assesment-ans

May 3, 2024

1) Download the data from the file data source and provide possible data insights.

```
[4]: import pandas as pd
     import numpy as np
     import matplotlib
     import seaborn as sns
     from matplotlib import pyplot as plt
     %matplotlib inline
     matplotlib.rcParams['figure.figsize']=(8,4)
```

```
[5]: import warnings
     warnings.filterwarnings('ignore')
```

```
[6]: df=pd.read_csv(r"C:\Users\jm88\Music\New folder\DataScience\Adapt␣
      ↪Ready\complaints.csv")
     df.head()
```

```
[6]:  Date received                                           Product  \
     0    2024-01-23  Credit reporting or other personal consumer re…
     1    2024-01-24  Credit reporting or other personal consumer re…
     2    2024-01-24  Credit reporting or other personal consumer re…
     3    2024-01-23  Credit reporting or other personal consumer re…
     4    2024-01-23  Credit reporting or other personal consumer re…

             Sub-product                                Issue  \
     0  Credit reporting  Incorrect information on your report
     1  Credit reporting  Incorrect information on your report
     2  Credit reporting           Improper use of your report
     3  Credit reporting           Improper use of your report
     4  Credit reporting           Improper use of your report

                                               Sub-issue  \
     0                 Information belongs to someone else
     1                 Information belongs to someone else
     2  Credit inquiries on your report that you don't…
     3      Reporting company used your report improperly
     4      Reporting company used your report improperly
```

```
                      Consumer complaint narrative  \
0                                              NaN   
1                                              NaN   
2                                              NaN   
3  In accordance with the Fair Credit Reporting a…   
4  I have observed several deviations from mandat…   

                             Company public response  \
0  Company has responded to the consumer and the …   
1  Company has responded to the consumer and the …   
2  Company has responded to the consumer and the …   
3  Company has responded to the consumer and the …   
4  Company has responded to the consumer and the …   

                                Company State ZIP code Tags  \
0  TRANSUNION INTERMEDIATE HOLDINGS, INC.    ME    04005  NaN   
1  TRANSUNION INTERMEDIATE HOLDINGS, INC.    FL    33311  NaN   
2  TRANSUNION INTERMEDIATE HOLDINGS, INC.    PA    175XX  NaN   
3  TRANSUNION INTERMEDIATE HOLDINGS, INC.    TX    79907  NaN   
4  TRANSUNION INTERMEDIATE HOLDINGS, INC.    NY    10075  NaN   

  Consumer consent provided? Submitted via Date sent to company  \
0       Consent not provided           Web           2024-01-23   
1                      Other           Web           2024-01-24   
2                      Other           Web           2024-01-24   
3           Consent provided           Web           2024-01-23   
4           Consent provided           Web           2024-01-23   

      Company response to consumer Timely response? Consumer disputed?  \
0  Closed with non-monetary relief              Yes                NaN   
1  Closed with non-monetary relief              Yes                NaN   
2  Closed with non-monetary relief              Yes                NaN   
3  Closed with non-monetary relief              Yes                NaN   
4  Closed with non-monetary relief              Yes                NaN   

   Complaint ID  
0       8206605  
1       8211390  
2       8211362  
3       8210433  
4       8209430  
```

[7]:
```
df.isnull().sum()
```

[7]:
```
Date received                        0
Product                              0
Sub-product                     235292
```

```
Issue                                 2
Sub-issue                        734684
Consumer complaint narrative    3329405
Company public response         2677245
Company                               0
State                             45517
ZIP code                          30225
Tags                            4653480
Consumer consent provided?      1024493
Submitted via                         0
Date sent to company                  0
Company response to consumer         14
Timely response?                      0
Consumer disputed?              4366651
Complaint ID                          0
dtype: int64
```

[49]:
```
df.shape
```

[49]:
```
(5134967, 18)
```

1 EDA & Visualazation

[9]:
```
df["Sub-product"].fillna('Others', inplace = True)
df["Sub-issue"].fillna('Others', inplace = True)
df["Issue"].fillna('Others', inplace = True)
df["State"].fillna('Others', inplace = True)
df["Consumer complaint narrative"].fillna('None', inplace = True)
df["Company public response"].fillna('None', inplace = True)
df["Consumer consent provided?"].fillna('None', inplace = True)
df["Company response to consumer"].fillna('None', inplace = True)
df["Consumer disputed?"].fillna('None', inplace = True)
#df['Sub-issue'].unique()
```

[10]:
```
df['Tags'].unique()
```

[10]:
```
array([nan, 'Older American, Servicemember', 'Servicemember',
       'Older American'], dtype=object)
```

[11]:
```
df["Tags"].fillna('Others', inplace = True)
```

[12]:
```
df["Tags"].unique()
```

[12]:
```
array(['Others', 'Older American, Servicemember', 'Servicemember',
       'Older American'], dtype=object)
```

[13]:
```python
df['Tags'].replace("Older American, Servicemember","Older American &␣
↪Servicemember", inplace = True)
```

[14]:
```python
df["Tags"].unique()
```

[14]:
```
array(['Others', 'Older American & Servicemember', 'Servicemember',
       'Older American'], dtype=object)
```

[15]:
```python
df1=df.drop(['ZIP code'],axis=1)
```

[16]:
```python
df1.isnull().sum()
```

[16]:
```
Date received                   0
Product                         0
Sub-product                     0
Issue                           0
Sub-issue                       0
Consumer complaint narrative    0
Company public response         0
Company                         0
State                           0
Tags                            0
Consumer consent provided?      0
Submitted via                   0
Date sent to company            0
Company response to consumer    0
Timely response?                0
Consumer disputed?              0
Complaint ID                    0
dtype: int64
```

2 Data Insights

3 Tags

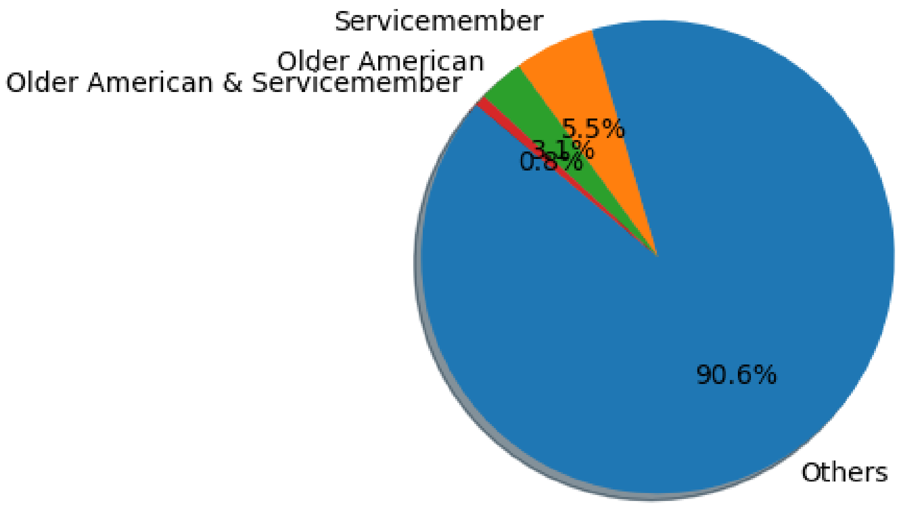
[17]:
```python
df1["Tags"].value_counts()
```

[17]:
```
Others                            4653480
Servicemember                      283442
Older American                     158828
Older American & Servicemember      39217
Name: Tags, dtype: int64
```

[18]:
```python
import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)
```

```
Responce = (df1["Tags"].value_counts())[:10]
lab = "Others", "Servicemember","Older American", "Older American &␣
↪Servicemember"
explode = (0,0,0,0)
#create bar chart of top 10 teams
Responce.plot(kind='pie', explode=explode , labels = lab,autopct='%1.1f%%',␣
↪shadow=True, startangle=140)
plt.ylabel("")
```

[18]:
```
Text(0, 0.5, '')
```



Analyse compliants using "Tags". 1) Service member is 5.5%. 2) Older American is 3.1%. 3) Older American & Servicemember is only 0.8% 4) Other is 90.6%. So most of the compliants from other Tags.

4 Submitted via

[19]:
```
df1["Submitted via"].value_counts()
```

[19]:
```
Web             4584816
Referral         248139
Phone            180150
Postal mail       94538
Fax               25658
Web Referral       1241
Email               425
```

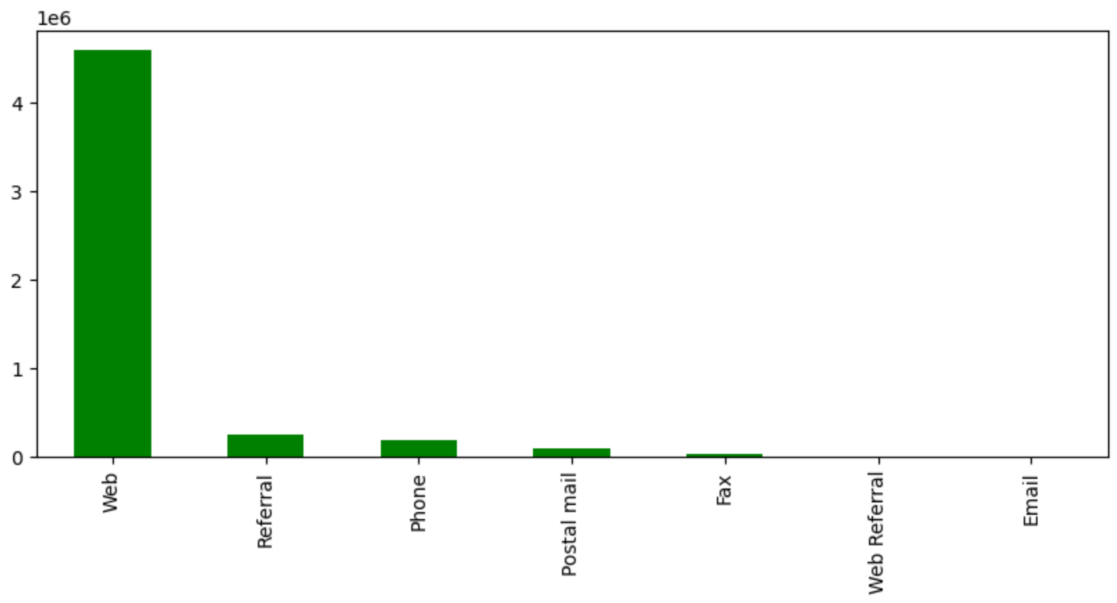
```
Name: Submitted via, dtype: int64
```

[20]:
```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)

top_10_teams = (df1["Submitted via"].value_counts())

#create bar chart of top 10 teams
top_10_teams.plot(kind='bar',color = "green")
```

[20]:
```
<Axes: >
```



Analyse compliants using "Submitted Via". * Most of the compliants Submitted Via "Web". Web submitted counts "4584816".

5 Sub-product

[21]:
```
df1["Sub-product"].value_counts()
```

[21]:
```
Credit reporting                                3069348
Others                                           235292
Checking account                                 227762
General-purpose credit card or charge card       197036
I do not know                                    133125
                                                  …
Transit card                                         37
```

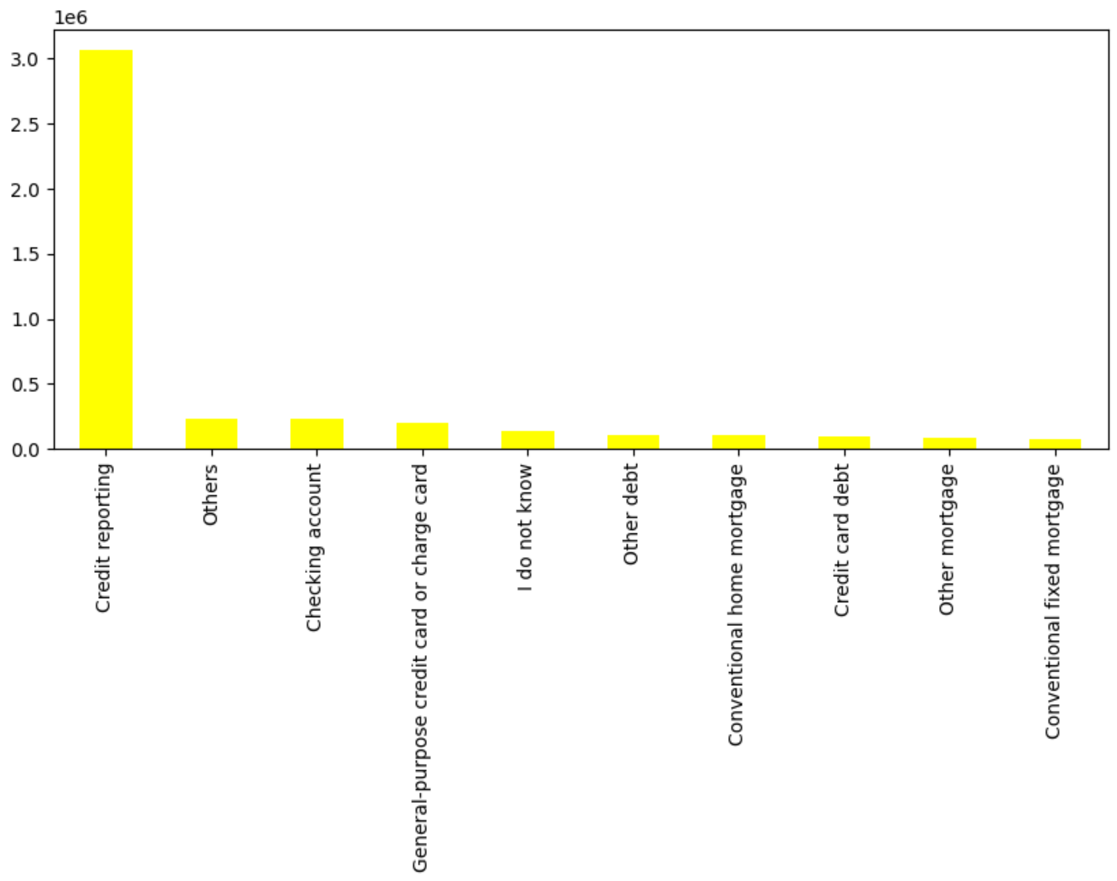
```
Earned wage access                                    36
Student loan debt relief                              21
Electronic Benefit Transfer / EBT card                12
Tax refund anticipation loan or check                  8
Name: Sub-product, Length: 87, dtype: int64
```

[22]:
```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)

top_10_teams = (df1["Sub-product"].value_counts())[:10]

#create bar chart of top 10 teams
top_10_teams.plot(kind='bar',color = "yellow")
```

[22]:
```
<Axes: >
```



[23]:
```
Total=df1["Sub-product"].count()
value = (3069348/Total)*100
value
```

```
[23]: 59.773470793483185
```

Analyse compliants using "Sub-Product". * Most of the compliants about "Credit reporting". Credit reporting compliants counts "3069348". * Credit reporting compliant is almost 60% in Sub-Product.

6 Product

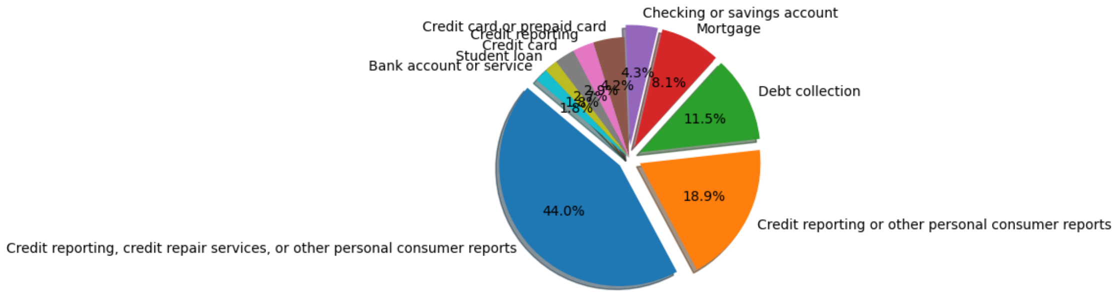
```
[39]: df1["Product"].unique()
df1["Product"].value_counts()[:10]
```

```
[39]: Credit reporting, credit repair services, or other personal consumer reports
2163878
Credit reporting or other personal consumer reports
931699
Debt collection
564942
Mortgage
397485
Checking or savings account
211779
Credit card or prepaid card
206373
Credit reporting
140429
Credit card
131953
Student loan
87898
Bank account or service
86205
Name: Product, dtype: int64
```

```
[40]: import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)

Responce = (df1["Product"].value_counts())[:10]
lab = "Credit reporting, credit repair services, or other personal consumer␣
 ↪reports","Credit reporting or other personal consumer reports","Debt␣
 ↪collection","Mortgage","Checking or savings account","Credit card or prepaid␣
 ↪card","Credit reporting","Credit card","Student loan","Bank account or␣
 ↪service"
explode = (0.1, 0.1, 0.1, 0.1, 0.1,0,0,0,0,0)
#create bar chart of top 10 teams
Responce.plot(kind='pie', explode=explode , labels = lab,autopct='%1.1f%%',␣
 ↪shadow=True, startangle=140)
plt.ylabel("")
```

[40]:
```
Text(0, 0.5, '')
```



Analyse compliants using "Product". * Most of the compliants about "Credit reporting, credit repair services, or other personal consumer reports". * "Credit reporting and Debt collection" are most of the compliants Products.

7 State

[23]:
```
df1["State"].value_counts()
```

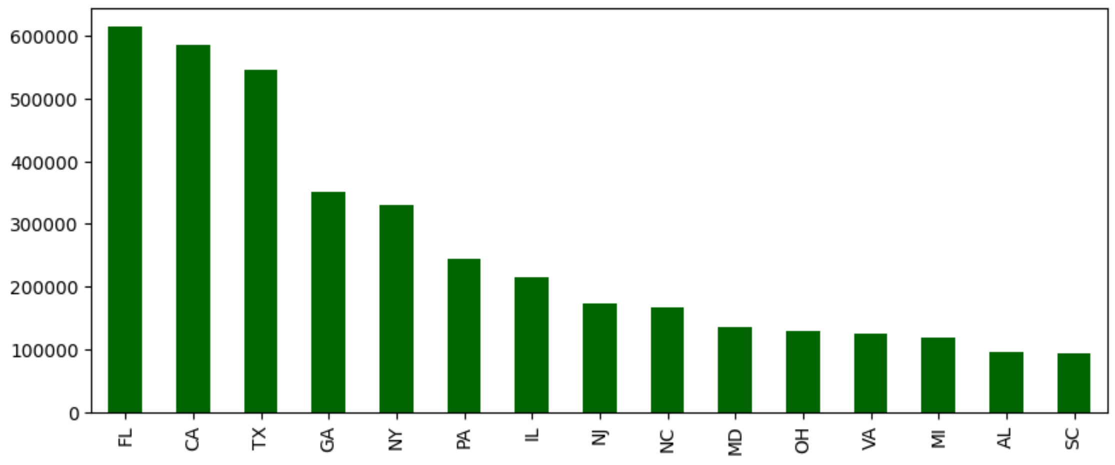
[23]:
```
FL    614893
CA    586768
TX    546373
GA    351669
NY    329708
       …
AA        59
MP        56
AS        47
MH        33
PW        13
Name: State, Length: 64, dtype: int64
```

[24]:
```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)

State = (df1["State"].value_counts())[:15]

#create bar chart of top 10 teams
State.plot(kind='bar',color = "darkgreen")
```

[24]:
```
<Axes: >
```



Analyse compliants using “States”. * Most of the compliants raised from FL, CA, TX, GA, NY, PA, IL States.

8 Issue

```
[41]: df1["Issue"].value_counts()
```

```
[41]: Incorrect information on your report
      1492050
      Improper use of your report
      790888
      Problem with a credit reporting company's investigation into an existing problem
      589336
      Attempts to collect debt not owed
      210783
      Problem with a company's investigation into an existing problem
      198504
           …
      Lender sold the property
      7
      Property was damaged or destroyed property
      7
      Lender damaged or destroyed property
      3
      Lost or stolen refund
      2
      Others
      2
      Name: Issue, Length: 179, dtype: int64
```

```
[42]: Total=df1["Issue"].count()
```

[43]:
```
#-> Total persentage of "Incorrect information on your report"
value = (1492050/Total)*100
```

[44]:
```
value
```

[44]:
```
29.056661902598403
```

Analyse compliants using "Issue". * Incorrect information on your report is 29% in Total Issues. # Top 5 issues 1) Incorrect information on your report
2) Improper use of your report
3) Problem with a credit reporting company's investigation into an existing problem
4) Attempts to collect debt not owed
5) Problem with a company's investigation into an existing problem

[29]:
```
df1["Sub-issue"].value_counts()
```

[29]:
```
Information belongs to someone else
988837
Others
734684
Reporting company used your report improperly
517881
Their investigation did not fix an error on your report
452281
Credit inquiries on your report that you don't recognize
268236
     …
Problem with a credit reporting company's investigation into an existing problem
5
Issues with financial aid services
4
Credit monitoring or identity theft protection services
1
Problem with fraud alerts or security freezes
1
Improper use of your report
1
Name: Sub-issue, Length: 273, dtype: int64
```

9 Timely response?

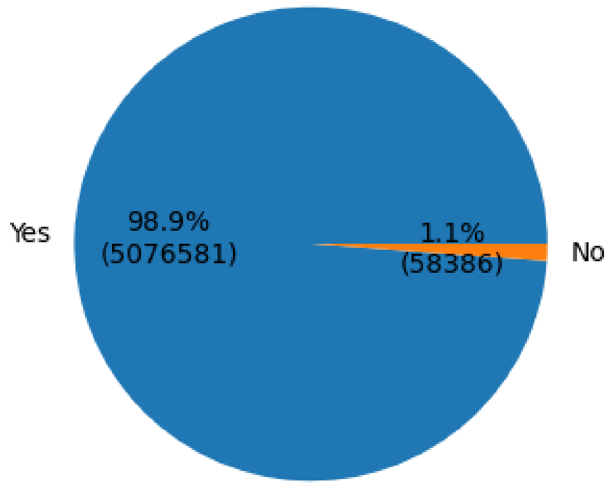
[30]:
```
df1["Timely response?"].value_counts()
```

[30]:
```
Yes    5076581
No       58386
Name: Timely response?, dtype: int64
```

[31]:
```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (8,4)
def autopct_format(values):
        def my_format(pct):
            total = sum(values)
            val = int(round(pct*total/100.0))
            return '{:.1f}%\n({v:d})'.format(pct, v=val)
        return my_format

s = df1['Timely response?'].value_counts()
plt.pie(s,labels = s.index, autopct=autopct_format(s))
```

[31]:
```
([<matplotlib.patches.Wedge at 0x27f56f5d510>,
  <matplotlib.patches.Wedge at 0x27f56f71a50>],
 [Text(-1.0992982859093792, 0.03928458472099473, 'Yes'),
  Text(1.0992982830358697, -0.039284665130162134, 'No')],
 [Text(-0.5996172468596613, 0.02142795530236076, '98.9%\n(5076581)'),
  Text(0.5996172452922925, -0.021427999161906616, '1.1%\n(58386)')])
```



Analyse compliants using "Timely Response?". * 98.9 % percentage responsed immediatly.

10 Consumer disputed?

[32]:
```
df1["Consumer disputed?"].value_counts()
```

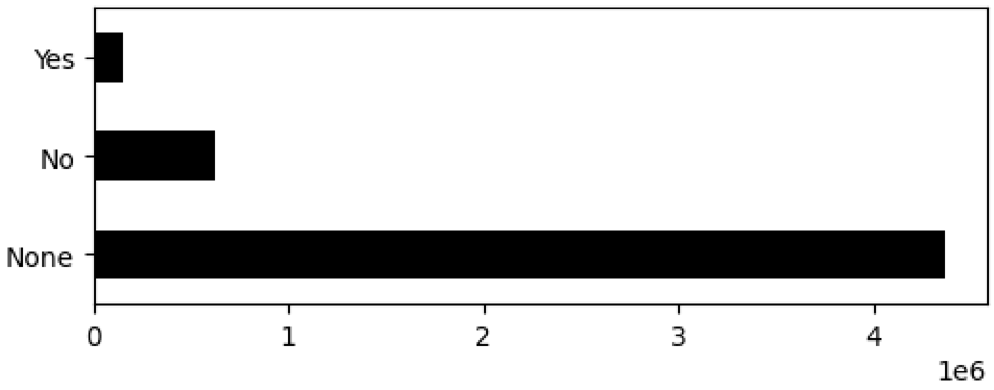
[32]:
```
None     4366651
No        619938
Yes       148378
Name: Consumer disputed?, dtype: int64
```

[33]:
```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (6,2)

disputed = (df1["Consumer disputed?"].value_counts())

#create bar chart of top 10 teams
disputed.plot(kind='barh',color = "black")
```

[33]:
```
<Axes: >
```



11 Company public responce?

[34]:
```
df1["Company public response"].value_counts()
```

[34]:
```
None
2677245
Company has responded to the consumer and the CFPB and chooses not to provide a
public response                                        2209207
Company believes it acted appropriately as authorized by contract or law
143822
Company chooses not to provide a public response
52473
Company believes the complaint is the result of a misunderstanding
13177
Company disputes the facts presented in the complaint
11216
Company believes complaint caused principally by actions of third party outside
```

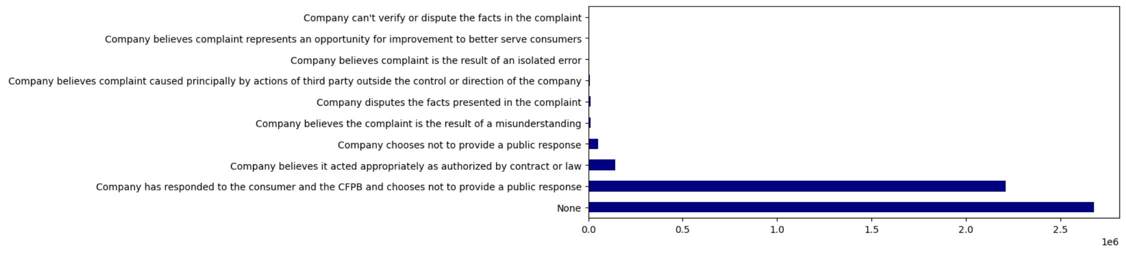
```
the control or direction of the company       7844
Company believes complaint is the result of an isolated error
6334
Company believes complaint represents an opportunity for improvement to better
serve consumers                                         4886
Company can't verify or dispute the facts in the complaint
4511
Company believes the complaint provided an opportunity to answer consumer's
questions                                                  4141
Company believes complaint relates to a discontinued policy or procedure
111
Name: Company public response, dtype: int64
```

[35]:
```python
import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)

Responce = (df1["Company public response"].value_counts())[:10]

#create bar chart of top 10 teams
Responce.plot(kind='barh',color = "navy")
```

[35]:
```
<Axes: >
```



Analyse compliants using “Company Public Response?”. * “Company has responded to the consumer and the CFPB and chooses not to provide a public response” is a most of the public responce about company.

12 Company

[36]:
```python
df1["Company"].value_counts()
```

[36]:
```
EQUIFAX, INC.                                   1063780
TRANSUNION INTERMEDIATE HOLDINGS, INC.           985391
Experian Information Solutions Inc.              897985
BANK OF AMERICA, NATIONAL ASSOCIATION            140149
WELLS FARGO & COMPANY                            128246
```

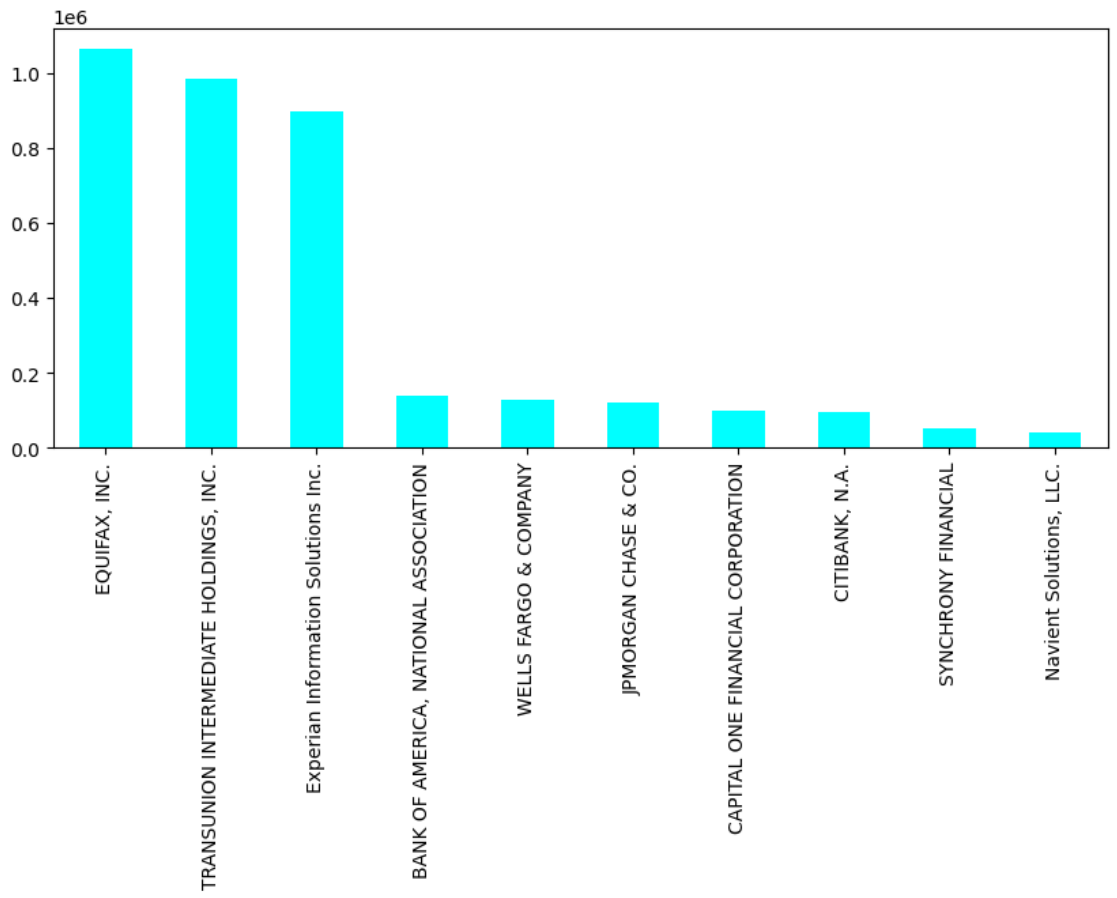
```
                                                                  ...
AutoStar Finance, Inc - D/B/A Atlanta AutoStar                     1
National Litigation Law Group, LLP                                 1
Law Offices of Thomas B. Peterman, P.A.                            1
PACIFIC FORESIGHT FINANCIAL CORPORATION                            1
FHC Mortgage                                                       1
Name: Company, Length: 7200, dtype: int64
```

[37]:
```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)

Responce = (df1["Company"].value_counts())[:10]

#create bar chart of top 10 teams
Responce.plot(kind='bar',color = "cyan")
```

[37]:
```
<Axes: >
```



Analyse compliants using "Company". # Top 5 Company get most compliants. 1)

EQUIFAX, INC.
2) TRANSUNION INTERMEDIATE HOLDINGS, INC.
3) Experian Information Solutions
Inc. 4) BANK OF AMERICA, NATIONAL ASSOCIATION
5) WELLS FARGO & COMPANY

13 Date sent to company

[61]:
```
df["Date sent to company"].value_counts()
```

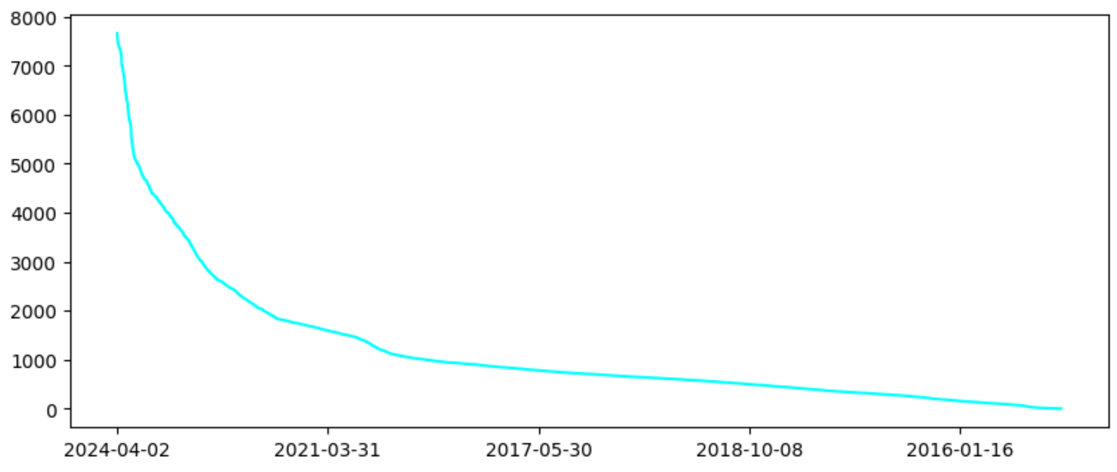
[61]:
```
2024-04-02    7657
2024-03-07    7588
2024-04-11    7532
2024-03-21    7485
2024-03-05    7443
              …
2012-02-19       1
2012-03-18       1
2012-11-11       1
2012-01-16       1
2012-02-11       1
Name: Date sent to company, Length: 4482, dtype: int64
```

[65]:
```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (10,4)

Responce = (df1["Date sent to company"].value_counts())

#create bar chart of top 10 teams
Responce.plot(kind='line',color = "cyan")
```

[65]:
```
<Axes: >
```



Analyse compliants using “Date sent to company”. * Between 30-05-2017 to 02-04-2024 most of the compliants sent to the companies.

14 Consumer consent provided?

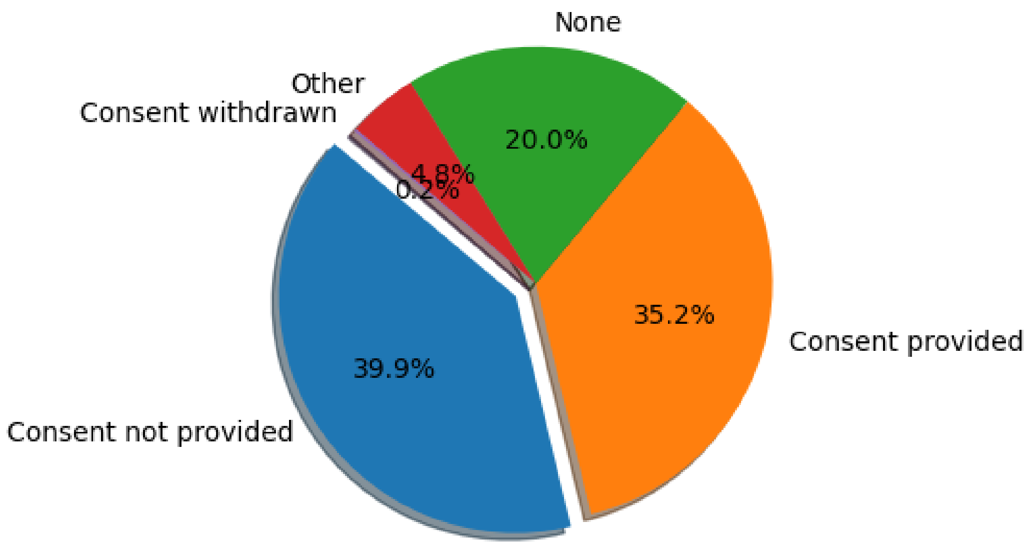
```
[66]: df1["Consumer consent provided?"].value_counts()
```

```
[66]: Consent not provided    2046457
      Consent provided        1807111
      None                    1024493
      Other                    248001
      Consent withdrawn          8905
      Name: Consumer consent provided?, dtype: int64
```

```
[39]: import matplotlib
      matplotlib.rcParams["figure.figsize"] = (10,4)

      Responce = (df1["Consumer consent provided?"].value_counts())[:10]
      lab = "Consent not provided", "Consent provided", "None","Other", "Consent␣
       ↪withdrawn"
      explode = (0.1, 0, 0, 0, 0)
      #create bar chart of top 10 teams
      Responce.plot(kind='pie', explode=explode , labels = lab,autopct='%1.1f%%',␣
       ↪shadow=True, startangle=140)
      plt.ylabel("")
```

```
[39]: Text(0, 0.5, '')
```



15 Company response to consumer

```
[47]: df1["Company response to consumer"].value_counts()
```

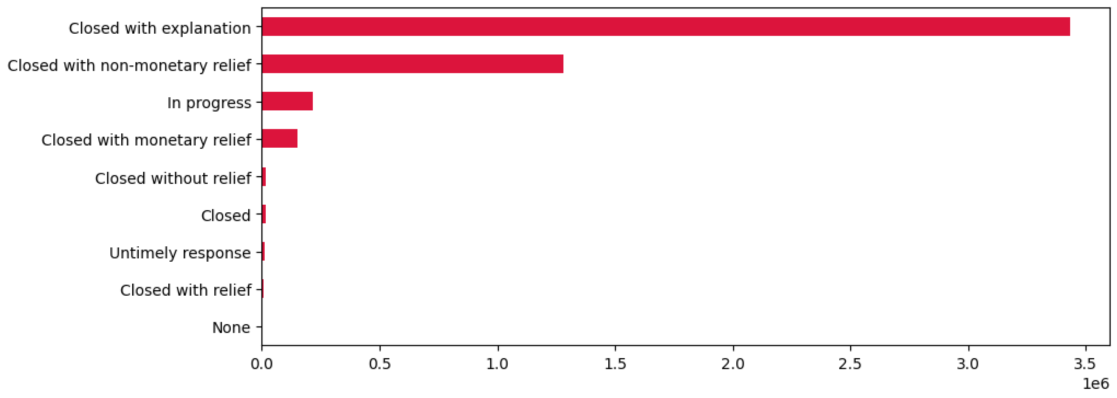
```
[47]: Closed with explanation            3432407
      Closed with non-monetary relief    1282308
      In progress                         215027
      Closed with monetary relief         153016
      Closed without relief                17868
      Closed                               17611
      Untimely response                    11412
      Closed with relief                    5304
      None                                    14
      Name: Company response to consumer, dtype: int64
```

```
[41]: import matplotlib
      matplotlib.rcParams["figure.figsize"] = (10,4)

      Responce = (df1["Company response to consumer"].value_counts())
      Responce= Responce.sort_values(ascending=True)

      Responce.plot(kind='barh',y= Responce, color = "crimson" )
```

```
[41]: <Axes: >
```



[48]:
```
Total=df1["Company response to consumer"].count()
value = (3432407/Total)*100
value
```

[48]:
```
66.84379860669017
```

Analyse compliants using "Company response to consumer". # 66.8 % Companies are Closed the compliants with explanation.

==

[52]:
```
df2=df1.sample(n=1048576)
df2.to_csv("complaints_EDA.csv")
```

2. Given an unsorted array of integers, find the length of the longest continuous increasing subsequence (subarray).

[54]:
```
def find_len_sub(nums):
    if not nums:
        return 0

    max_length = 1
    current_length = 1

    for i in range(1, len(nums)):
        if nums[i] > nums[i - 1]:
            current_length += 1
            max_length = max(max_length, current_length)
        else:
            current_length = 1

    return max_length

# get the input
```

```
input1 = list(map(int,input().split())) #[1, 3, 5, 4, 7],[2, 2, 2, 2, 2]

print("Output:", find_len_sub(input1))
```

```
 2 2 2 2 2

Output:  1
```

```
==================================================================================
```

3. Given a list of non negative integers, arrange them such that they form the largest number.

[57]:
```
from functools import cmp_to_key

def largest_number(nums):
    def compare(a, b):
        # Concatenate and compare as strings
        return int(b + a) - int(a + b)
    # Convert integers to strings
    nums_str = [str(num) for num in nums]
    nums_str.sort(key=cmp_to_key(compare))
    # Handle case when the input list contains only zeros
    if nums_str[0] == '0':
        return '0'
    return ''.join(nums_str)

# Get the input
input1 = list(map(int,input().split())) #[10,2], [3, 30, 34, 5, 9]

print("Output:", largest_number(input1))
```

```
 3 30 34 5 9

Output: 9534330
```

```
==================================================================================
```

4. Store all the "servlet-name", and "servlet-class" to a csv file from the attached sample_json.json file using Python.

[58]:
```
import json
import csv

with open(r"C:\Users\jm88\Music\New folder\DataScience\Adapt Ready\DT A1␣
 ↪sample_json.json", 'r') as json_file:
    data = json.load(json_file)

# get "servlet-name" and "servlet-class" from each entry
servlet_data = []
for servlet in data['web-app']['servlet']:
    servlet_name = servlet['servlet-name']
    servlet_class = servlet['servlet-class']
    servlet_data.append((servlet_name, servlet_class))

with open('servlet_data.csv', 'w', newline='') as csvfile:
    writer = csv.writer(csvfile)
    # Write the header
    writer.writerow(['servlet-name', 'servlet-class'])
    # Write the data
    writer.writerows(servlet_data)

print("CSV file created successfully.")
```

```
CSV file created successfully.
```

[ ]: