILLING AND SERV
                                             })
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({'
                                             'COMCAST IS A TERRIBLE SERVICE':'COMCAST SERVICE',
                                             'UNACCEPTABLE BUSINESS INTERNET SERVICE FROM COMCAST':'COMCAST SERVICE',
                                             'COMCAST MISREPRESENTED THEIR SERVICE AREA, THEN CHARGED ME FOR ATTEMPTING TO USE IT.':
                                             'COMCAST DOES NOT DELIVER SERVICE':'COMCAST SERVICE',
                                             'COMCAST TV/INTERNET HOOKUP':'COMCAST SERVICE', 'MISLEADING SALES PRACTICE AND ADVERTISI
                                             'SIGNIFICANT QUALITY LOSS':'COMCAST SERVICE',
                                             'WEST COAST SERVICE ISSUES - COMCAST':'COMCAST SERVICE',
                                             'COMCAST WILL NOT LET ME DISCUSS MY BILL OR SERVICE WITH A REPRESENTATIVE ':'COMCAS
                                             'XFINITY SECURITY SYSTEM':'COMCAST SERVICE',
                                             'COMCAST POOR CUSTOMER SERVICE':'COMCAST SERVICE', 'COMCAST BILLING & CUSTOMER SERVICE':
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({'
                                             'COMCAST SPEED AND CAP MISINFORMATION':'COMCAST DATA CAP',
                                             'COMCAST/XFINITY INTERNET DATA CAP':'COMCAST DATA CAP',
                                             'COMAST DATA CAP':'COMCAST DATA CAP'
                                             })
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({'
```

```
'CHARGE FOR EQUIPMENT FROM COMCAST I WAS NOT MADE AWARE WHEN I ORDERED IT': 'COMCAST'
'COMCAST SPEEDS NOT AS ADVERTISED': 'COMCAST INTERNET',
"LIED TO!!! NOW I'M SUFFERING?!?! AND AT A LOSS!!!": 'COMCAST',
'COMCAST ADVERTISED WIFI INTERNET SPEED NOT PROVIDED FALSE ADVERTISMENT': 'COMCAST I
'LACK OF REASONABLE INFRASTRUCTURE CLOSE TO TOWN': 'COMCAST SERVICE',
'WASTED TIME AND MONEY!': 'COMCAST',
'COMCAST - MAJOR COMPLAINT 1ST TIME CUSTOMER - AGGRAVATED HEALTH ISSUES': 'COMCAST',
'RECURRING COMCAST SERVICE ISSUES AND LONG WAITS FOR NON-SERVICE': 'COMCAST SERVICE'
'THROTTLE INTERNET': 'COMCAST INTERNET',
'INTERNET SERVICE TERMINATION': 'COMCAST INTERNET', 'INTERNET SPEEDS ARE THROTTLED': '
'COMCAST SERVICE OVERCHARGE FOR INTERNET AND PHONE': 'COMCAST BILLING',
'PROBLEMS WITH INTERNET SERVICE': 'COMCAST INTERNET',
'COMCAST BILL AND SERVICE DISCLOSURE': 'COMCAST BILLING', 'POSTAL MAIL TICKET #2334':
'CABLE SERVICE AND TELEPHONE CONNECT NOT COMPLETE': 'COMCAST SERVICE',
'EXTREMELY SLOW INTERNET SPEEDS; HORRIBLE SUPPORT': 'COMCAST INTERNET',
'COMCAST SERVICE AND CUSTOMER SERVICE REPRESENTATIVE': 'COMCAST SERVICE',

}}
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
'COMCAST REFUSES TO LOWER MY BILL TO PREVOIUS AGREEMENT': 'COMCAST BILLING',
'COMCAST EXCESSIVE CHARGE WHEN CANCELLING SERVICE': 'COMCAST BILLING',
"INCORRECT BILLING OF NON-RENTED EQUIPMENT": 'COMCAST BILLING',
'CONSTANT INTERNET ISSUES': 'COMCAST INTERNET',
'SERVICE PROVIDED IS NOT WHAT WAS PROMISED': 'COMCAST SERVICE',
'SERVICE COMPLAINT': 'COMCAST SERVICE',
'POOR CUSTOMER SERVICE WITH COMCAST': 'COMCAST SERVICE',
'ONLINE ADERTISED PRICE WAS NOT HONORED OVER PHONE': 'COMCAST BILLING',
'XFINITY/COMCAST CABLE': 'COMCAST INTERNET',
'COMCAST -- THROTTLING CONNECTION': 'COMCAST INTERNET',
'COMCAST IS LIMITING MY ACCESS TO DATA BY USING "DATA CAPS": 'COMCAST DATA CAP',
'COMCAST EXTENDED OUTAGES': 'COMCAST INTERNET',
'DECEPTIVE BUSINESS PRACTICES BY COMCAST': 'COMCAST',
'COMCAST REFUSES TO UHOLD CONTRACT FOR 2 YEARS PHONE/INTERNET': 'COMCAST BILLING',
'BLOCKING THE VIEWING OF WEBSITES': 'COMCAST',
'CAP ON DATA USAGE': 'COMCAST DATA CAP',
'COMCAST LIES TO THE CUSTOMER JUST TO GET THEM OFF THE PHONE': 'COMCAST SERVICE',
'POOR INTERNET SERVICE': 'COMCAST INTERNET',
'COMCAST!': 'COMCAST'

})
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
'COMCAST/XFINITY POOR SERVICE, FRAUDULENT BILLING AND COLLECTION': 'COMCAST BILLING'
'DSL': 'COMCAST',
"COMCAST VIOLATING OPEN INTERNET RULES": 'COMCAST INTERNET',
'MONTHLY RATE CONFUSION & POOR CUSTOMER SUPPORT': 'COMCAST SERVICE',
'DATA CAPS FOR BROADBAND INTERNET': 'COMCAST DATA CAP',
'BAD INTERNER SPEEDS AND ACCESS': 'COMCAST INTERNET',
'ARBITRARY PRICE INCREASE': 'COMCAST BILLING',
'BILLING ISSUES WITH COMCAST': 'COMCAST BILLING',
'COMCAST DATA USAGE ROBBING US': 'COMCAST INTERNET',
'COMCAST DISCONTINUATION OF SERVICE ISSUE': 'COMCAST SERVICE',
'60 DAYS TO CLOSE MY ACCOUNT': 'COMCAST',
'DATA CAP PROBLEMS': 'COMCAST DATA CAP',
'COMCAST HOME SECURITY SYSTEM': 'COMCAST',
'DECEPTIVE SALES PRACTICES': 'COMCAST SERVICE',
'HEARSTS MAGAZINE CONTEST SCAM': 'COMCAST',
'XFINITY/COMCAST TETHERING CONNECTION': 'COMCAST INTERNET',
```

```
'COMCAST ISP OIO VIOLATION': 'COMCAST',
'XFINITY CUSTOMER SERVICE': 'COMCAST SERVICE',
'INTERNET SPEED ON WIRELESS CONNECTION': 'COMCAST INTERNET'
})
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
'COMCAST WRONG ADVERTISED SPEEDS': 'COMCAST INTERNET',
'INCORRECT BILL': 'COMCAST BILLING', "COMCAST BECOMING A HASSLE": 'COMCAST',
'COMCAST ETF CHARGE': 'COMCAST BILLING',
'BEING LIED TO, AND MISLEAD BY COMCAST / XFINITY': 'COMCAST',
'COMCAST XFINITY CHARGING RENTAL FEE FOR PERSONALLY OWNED MODEM': 'COMCAST BILLING',
'CHEATING CUSTOMER': 'COMCAST BILLING', 'COMCAST OF INDIANA': 'COMCAST',
'COMCAST SERVICE CORVALLIS, OR.': 'COMCAST SERVICE',
'ROBBER BARRON BILLING PRACTICES': 'COMCAST BILLING',
'DATA USAGE CAP WITH COMCAST XFINITY': 'COMCAST DATA CAP',
'DECEPTIVE SALES- CHANGE IN BILLING AMOUNT ETC.': 'COMCAST BILLING',
'COMCAST XFINITY PRICE GOUGING SENIORS': 'COMCAST BILLING', 'FRAUDULENT ADVERTISING'
'COMCAST & SONY PLAYSTATION DEVICES': 'COMCAST', 'COMCASTS SHADY BUSINESS PRACTICES'
'COMCAST BILLING/SERVICE': 'COMCAST BILLING', 'INSTALLATION CHARGES': 'COMCAST BILLING'
'PROBLEMS WITH COMCAST XFINITY INTERNET SERVICE': 'COMCAST INTERNET'
})
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
'SERVICES INTERRUPTED': 'COMCAST SERVICE',
'COMCAST OVER CHARGE': 'COMCAST BILLING', "300GB/MONTH DATA CAP": 'COMCAST DATA CAP',
'COMCAST INTERNET AND TV FALSE INFORMATION AND FALSE PRICE': 'COMCAST BILLING',
'COMCAST BLOCKING HBO GO ACCESS ON PLAYSTATION 4': 'COMCAST',
'COMCAST (CHICAGO IL)': 'COMCAST',
'BILLING OVERCHARGING ISSUES BY COMCAST': 'COMCAST BILLING', 'RIDICULOUS CHARGES': 'CO
'INTERMITTANT PHONE AND INTERNET': 'COMCAST SERVICE',
'OUTRAGEOUS BILLING COSTS AND DATA CAPS': 'COMCAST BILLING',
'BILLING & CUSTOMER SERVICE ISSUES': 'COMCAST BILLING',
'COMCAST TRANSFER OF SERVICE COMPLAINT': 'COMCAST SERVICE',
'COMCAST BILLING SUPPORT AND PRACTICES': 'COMCAST BILLING', 'COMCAST BUNDLES': 'COMCA
'COMCAST BILLING / SPEED ISSUES': 'COMCAST BILLING', 'COMCAST IS BLOCKING HBO GO IN
'COMCAST SERVICE AGREEMENT': 'COMCAST SERVICE', 'INTERNET PRICES IN U.S.A': 'COMCAST B
'COMCAST REFUSING TO FIX CONNECTIVITY ISSUES': 'COMCAST SERVICE'
})
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
'FAULTY SERVICE AND FALSE ADVERTISEMENT': 'COMCAST SERVICE',
'SERVICE, BILLING': 'COMCAST BILLING', "COMCAST CONNECTION ISSUES": 'COMCAST SERVICE'
'COMCAST RATE': 'COMCAST BILLING',
'2 MONTHS AND COMCAST HAS NOT FIXED PROBLEM': 'COMCAST SERVICE', 'BILL FLUCUATION': '
'COMCAST LOWERING INTERNET SPEEDS ON CONSTANT BASIS ': 'COMCAST INTERNET',
'COMCAST INTERNET AND CABLE SERVICE': 'COMCAST SERVICE', 'COMCAST UNFAIR BUSINESS PRA
'CUSTOMER SERVICE & PRICE': 'COMCAST SERVICE',
'SOMEONE AT COMCAST ADDED SERVICES WITHOUT ME KNOWING': 'COMCAST SERVICE',
'MANIPULATIVE BILLING ISSUE': 'COMCAST BILLING',
'LONG TERM BILLING ISSUE WITH RUDE CUSTOMER SERVICE CAUSED DEPRESSION AND TRAUMA': '
'COMCAST- NOT RESPONSIVE TO MULTIPLE REQUESTS FOR SERVICE': 'COMCAST SERVICE',
'COMCAST DATA CAP OVERAGE FEES': 'COMCAST BILLING',
'RATES': 'COMCAST BILLING', 'EXTREMELY POOR CUSTOMER SERVICE': 'COMCAST SERVICE',
'XFINITY ORDER STATUS': 'COMCAST SERVICE',
'COMCAST CHARGING TOO MUCH AND INTERNET SPEED LOWER THAN ORDERED': 'COMCAST BILLING'
'POOR SERVICE FROM COMCAST': 'COMCAST SERVICE'
})
```



```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
    'INTERNET SPEED':'COMCAST INTERNET',
    'SERVICE ISSUES':'COMCAST SERVICE', "COMCAST CABLE":'COMCAST SERVICE',
    'UNFAIR PRICING':'COMCAST BILLING',
    'COMCAST XFINITY':'COMCAST', 'COMCAST UNFAIR BILLING PRACTICES':'COMCAST BILLING',
    'SPEED':'COMCAST INTERNET',
    'COMCAST BILLING AND SERVICE ISSUES':'COMCAST BILLING','COMCAST CUSTOMER SERVICE':
    'BILLING DISPUTE':'COMCAST BILLING',
    'COMCAST INTERNET COMPLAINT':'COMCAST INTERNET',
    'SLOW INTERNET SPEEDS':'COMCAST INTERNET',
    'INTERNET THROTTLING':'COMCAST INTERNET',
    'COMCAST INTERNET SPEEDS':'COMCAST INTERNET',
    'MONOPOLY':'COMCAST',
    'THROTTLING':'COMCAST INTERNET', 'COMPLAINT ABOUT COMCAST':'COMCAST',
    'NO SERVICE':'COMCAST SERVICE',
    'BILLING/SERVICE ISSUES':'COMCAST BILLING',
    'COMCAST THROTTLING':'COMCAST INTERNET'
})
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
    'BILLING COMPLAINT':'COMCAST BILLING',
    'COMCAST BUSINESS INTERNET':'COMCAST INTERNET', "INTERNET PROBLEMS":'COMCAST INTERNET',
    'SLOW INTERNET SPEED':'COMCAST INTERNET',
    'COMCAST CHARGES':'COMCAST BILLING', 'COMCAST BAIT AND SWITCH':'COMCAST',
    'COMCAST/XFINITY CUSTOMER SERVICE':'COMCAST SERVICE',
    'COMCAST FALSE ADVERTISING':'COMCAST',
    'COMCAST -EXFINITY CUSTOMER SERVICE ERRORS, LIES AND WASTED TIME':'COMCAST SERVICE',
    'COMCAST THROTTLING INTERNET':'COMCAST INTERNET',
    'CUSTOMER SERVICE':'COMCAST SERVICE',
    'INTERNET DOWN':'COMCAST INTERNET',
    'COMCAST TERRIBLE EXPERIENCE WITH NO RESOLUTION':'COMCAST SERVICE',
    'MONOPOLISTIC BILLING PRACTICES':'COMCAST BILLING',
    'INTERNET HELP @ , SOUTH LYON, MI 48178':'COMCAST INTERNET',
    'INTERMITTENT INTERNET':'COMCAST INTERNET', 'BAIT AND SWITCH':'COMCAST',
    'INCORRECT BILLING':'COMCAST BILLING',
    'COMCAST SPEED':'COMCAST INTERNET',
    'COMCAST INTERNET FOR LOW INCOME FAMILIES':'COMCAST INTERNET'
})
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
    'COMCAST UNWILLING TO RESOLVE DATA USAGE ISSUE':'COMCAST INTERNET',
    'UNABLE TO RETURN EQUIPMENT':'COMCAST INTERNET', "FRAUD":'COMCAST SERVICE',
    'EXAGGERATED BILL AND LACK OF RESPONSIBILITIES IN KEEP APPOINTMENTS! DISRESPECT FOR
    'COMCAST CUSTOMER CARE ( RACISM)':'COMCAST SERVICE', 'INTERNET OUTAGES':'COMCAST INTERNET',
    'BAD CUSTOMER SERVICE':'COMCAST SERVICE','COMCAST MONOPOLY':'COMCAST',
    'COMCAST CABLE UNAUTHORIZED CHARGES':'COMCAST BILLING',
    'CHARGED FOR DATA NOT ACTUALLY USED':'COMCAST BILLING',
    'DATA OVERAGE CHARGES':'COMCAST BILLING',
    'ABOUT COMCAST':'COMCAST',
    'COMCAST DATA USAGE CHARGES':'COMCAST BILLING',
    'COMCAST THROTTLING SPEEDS':'COMCAST INTERNET',
    'COMCAST DATA USAGE METER':'COMCAST INTERNET'
})
```

```
In [ ]:
```



```
complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
    'CABLE':'COMCAST INTERNET',
    'DATA CAP OVERAGES':'COMCAST DATA CAP', "COMCAST BILL":'COMCAST BILLING',
    'CONTINUED SLOWNESS FOR ALMOST 3 WEEKS':'COMCAST INTERNET',
    'PROBLEMS WITH COMCAST':'COMCAST', 'COMCAST SERVICE BILLING':'COMCAST BILLING',
    'INVALID SERCICE':'COMCAST SERVICE', 'COMCAST INTERNET OVERAGE CHARGES':'COMCAST BIL
    'UNRELIABLE CONNECTIONS':'COMCAST INTERNET', 'COMCAST SLOW INTERNET':'COMCAST INTERN
    'COMCAST BILLING PROBLEM':'COMCAST BILLING', 'COMCAST RUN AROUND':'COMCAST',
    'COMCAST INTERNET DATA CAP ':'COMCAST DATA CAP',
    'COMCAST/XFINITY- PAYING FOR HIGH SPEED SERVICE':'COMCAST BILLING',
    'DECEPTIVE TRADE':'COMCAST SERVICE'
})
```

```
In [ ]: complaints['Customer Complaint']= complaints['Customer Complaint'].replace({
    'INTERNET SERVICES':'COMCAST INTERNET',
    'COMCAST SERVICE COMPLAINT':'COMCAST SERVICE', "COMCAST 300GB DATA CAP":'COMCAST DA
    'INTERNET THROTTLING & UNFAIR BILLING PRACTICES':'COMCAST BILLING',
    'SPEED THROTTLING':'COMCAST INTERNET', 'INTERNET BILLING':'COMCAST BILLING',
    'COMCAST UNFAIR BILLING':'COMCAST BILLING', 'COMCAST INTERNET SERVICE COMPLAINT':'CO
    'INTERNET CONNECTIVITY':'COMCAST INTERNET', 'XFINITY':'COMCAST',
    'COMCAST INTERNET DATA CAP':'COMCAST DATA CAP', 'COMCAST FRAUDULENT CHARGES':'COMCAS
    'LACK OF SERVICE, SERVICE CALL COMPLAINT':'COMCAST SERVICE',
    'COMCAST USAGE CAPS':'COMCAST DATA CAP'
})
```

```
In [ ]: #Provide a table with the frequency of complaint types.
x= complaints['Customer Complaint'].value_counts()
with pd.option_context('display.max_rows', None, 'display.max_columns', None):
    display(x)
```

```
In [ ]: #Which complaint types are maximum i.e., around internet, network issues, or across any
complaints['Customer Complaint'].value_counts().sort_values(ascending=False)[:1]
#sorted the complaints based on the 'Customer Complaint',sorted them and found the 1st
```

```
In [ ]: #billing issues are the highest complaints
```

```
In [ ]: #Create a new categorical variable with value as Open and Closed. Open & Pending is to
#Closed & Solved is to be categorized as Closed.
complaints['NewStatus']="new"
complaints.loc[(complaints['Status'] == 'OPEN') | (complaints['Status'] == 'PENDING'),
complaints.loc[(complaints['Status'] == 'CLOSED') | (complaints['Status'] == 'SOLVED'),
complaints.head()
#creating a new column 'NewStatus' and assigning the value OPEN/CLOSED depending on the
#OPEN if Status has value Pending or Open
#CLOSED if Status has value CLOSED or SOLVED
```

```
In [ ]: complaints.NewStatus.value_counts()# ensuring no "new" status is there
#1707 complaints are closed while 517 complaints are open.
```

```
In [ ]: #Provide state wise status of complaints in a stacked bar chart.
fig,axs =plt.subplots(figsize=(8,15))#fixing the plot size.
```

```
axs.bar(complaints['NewStatus'],complaints['State'])
```

```
In [ ]: #Which state has the maximum complaints  
complaints.State.value_counts().sort_values(ascending=False)[:1]  
#finding the complaints count by state , sorted them and found the 1st row to find the
```

```
In [ ]: #Georgia has the max complaints with 288 complaints.
```

```
In [ ]: #Which state has the highest percentage of unresolved complaints
```

```
In [ ]: UnresolvedComplaints=complaints[complaints['NewStatus']=='OPEN']  
#extracting only the Open complaints.
```

```
In [ ]: ((UnresolvedComplaints.State.value_counts()/UnresolvedComplaints.State.value_counts().s  
#finding the number of unresolved complaints per state and dividing it by total unresol  
#to get percent and then rounding it to 1 decimal point.Then taking just the first row
```

```
In [ ]: #GEORGIA with 15.473888% has the highest percentage of unresolved cases.
```

```
In [ ]: #Provide the percentage of complaints resolved till date, which were received through t  
ResolvedComplaints=complaints[complaints['NewStatus']=='CLOSED']  
#extracting only the closed complaints.
```

```
In [ ]: (ResolvedComplaints['Received Via'].value_counts()/ResolvedComplaints['Received Via'].v  
#finding the number of resolved complaints per state and dividing it by total resolved  
#to get percent and then rounding it to 1 decimal point.
```

```
In [ ]: #Out of the resolved complaints,50.6% were received via customer care call and 49.4% we
```

```
In [ ]:
```