AdaptReady_ConsumerForum_assignment

May 20, 2024

1. Data set reference link: https://www.consumerfinance.gov/data-research/consumer-complaints/#download-the-data File data source: https://files.consumerfinance.gov/ccdb/complaints.csv.zip Problem statement: Download the data from the file data source and provide possible data insights.

1 READ THE CONSUMER DATA USING PANDAS

[1]:

```
import warnings
import pandas as pd
df=pd.read_csv("complaints.csv")
df.head(10)
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_1780\3191535270.py:3: DtypeWarning:
Columns (16) have mixed types. Specify dtype option on import or set
low_memory=False.
  df=pd.read_csv("complaints.csv")
```

[1]:

```
  Date received                                            Product  \
0    2024-03-13                                        Credit card
1    2024-03-14  Credit reporting or other personal consumer re…
2    2023-10-25  Credit reporting or other personal consumer re…
3    2023-10-25                                           Mortgage
4    2024-05-02  Money transfer, virtual currency, or money ser…
5    2024-02-28  Credit reporting or other personal consumer re…
6    2024-05-03  Credit reporting or other personal consumer re…
7    2024-02-08                                    Debt collection
8    2024-02-08  Money transfer, virtual currency, or money ser…
9    2024-05-02  Credit reporting or other personal consumer re…

                                  Sub-product  \
0  General-purpose credit card or charge card
1                            Credit reporting
2                            Credit reporting
3                                FHA mortgage
4                Domestic (US) money transfer
5                            Credit reporting
6                            Credit reporting
7                               I do not know
```

```
8                Domestic (US) money transfer
9                            Credit reporting

                                               Issue  \
0  Advertising and marketing, including promotion…
1               Incorrect information on your report
2                        Improper use of your report
3                         Struggling to pay mortgage
4              Money was not available when promised
5               Incorrect information on your report
6  Problem with a company's investigation into an…
7                  Attempts to collect debt not owed
8                                      Fraud or scam
9  Problem with a company's investigation into an…

                                           Sub-issue  \
0     Didn't receive advertised or promotional terms
1                Information belongs to someone else
2      Reporting company used your report improperly
3  An existing modification, forbearance plan, sh…
4                                                NaN
5                Information belongs to someone else
6  Was not notified of investigation status or re…
7                                  Debt is not yours
8                                                NaN
9  Their investigation did not fix an error on yo…

                        Consumer complaint narrative  \
0  I formally request the removal of an inaccurat…
1                                                NaN
2                                                NaN
3                                                NaN
4                                                NaN
5                                                NaN
6                                                NaN
7  ROZLIN FINANCIAL GROUP L at XXXX XXXX XXXX XXX…
8  Someone posted online that they had tickets to…
9                                                NaN

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

```
7                                                NaN
8                                                NaN
9                                                NaN

                                   Company State ZIP code Tags  \
0                            EQUIFAX, INC.    MO    631XX  NaN
1                            EQUIFAX, INC.    PA    19142  NaN
2   TRANSUNION INTERMEDIATE HOLDINGS, INC.    CA    92114  NaN
3  Specialized Loan Servicing Holdings LLC    CA    956XX  NaN
4                              Sigue Corp.    TX    78644  NaN
5      Experian Information Solutions Inc.    FL    33186  NaN
6      Experian Information Solutions Inc.    FL    33018  NaN
7             Rozlin Financial Group, Inc.    FL    32808  NaN
8                     JPMORGAN CHASE & CO.    AZ    85013  NaN
9      Experian Information Solutions Inc.    GA    31407  NaN

  Consumer consent provided? Submitted via Date sent to company  \
0           Consent provided           Web           2024-03-13
1       Consent not provided           Web           2024-03-14
2       Consent not provided           Web           2023-10-25
3                      Other           Web           2023-10-25
4                      Other           Web           2024-05-02
5                      Other           Web           2024-02-28
6                        NaN           Web           2024-05-03
7           Consent provided           Web           2024-02-08
8           Consent provided           Web           2024-02-08
9                        NaN           Web           2024-05-02

      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 explanation              Yes                NaN
3          Closed with explanation              Yes                NaN
4                      In progress              Yes                NaN
5  Closed with non-monetary relief              Yes                NaN
6                      In progress              Yes                NaN
7          Closed with explanation              Yes                NaN
8          Closed with explanation              Yes                NaN
9                      In progress              Yes                NaN

   Complaint ID
0       8538710
1       8551289
2       7755832
3       7753166
4       8916876
5       8443920
```

```
6        8926709
7        8309374
8        8309639
9        8916613
```

2 DATA PROCESSING & insights

[5]:

```
df.columns
```

[5]:

```
Index(['Date received', 'Product', 'Sub-product', 'Issue', 'Sub-issue',
       'Consumer complaint narrative', 'Company public response', 'Company',
       'State', 'ZIP code', 'Tags', 'Consumer consent provided?',
       'Submitted via', 'Date sent to company', 'Company response to consumer',
       'Timely response?', 'Consumer disputed?', 'Complaint ID'],
      dtype='object')
```

[6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5243000 entries, 0 to 5242999
Data columns (total 18 columns):
 #   Column                        Dtype
---  ------                        -----
 0   Date received                 object
 1   Product                       object
 2   Sub-product                   object
 3   Issue                         object
 4   Sub-issue                     object
 5   Consumer complaint narrative  object
 6   Company public response       object
 7   Company                       object
 8   State                         object
 9   ZIP code                      object
 10  Tags                          object
 11  Consumer consent provided?    object
 12  Submitted via                 object
 13  Date sent to company          object
 14  Company response to consumer  object
 15  Timely response?              object
 16  Consumer disputed?            object
 17  Complaint ID                  int64
dtypes: int64(1), object(17)
memory usage: 720.0+ MB
```

[9]:

```
df['Date received'] = pd.to_datetime(df['Date received'], format='%Y-%m-%d')
```

[10]:

```python
# Extract year, month, and day into separate columns
df['Year'] = df['Date received'].dt.year
df['Month'] = df['Date received'].dt.month
df['Day'] = df['Date received'].dt.day
df.head(5)
```

[10]:

```
  Date received                                            Product  \
0    2024-03-13                                        Credit card   
1    2024-03-14  Credit reporting or other personal consumer re…   
2    2023-10-25  Credit reporting or other personal consumer re…   
3    2023-10-25                                           Mortgage   
4    2024-05-02  Money transfer, virtual currency, or money ser…   

                                  Sub-product  \
0  General-purpose credit card or charge card   
1                             Credit reporting   
2                             Credit reporting   
3                                 FHA mortgage   
4                 Domestic (US) money transfer   

                                               Issue  \
0  Advertising and marketing, including promotion…   
1               Incorrect information on your report   
2                        Improper use of your report   
3                         Struggling to pay mortgage   
4              Money was not available when promised   

                                           Sub-issue  \
0     Didn't receive advertised or promotional terms   
1                Information belongs to someone else   
2      Reporting company used your report improperly   
3  An existing modification, forbearance plan, sh…   
4                                                NaN   

                        Consumer complaint narrative  \
0  I formally request the removal of an inaccurat…   
1                                                NaN   
2                                                NaN   
3                                                NaN   
4                                                NaN   

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

```
                                   Company State ZIP code  …  \
0                            EQUIFAX, INC.    MO    631XX  …
1                            EQUIFAX, INC.    PA    19142  …
2   TRANSUNION INTERMEDIATE HOLDINGS, INC.    CA    92114  …
3  Specialized Loan Servicing Holdings LLC    CA    956XX  …
4                              Sigue Corp.    TX    78644  …

  Consumer consent provided? Submitted via Date sent to company  \
0           Consent provided           Web           2024-03-13
1       Consent not provided           Web           2024-03-14
2       Consent not provided           Web           2023-10-25
3                      Other           Web           2023-10-25
4                      Other           Web           2024-05-02

      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 explanation              Yes                NaN
3          Closed with explanation              Yes                NaN
4                      In progress              Yes                NaN

  Complaint ID  Year  Month  Day
0      8538710  2024      3   13
1      8551289  2024      3   14
2      7755832  2023     10   25
3      7753166  2023     10   25
4      8916876  2024      5    2

[5 rows x 21 columns]
```

[11]:

```
df.dtypes
```

[11]:

```
Date received                   datetime64[ns]
Product                                 object
Sub-product                             object
Issue                                   object
Sub-issue                               object
Consumer complaint narrative            object
Company public response                 object
Company                                 object
State                                   object
ZIP code                                object
Tags                                    object
Consumer consent provided?              object
Submitted via                           object
Date sent to company                    object
```

```
Company response to consumer            object
Timely response?                        object
Consumer disputed?                      object
Complaint ID                             int64
Year                                     int32
Month                                    int32
Day                                      int32
dtype: object
```

[12]:

```
df['Year'].value_counts()
```

[12]:

```
Year
2023    1292148
2022     800359
2024     736842
2021     496003
2020     444294
2019     277298
2018     257220
2017     242854
2016     191414
2015     168437
2014     153008
2013     108215
2012      72372
2011       2536
Name: count, dtype: int64
```

“ “ “We have data from 2011 to 2023. We can see more Number of complaints raised in the year 2023. least being in the year 2011 2023 1292148 2022 800359 2024 736842 2021 496003 2020 444294 2019 277298 2018 257220 2017 242854 2016 191414 2015 168437 2014 153008 2013 108215 2012 72372 2011 2536” “ ”

[13]:

```
# Make subsets based on year
# Group the DataFrame by 'Year'
year_groups = df.groupby('Year')

# Create a empty dictionary to store subsets based on year
year_subsets = {}

# Iterate each group and store the subsets in the dictionary
for year, group in year_groups:
    year_subsets[year] = group

year_subsets[2023].head(5)
```

[13]:

```
   Date received                                            Product  \
2     2023-10-25  Credit reporting or other personal consumer re…
```

```
3     2023-10-25                                           Mortgage
18    2023-11-30  Credit reporting or other personal consumer re…
20    2023-09-15  Credit reporting or other personal consumer re…
62    2023-11-30  Credit reporting or other personal consumer re…

         Sub-product                                             Issue  \
2   Credit reporting                        Improper use of your report
3       FHA mortgage                         Struggling to pay mortgage
18  Credit reporting               Incorrect information on your report
20  Credit reporting               Incorrect information on your report
62  Credit reporting  Problem with a company's investigation into an…

                                            Sub-issue  \
2       Reporting company used your report improperly
3   An existing modification, forbearance plan, sh…
18                     Personal information incorrect
20                Information belongs to someone else
62  Their investigation did not fix an error on yo…

                         Consumer complaint narrative  \
2                                                 NaN
3                                                 NaN
18                                                NaN
20  I am writing to formally dispute and request c…
62  On or around XXXX XX/XX/XXXX I filed complaint…

                              Company public response  \
2   Company has responded to the consumer and the …
3   Company has responded to the consumer and the …
18  Company has responded to the consumer and the …
20  Company has responded to the consumer and the …
62                                                NaN

                                    Company State ZIP code  …  \
2     TRANSUNION INTERMEDIATE HOLDINGS, INC.    CA    92114  …
3   Specialized Loan Servicing Holdings LLC    CA    956XX  …
18      Experian Information Solutions Inc.    TX    77479  …
20      Experian Information Solutions Inc.    MO    630XX  …
62                 AMERICAN EXPRESS COMPANY    MI    48104  …

   Consumer consent provided? Submitted via Date sent to company  \
2        Consent not provided           Web           2023-10-25
3                       Other           Web           2023-10-25
18       Consent not provided           Web           2023-11-30
20           Consent provided           Web           2023-09-15
62           Consent provided           Web           2023-11-30
```

```
       Company response to consumer Timely response? Consumer disputed?  \
2           Closed with explanation              Yes                NaN
3           Closed with explanation              Yes                NaN
18  Closed with non-monetary relief              Yes                NaN
20  Closed with non-monetary relief              Yes                NaN
62          Closed with explanation              Yes                NaN

   Complaint ID  Year  Month  Day
2       7755832  2023     10   25
3       7753166  2023     10   25
18      7930963  2023     11   30
20      7549549  2023      9   15
62      7929653  2023     11   30

[5 rows x 21 columns]
```

[14]:

```
info_output = "\n".join([f"Year {year} Subset Info:\n{year_subsets[year].
 ↪info()}\n" for year in [2011,2012, 2013, 2014,2015, 2016, 2017, 2018, 2019,␣
 ↪2020, 2021, 2022, 2023]])
print(info_output)
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 2536 entries, 340863 to 5242308
Data columns (total 21 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Date received                 2536 non-null   datetime64[ns]
 1   Product                       2536 non-null   object
 2   Sub-product                   1276 non-null   object
 3   Issue                         2536 non-null   object
 4   Sub-issue                     0 non-null      object
 5   Consumer complaint narrative  0 non-null      object
 6   Company public response       0 non-null      object
 7   Company                       2536 non-null   object
 8   State                         2521 non-null   object
 9   ZIP code                      2523 non-null   object
 10  Tags                          381 non-null    object
 11  Consumer consent provided?    0 non-null      object
 12  Submitted via                 2536 non-null   object
 13  Date sent to company          2536 non-null   object
 14  Company response to consumer  2536 non-null   object
 15  Timely response?              2536 non-null   object
 16  Consumer disputed?            2536 non-null   object
 17  Complaint ID                  2536 non-null   int64
 18  Year                          2536 non-null   int32
 19  Month                         2536 non-null   int32
 20  Day                           2536 non-null   int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
```

```
memory usage: 406.2+ KB
<class 'pandas.core.frame.DataFrame'>
Index: 72372 entries, 1629 to 5242317
Data columns (total 21 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Date received                 72372 non-null  datetime64[ns]
 1   Product                       72372 non-null  object
 2   Sub-product                   55146 non-null  object
 3   Issue                         72372 non-null  object
 4   Sub-issue                     1883 non-null   object
 5   Consumer complaint narrative  0 non-null      object
 6   Company public response       2 non-null      object
 7   Company                       72372 non-null  object
 8   State                         71757 non-null  object
 9   ZIP code                      71876 non-null  object
 10  Tags                          7382 non-null   object
 11  Consumer consent provided?    0 non-null      object
 12  Submitted via                 72372 non-null  object
 13  Date sent to company          72372 non-null  object
 14  Company response to consumer  72372 non-null  object
 15  Timely response?              72372 non-null  object
 16  Consumer disputed?            72372 non-null  object
 17  Complaint ID                  72372 non-null  int64
 18  Year                          72372 non-null  int32
 19  Month                         72372 non-null  int32
 20  Day                           72372 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 11.3+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 108215 entries, 719 to 5242302
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 108215 non-null  datetime64[ns]
 1   Product                       108215 non-null  object
 2   Sub-product                   80536 non-null   object
 3   Issue                         108215 non-null  object
 4   Sub-issue                     25574 non-null   object
 5   Consumer complaint narrative  0 non-null       object
 6   Company public response       9 non-null       object
 7   Company                       108215 non-null  object
 8   State                         107162 non-null  object
 9   ZIP code                      107385 non-null  object
 10  Tags                          14053 non-null   object
 11  Consumer consent provided?    0 non-null       object
 12  Submitted via                 108215 non-null  object
 13  Date sent to company          108215 non-null  object
 14  Company response to consumer  108215 non-null  object
 15  Timely response?              108215 non-null  object
 16  Consumer disputed?            108215 non-null  object
 17  Complaint ID                  108215 non-null  int64
 18  Year                          108215 non-null  int32
 19  Month                         108215 non-null  int32
 20  Day                           108215 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 16.9+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 153008 entries, 9139 to 5242311
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 153008 non-null  datetime64[ns]
 1   Product                       153008 non-null  object
 2   Sub-product                   108090 non-null  object
 3   Issue                         153008 non-null  object
 4   Sub-issue                     72617 non-null   object
 5   Consumer complaint narrative  0 non-null       object
 6   Company public response       133 non-null     object
 7   Company                       153008 non-null  object
 8   State                         152007 non-null  object
 9   ZIP code                      152397 non-null  object
 10  Tags                          22685 non-null   object
 11  Consumer consent provided?    0 non-null       object
 12  Submitted via                 153008 non-null  object
 13  Date sent to company          153008 non-null  object
 14  Company response to consumer  153008 non-null  object
 15  Timely response?              153008 non-null  object
 16  Consumer disputed?            153008 non-null  object
 17  Complaint ID                  153008 non-null  int64
 18  Year                          153008 non-null  int32
 19  Month                         153008 non-null  int32
 20  Day                           153008 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 23.9+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 168437 entries, 4653 to 5242313
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 168437 non-null  datetime64[ns]
 1   Product                       168437 non-null  object
 2   Sub-product                   115280 non-null  object
 3   Issue                         168437 non-null  object
 4   Sub-issue                     78469 non-null   object
 5   Consumer complaint narrative  54739 non-null   object
 6   Company public response       61700 non-null   object
 7   Company                       168437 non-null  object
 8   State                         167293 non-null  object
 9   ZIP code                      167685 non-null  object
 10  Tags                          26016 non-null   object
 11  Consumer consent provided?    99636 non-null   object
 12  Submitted via                 168437 non-null  object
 13  Date sent to company          168437 non-null  object
 14  Company response to consumer  168437 non-null  object
 15  Timely response?              168437 non-null  object
 16  Consumer disputed?            168437 non-null  object
 17  Complaint ID                  168437 non-null  int64
 18  Year                          168437 non-null  int32
 19  Month                         168437 non-null  int32
 20  Day                           168437 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 26.3+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 191414 entries, 8007 to 5242310
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 191414 non-null  datetime64[ns]
 1   Product                       191414 non-null  object
 2   Sub-product                   124706 non-null  object
 3   Issue                         191414 non-null  object
 4   Sub-issue                     92596 non-null   object
 5   Consumer complaint narrative  77796 non-null   object
 6   Company public response       99617 non-null   object
 7   Company                       191414 non-null  object
 8   State                         190087 non-null  object
 9   ZIP code                      190566 non-null  object
 10  Tags                          28409 non-null   object
 11  Consumer consent provided?    140615 non-null  object
 12  Submitted via                 191414 non-null  object
 13  Date sent to company          191414 non-null  object
 14  Company response to consumer  191414 non-null  object
 15  Timely response?              191414 non-null  object
 16  Consumer disputed?            191414 non-null  object
 17  Complaint ID                  191414 non-null  int64
 18  Year                          191414 non-null  int32
 19  Month                         191414 non-null  int32
 20  Day                           191414 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 29.9+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 242854 entries, 717 to 5242094
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 242854 non-null  datetime64[ns]
 1   Product                       242854 non-null  object
 2   Sub-product                   218633 non-null  object
 3   Issue                         242854 non-null  object
 4   Sub-issue                     184643 non-null  object
 5   Consumer complaint narrative  115114 non-null  object
 6   Company public response       116773 non-null  object
 7   Company                       242854 non-null  object
 8   State                         238883 non-null  object
 9   ZIP code                      239685 non-null  object
 10  Tags                          32944 non-null   object
 11  Consumer consent provided?    197821 non-null  object
 12  Submitted via                 242854 non-null  object
 13  Date sent to company          242854 non-null  object
 14  Company response to consumer  242854 non-null  object
 15  Timely response?              242854 non-null  object
 16  Consumer disputed?            72334 non-null   object
 17  Complaint ID                  242854 non-null  int64
 18  Year                          242854 non-null  int32
 19  Month                         242854 non-null  int32
 20  Day                           242854 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 38.0+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 257220 entries, 3105 to 5241753
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 257220 non-null  datetime64[ns]
 1   Product                       257220 non-null  object
 2   Sub-product                   257205 non-null  object
 3   Issue                         257220 non-null  object
 4   Sub-issue                     221496 non-null  object
 5   Consumer complaint narrative  118437 non-null  object
 6   Company public response       129713 non-null  object
 7   Company                       257220 non-null  object
 8   State                         249733 non-null  object
 9   ZIP code                      250648 non-null  object
 10  Tags                          33312 non-null   object
 11  Consumer consent provided?    208830 non-null  object
 12  Submitted via                 257220 non-null  object
 13  Date sent to company          257220 non-null  object
 14  Company response to consumer  257219 non-null  object
 15  Timely response?              257220 non-null  object
 16  Consumer disputed?            0 non-null       object
 17  Complaint ID                  257220 non-null  int64
 18  Year                          257220 non-null  int32
 19  Month                         257220 non-null  int32
 20  Day                           257220 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 40.2+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 277298 entries, 207721 to 5241718
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 277298 non-null  datetime64[ns]
 1   Product                       277298 non-null  object
 2   Sub-product                   277285 non-null  object
 3   Issue                         277298 non-null  object
 4   Sub-issue                     242640 non-null  object
 5   Consumer complaint narrative  124864 non-null  object
 6   Company public response       144003 non-null  object
 7   Company                       277298 non-null  object
 8   State                         269403 non-null  object
 9   ZIP code                      270319 non-null  object
 10  Tags                          37765 non-null   object
 11  Consumer consent provided?    232676 non-null  object
 12  Submitted via                 277298 non-null  object
 13  Date sent to company          277298 non-null  object
 14  Company response to consumer  277298 non-null  object
 15  Timely response?              277298 non-null  object
 16  Consumer disputed?            0 non-null       object
 17  Complaint ID                  277298 non-null  int64
 18  Year                          277298 non-null  int32
 19  Month                         277298 non-null  int32
 20  Day                           277298 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 43.4+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 444294 entries, 2119 to 5242337
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 444294 non-null  datetime64[ns]
 1   Product                       444294 non-null  object
 2   Sub-product                   444279 non-null  object
 3   Issue                         444294 non-null  object
 4   Sub-issue                     404790 non-null  object
 5   Consumer complaint narrative  174343 non-null  object
 6   Company public response       252645 non-null  object
 7   Company                       444294 non-null  object
 8   State                         436209 non-null  object
 9   ZIP code                      437118 non-null  object
 10  Tags                          44408 non-null   object
 11  Consumer consent provided?    395202 non-null  object
 12  Submitted via                 444294 non-null  object
 13  Date sent to company          444294 non-null  object
 14  Company response to consumer  444294 non-null  object
 15  Timely response?              444294 non-null  object
 16  Consumer disputed?            0 non-null       object
 17  Complaint ID                  444294 non-null  int64
 18  Year                          444294 non-null  int32
 19  Month                         444294 non-null  int32
 20  Day                           444294 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 69.5+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 496003 entries, 3038 to 5242894
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 496003 non-null  datetime64[ns]
 1   Product                       496003 non-null  object
 2   Sub-product                   495952 non-null  object
 3   Issue                         496003 non-null  object
 4   Sub-issue                     449769 non-null  object
 5   Consumer complaint narrative  203595 non-null  object
 6   Company public response       199177 non-null  object
 7   Company                       496003 non-null  object
 8   State                         490234 non-null  object
 9   ZIP code                      493509 non-null  object
 10  Tags                          44953 non-null   object
 11  Consumer consent provided?    457311 non-null  object
 12  Submitted via                 496003 non-null  object
 13  Date sent to company          496003 non-null  object
 14  Company response to consumer  496002 non-null  object
 15  Timely response?              496003 non-null  object
 16  Consumer disputed?            0 non-null       object
 17  Complaint ID                  496003 non-null  int64
 18  Year                          496003 non-null  int32
 19  Month                         496003 non-null  int32
 20  Day                           496003 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 77.6+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 800359 entries, 238 to 5242983
Data columns (total 21 columns):
 #   Column                        Non-Null Count   Dtype
---  ------                        --------------   -----
 0   Date received                 800359 non-null  datetime64[ns]
 1   Product                       800359 non-null  object
 2   Sub-product                   800332 non-null  object
 3   Issue                         800359 non-null  object
 4   Sub-issue                     755219 non-null  object
 5   Consumer complaint narrative  337195 non-null  object
 6   Company public response       459119 non-null  object
 7   Company                       800359 non-null  object
 8   State                         798373 non-null  object
 9   ZIP code                      800185 non-null  object
 10  Tags                          69106 non-null   object
 11  Consumer consent provided?    755443 non-null  object
 12  Submitted via                 800359 non-null  object
 13  Date sent to company          800359 non-null  object
 14  Company response to consumer  800359 non-null  object
 15  Timely response?              800359 non-null  object
 16  Consumer disputed?            0 non-null       object
 17  Complaint ID                  800359 non-null  int64
 18  Year                          800359 non-null  int32
 19  Month                         800359 non-null  int32
 20  Day                           800359 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
memory usage: 125.2+ MB
<class 'pandas.core.frame.DataFrame'>
Index: 1292148 entries, 2 to 5242999
Data columns (total 21 columns):
 #   Column                        Non-Null Count    Dtype
---  ------                        --------------    -----
 0   Date received                 1292148 non-null  datetime64[ns]
 1   Product                       1292148 non-null  object
 2   Sub-product                   1292148 non-null  object
 3   Issue                         1292148 non-null  object
 4   Sub-issue                     1251357 non-null  object
 5   Consumer complaint narrative  487471 non-null   object
 6   Company public response       766215 non-null   object
 7   Company                       1292148 non-null  object
 8   State                         1288541 non-null  object
 9   ZIP code                      1292038 non-null  object
 10  Tags                          90569 non-null    object
 11  Consumer consent provided?    1256242 non-null  object
 12  Submitted via                 1292148 non-null  object
 13  Date sent to company          1292148 non-null  object
 14  Company response to consumer  1292142 non-null  object
 15  Timely response?              1292148 non-null  object
 16  Consumer disputed?            0 non-null        object
 17  Complaint ID                  1292148 non-null  int64
 18  Year                          1292148 non-null  int32
 19  Month                         1292148 non-null  int32
 20  Day                           1292148 non-null  int32
dtypes: datetime64[ns](1), int32(3), int64(1), object(16)
```

```
memory usage: 202.1+ MB
Year 2011 Subset Info:
None

Year 2012 Subset Info:
None

Year 2013 Subset Info:
None

Year 2014 Subset Info:
None

Year 2015 Subset Info:
None

Year 2016 Subset Info:
None

Year 2017 Subset Info:
None

Year 2018 Subset Info:
None

Year 2019 Subset Info:
None

Year 2020 Subset Info:
None

Year 2021 Subset Info:
None

Year 2022 Subset Info:
None

Year 2023 Subset Info:
None
```

Individual entries per year

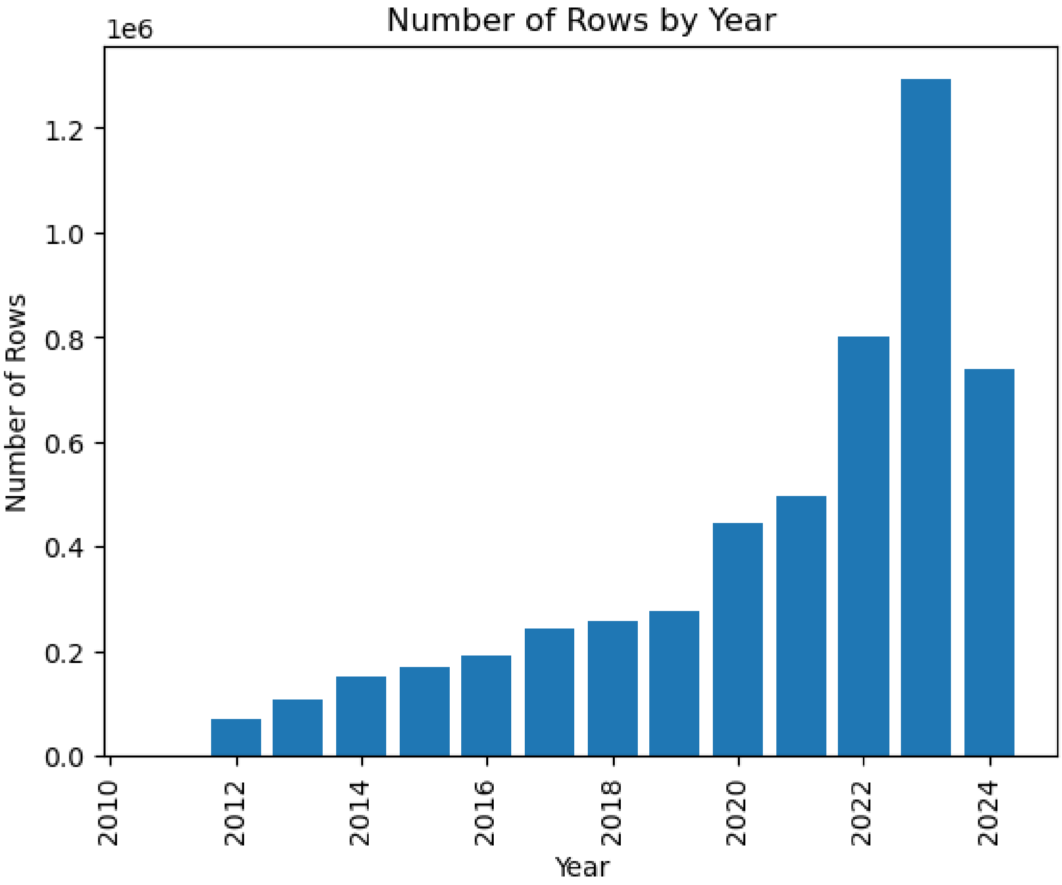
[15]:
```
# Create an empty dictionary to store subsets based on year
year_subsets = {}

# Create an empty dictionary to store row counts for each year
year_row_counts_dict = {}
```

```
# Iterate over each group and store the subsets and row counts in the␣
 ↪dictionaries
for year, group in year_groups:
    year_subsets[year] = group
    year_row_counts_dict[year] = len(group)

# Print the dictionary containing row counts for each year
print(year_row_counts_dict)
```

```
{2011: 2536, 2012: 72372, 2013: 108215, 2014: 153008, 2015: 168437, 2016:
191414, 2017: 242854, 2018: 257220, 2019: 277298, 2020: 444294, 2021: 496003,
2022: 800359, 2023: 1292148, 2024: 736842}
```

[16]:

```
import matplotlib.pyplot as plt

# Create lists to store years and row counts
years = list(year_row_counts_dict.keys())
row_counts = list(year_row_counts_dict.values())

# Bar plot
plt.bar(years, row_counts)

# labels and title
plt.xlabel('Year')
plt.ylabel('Number of Rows')
plt.title('Number of Rows by Year')
plt.xticks(rotation=90)
plt.show()
```



3 Timely response?

```
[17]: # Create an empty dictionary to store the counts of timely responses for each␣
        ↪year
      timely_response_counts_by_year = {}

      # Iterate over each year
      for year, group in year_groups:
          # Filter the DataFrame for the current year
          subset_year = group

          # Count the number of occurrences of "Yes" and "No" in the "Timely response?
        ↪" column for the current year
          timely_response_counts = subset_year['Timely response?'].value_counts()

          # Store the counts in the dictionary
          timely_response_counts_by_year[year] = {
              'Yes': timely_response_counts.get('Yes', 0),
```

```python
        'No': timely_response_counts.get('No', 0)
    }

# Print the counts for each year
for year, counts in timely_response_counts_by_year.items():
    print(f"Year {year}:")
    print("Number of timely responses (Yes):", counts['Yes'])
    print("Number of non-timely responses (No):", counts['No'])
    print()
```

```
Year 2011:
Number of timely responses (Yes): 2285
Number of non-timely responses (No): 251

Year 2012:
Number of timely responses (Yes): 69865
Number of non-timely responses (No): 2507

Year 2013:
Number of timely responses (Yes): 106948
Number of non-timely responses (No): 1267

Year 2014:
Number of timely responses (Yes): 149410
Number of non-timely responses (No): 3598

Year 2015:
Number of timely responses (Yes): 163651
Number of non-timely responses (No): 4786

Year 2016:
Number of timely responses (Yes): 184796
Number of non-timely responses (No): 6618

Year 2017:
Number of timely responses (Yes): 235950
Number of non-timely responses (No): 6904

Year 2018:
Number of timely responses (Yes): 252729
Number of non-timely responses (No): 4491

Year 2019:
Number of timely responses (Yes): 273089
Number of non-timely responses (No): 4209

Year 2020:
Number of timely responses (Yes): 439658
Number of non-timely responses (No): 4636

Year 2021:
Number of timely responses (Yes): 489781
Number of non-timely responses (No): 6222

Year 2022:
Number of timely responses (Yes): 795131
Number of non-timely responses (No): 5228

Year 2023:
Number of timely responses (Yes): 1286519
Number of non-timely responses (No): 5629

Year 2024:
Number of timely responses (Yes): 734511
Number of non-timely responses (No): 2331
```

Year 2011: Number of timely responses (Yes): 2285 Number of non-timely responses (No): 251

Year 2012: Number of timely responses (Yes): 69865 Number of non-timely responses (No): 2507

Year 2013: Number of timely responses (Yes): 106948 Number of non-timely responses (No): 1267

Year 2014: Number of timely responses (Yes): 149410 Number of non-timely responses (No): 3598

Year 2015: Number of timely responses (Yes): 163651 Number of non-timely responses (No): 4786

Year 2016: Number of timely responses (Yes): 184796 Number of non-timely responses (No): 6618

Year 2017: Number of timely responses (Yes): 235950 Number of non-timely responses (No): 6904

Year 2018: Number of timely responses (Yes): 252729 Number of non-timely responses (No): 4491

Year 2019: Number of timely responses (Yes): 273089 Number of non-timely responses (No): 4209

Year 2020: Number of timely responses (Yes): 439658 Number of non-timely responses (No): 4636

Year 2021: Number of timely responses (Yes): 489781 Number of non-timely responses (No): 6222

Year 2022: Number of timely responses (Yes): 795131 Number of non-timely responses (No): 5228

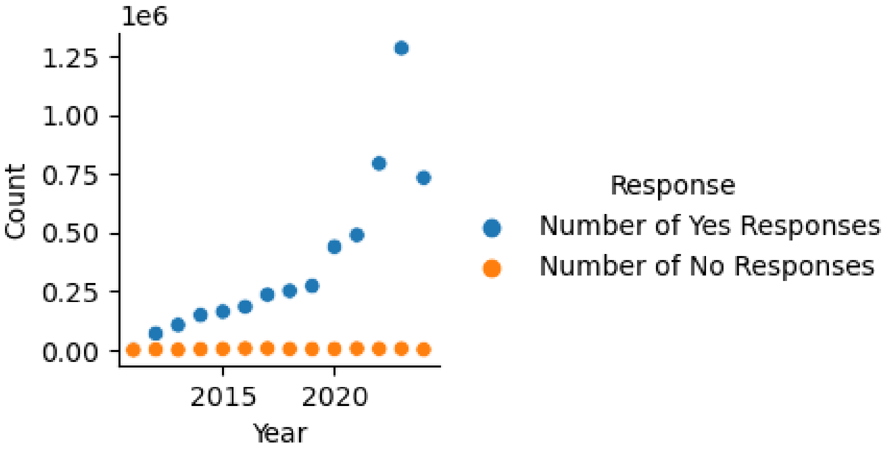
Year 2023: Number of timely responses (Yes): 1286519 Number of non-timely responses (No): 5629

Year 2024: Number of timely responses (Yes): 734511 Number of non-timely responses (No): 2331

[18]:

```python
import seaborn as sns
import pandas as pd

# Convert the dictionary into a DataFrame
timely_response_df = pd.DataFrame.from_dict(timely_response_counts_by_year, orient='index')
```

```
# Reset the index to convert the years from index to a regular column
timely_response_df.reset_index(inplace=True)

# Rename the columns for better clarity
timely_response_df.rename(columns={'index': 'Year', 'Yes': 'Number of Yes␣
↪Responses', 'No': 'Number of No Responses'}, inplace=True)

# Melt the DataFrame to make it suitable for pairplot
timely_response_melted = pd.melt(timely_response_df, id_vars=['Year'],␣
↪value_vars=['Number of Yes Responses', 'Number of No Responses'],␣
↪var_name='Response', value_name='Count')

# Draw the pairplot
sns.pairplot(timely_response_melted, x_vars='Year', y_vars='Count',␣
↪hue='Response', kind='scatter')

# Show the plot
plt.show()
```



[19]:
```
Issues=df['Issue'].unique()
Issues
```

[19]:
```
array(['Advertising and marketing, including promotional offers',
       'Incorrect information on your report',
       'Improper use of your report', 'Struggling to pay mortgage',
       'Money was not available when promised',
       "Problem with a company's investigation into an existing problem",
       'Attempts to collect debt not owed', 'Fraud or scam',
       'Managing an account', 'Trouble using your card',
       'Closing your account',
       'Took or threatened to take negative or legal action',
       'Problem with a purchase shown on your statement',
       'Written notification about debt',
       'Applying for a mortgage or refinancing an existing mortgage',
       "Problem with a company's investigation into an existing issue",
       'Trouble during payment process',
       "Problem with a credit reporting company's investigation into an existing
problem",
       'Other transaction problem', 'False statements or representation',
       'Opening an account', 'Managing the loan or lease',
       'Closing an account', 'Problem when making payments',
       'Unable to get your credit report or credit score',
       'Threatened to contact someone or share information improperly',
       'Problem with a lender or other company charging your account',
       'Credit monitoring or identity theft protection services',
       'Fees or interest',
       'Problem with fraud alerts or security freezes',
       'Confusing or missing disclosures', 'Repossession',
       'Other features, terms, or problems',
       'Dealing with my lender or servicer',
       'Loan modification,collection,foreclosure',
       'Struggling to pay your bill', 'Communication tactics',
       'Problems at the end of the loan or lease',
       'Identity theft protection or other monitoring services',
       'Overdraft, savings, or rewards features',
       'Dealing with your lender or servicer',
       'Application, originator, mortgage broker',
       "Charged fees or interest you didn't expect", 'Getting the loan',
       'Getting a credit card', 'Getting a loan',
       'Trouble accessing funds in your mobile or digital wallet',
       'Struggling to repay your loan',
       'Problem with a purchase or transfer',
       'Problem getting a card or closing an account',
       'Electronic communications',
       'Problem with additional add-on products or services',
       'Trouble using the card', 'Struggling to pay your loan',
       'Account opening, closing, or management',
       'Problem with customer service',
       'Managing, opening, or closing your mobile wallet account',
       'Getting a loan or lease',
       'Unauthorized transactions or other transaction problem',
       'Problem caused by your funds being low', 'Lost or stolen check',
       'Credit decision / Underwriting', 'Getting a line of credit',
       'Unexpected or other fees',
       'Vehicle was damaged or destroyed the vehicle',
       'Closing on a mortgage', 'Problem with overdraft',
       'Charged upfront or unexpected fees',
       'Wrong amount charged or received',
       'Loan servicing, payments, escrow account',
       'Other service problem', 'Excessive fees',
       'Unauthorized withdrawals or charges',
       'Money was taken from your bank account on the wrong day or for the wrong
amount',
       'Deposits and withdrawals',
       'Problems caused by my funds being low',
       "Cont'd attempts collect debt not owed",
       'Confusing or misleading advertising or marketing',
       "Received a loan you didn't apply for",
       "Didn't provide services promised",
       'Incorrect information on credit report',
       'Settlement process and costs',
       'Problem with the payoff process at the end of the loan',
       'Lost or stolen money order', 'Disclosure verification of debt',
       'Taking/threatening an illegal action',
       "Can't stop withdrawals from your bank account",
       'Improper contact or sharing of info', 'Late fee',
       'Problem adding money',
       "Was approved for a loan, but didn't receive the money",
       "Can't contact lender or servicer",
       'Vehicle was repossessed or sold the vehicle',
       'Issue with income share agreement', 'Credit limit changed',
       'Advertising', nan, 'Issue where my lender is my school',
       'Problems receiving the advance', "Can't repay my loan",
       'Problem with cash advance', 'Credit reporting',
       "Was approved for a loan, but didn't receive money",
       'Unexpected fees', "Loan payment wasn't credited to your account",
       'Issues with repayment', 'Incorrect exchange rate',
       'Problems when you are unable to pay', 'Collection debt dispute',
       "Credit reporting company's investigation", 'Billing disputes',
       'Convenience checks', 'Lost or stolen refund',
       'Customer service / Customer relations',
       'Unable to get credit report/credit score', 'Payoff process',
       'Delinquent account', 'Collection practices', 'Repaying your loan',
       'Making/receiving payments, sending money',
       'Advertising and marketing',
       'Credit card protection / Debt protection', 'Other',
       'Shopping for a loan or lease', 'APR or interest rate',
       'Billing statement', 'Other transaction issues',
       'Improper use of my credit report', 'Closing/Cancelling account',
       'Identity theft / Fraud / Embezzlement',
       'Shopping for a line of credit', 'Payment to acct not credited',
       'Property was sold', 'Transaction issue',
       'Managing the line of credit', 'Bankruptcy',
       "Can't contact lender", 'Account terms and changes',
       'Problem with credit report or credit score',
       "Charged fees or interest I didn't expect",
       'Managing, opening, or closing account',
       'Taking out the loan or lease', 'Using a debit or ATM card',
       'Credit determination', 'Credit monitoring or identity protection',
       'Other fee', 'Sale of account', 'Rewards', 'Balance transfer',
       'Applied for loan/did not receive money',
       'Credit line increase/decrease',
       "Received a loan I didn't apply for",
       'Unsolicited issuance of credit card',
       'Incorrect/missing disclosures or info', 'Privacy',
       "Can't stop charges to bank account", 'Cash advance fee',
       'Forbearance / Workout plans', 'Arbitration',
       'Application processing delay', 'Disclosures',
       'Unauthorized transactions/trans. issues', 'Adding money',
       'Cash advance', 'Unexpected/Other fees', 'Fees',
       'Other service issues', 'Charged bank acct wrong day or amt',
       'Balance transfer fee', 'Overlimit fee',
       'Customer service/Customer relations',
       'Overdraft, savings or rewards features',
       'Property was damaged or destroyed property',
       'Lender repossessed or sold the vehicle',
       'Advertising, marketing or disclosures',
       'Problem with an overdraft', 'Lender sold the property',
       'Lender damaged or destroyed vehicle',
       'Lender damaged or destroyed property'], dtype=object)
```

[20]:

```
len(Issues)
```

[20]:

```
179
```

[21]:

```
unique_value_counts = df['Issue'].value_counts()
print(unique_value_counts)
```

```
Issue
Incorrect information on your report
1534862
Improper use of your report
820098
Problem with a credit reporting company's investigation into an existing problem
589336
Problem with a company's investigation into an existing problem
218662
Attempts to collect debt not owed
213762
     …
Lender damaged or destroyed vehicle
8
```

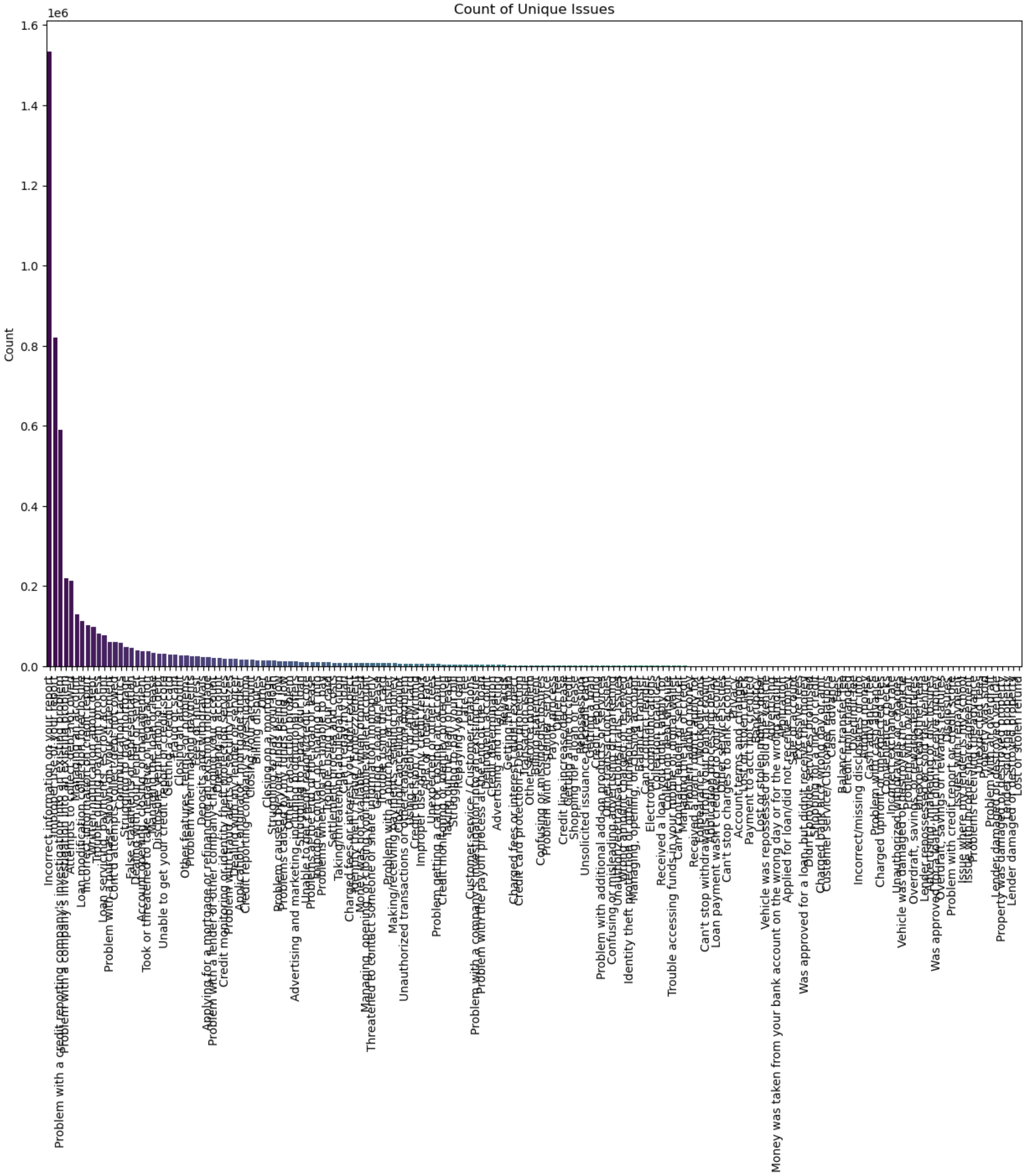
```
Property was damaged or destroyed property
7
Lender sold the property
7
Lender damaged or destroyed property
3
Lost or stolen refund
2
Name: count, Length: 178, dtype: int64
```

[22]:

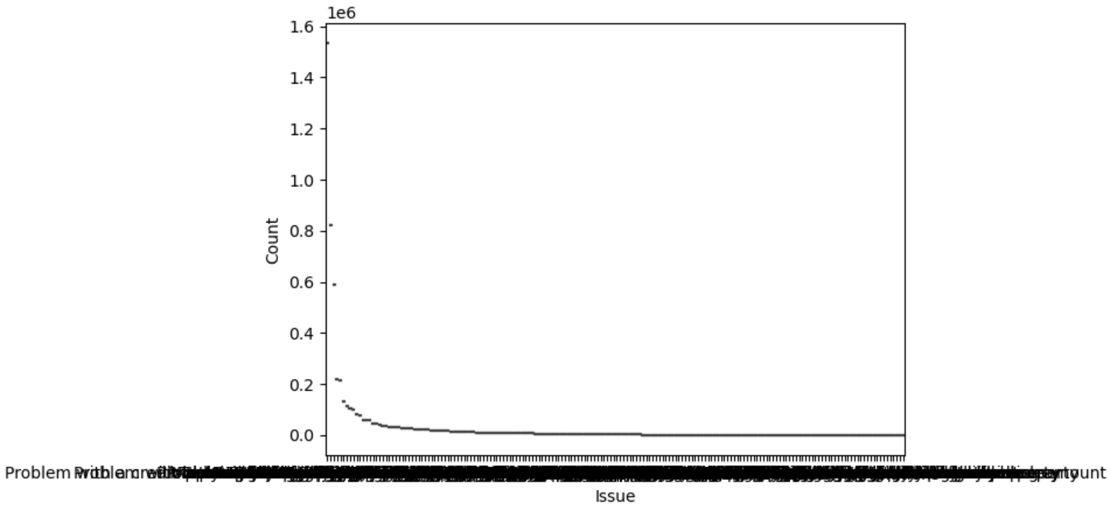
```python
import seaborn as sns
import matplotlib.pyplot as plt

unique_value_counts = df['Issue'].value_counts()

# Converting the counts to a DataFrame for plotting
unique_value_counts_df = unique_value_counts.reset_index()
unique_value_counts_df.columns = ['Issue', 'Count']

# BArPlot
plt.figure(figsize=(15, 10))
sns.barplot(x='Issue', y='Count', data=unique_value_counts_df,␣
  ↪palette='viridis')
plt.title('Count of Unique Issues')
plt.xlabel('Issue')
plt.ylabel('Count')
plt.xticks(rotation=90)
```

[22]:

```
(array([  0,   1,   2,   3,   4,   5,   6,   7,   8,   9,  10,  11,  12,
         13,  14,  15,  16,  17,  18,  19,  20,  21,  22,  23,  24,  25,
         26,  27,  28,  29,  30,  31,  32,  33,  34,  35,  36,  37,  38,
         39,  40,  41,  42,  43,  44,  45,  46,  47,  48,  49,  50,  51,
         52,  53,  54,  55,  56,  57,  58,  59,  60,  61,  62,  63,  64,
         65,  66,  67,  68,  69,  70,  71,  72,  73,  74,  75,  76,  77,
         78,  79,  80,  81,  82,  83,  84,  85,  86,  87,  88,  89,  90,
         91,  92,  93,  94,  95,  96,  97,  98,  99, 100, 101, 102, 103,
        104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116,
        117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129,
        130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142,
        143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155,
        156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168,
        169, 170, 171, 172, 173, 174, 175, 176, 177]),
 [Text(0, 0, 'Incorrect information on your report'),
  Text(1, 0, 'Improper use of your report'),
  Text(2, 0, "Problem with a credit reporting company's investigation into an
existing problem"),
  Text(3, 0, "Problem with a company's investigation into an existing problem"),
Text(4, 0, 'Attempts to collect debt not owed'),
Text(5, 0, 'Managing an account'),
Text(6, 0, 'Loan modification,collection,foreclosure'),
Text(7, 0, 'Incorrect information on credit report'),
Text(8, 0, 'Written notification about debt'),
Text(9, 0, 'Trouble during payment process'),
Text(10, 0, 'Loan servicing, payments, escrow account'),
Text(11, 0, 'Problem with a purchase shown on your statement'),
Text(12, 0, "Cont'd attempts collect debt not owed"),
Text(13, 0, 'Communication tactics'),
Text(14, 0, 'Struggling to pay mortgage'),
Text(15, 0, 'False statements or representation'),
Text(16, 0, 'Dealing with your lender or servicer'),
Text(17, 0, 'Account opening, closing, or management'),
Text(18, 0, 'Took or threatened to take negative or legal action'),
Text(19, 0, 'Managing the loan or lease'),
Text(20, 0, 'Disclosure verification of debt'),
Text(21, 0, 'Unable to get your credit report or credit score'),
Text(22, 0, 'Getting a credit card'),
Text(23, 0, 'Fraud or scam'),
Text(24, 0, 'Closing an account'),
Text(25, 0, 'Other features, terms, or problems'),
Text(26, 0, 'Problem when making payments'),
Text(27, 0, 'Fees or interest'),
Text(28, 0, 'Deposits and withdrawals'),
Text(29, 0, 'Applying for a mortgage or refinancing an existing mortgage'),
Text(30, 0, 'Problem with a lender or other company charging your account'),
Text(31, 0, 'Opening an account'),
Text(32, 0, 'Credit monitoring or identity theft protection services'),
Text(33, 0, 'Problem with fraud alerts or security freezes'),
Text(34, 0, 'Dealing with my lender or servicer'),
Text(35, 0, 'Application, originator, mortgage broker'),
Text(36, 0, "Credit reporting company's investigation"),
Text(37, 0, 'Closing your account'),
Text(38, 0, 'Billing disputes'),
Text(39, 0, 'Other'),
Text(40, 0, 'Closing on a mortgage'),
Text(41, 0, 'Struggling to pay your loan'),
Text(42, 0, 'Problem caused by your funds being low'),
Text(43, 0, 'Problems caused by my funds being low'),
Text(44, 0, 'Other transaction problem'),
Text(45, 0, 'Advertising and marketing, including promotional offers'),
Text(46, 0, 'Struggling to repay your loan'),
Text(47, 0, 'Unable to get credit report/credit score'),
Text(48, 0, 'Problems at the end of the loan or lease'),
Text(49, 0, 'Improper contact or sharing of info'),
Text(50, 0, 'Problems when you are unable to pay'),
Text(51, 0, 'Trouble using your card'),
Text(52, 0, 'Settlement process and costs'),
Text(53, 0, 'Taking/threatening an illegal action'),
Text(54, 0, "Can't repay my loan"),
Text(55, 0, "Charged fees or interest you didn't expect"),
Text(56, 0, 'Identity theft / Fraud / Embezzlement'),
Text(57, 0, 'Money was not available when promised'),
Text(58, 0, 'Managing, opening, or closing your mobile wallet account'),
Text(59, 0, 'Threatened to contact someone or share information improperly'),
Text(60, 0, 'Getting a loan or lease'),
Text(61, 0, 'Trouble using the card'),
Text(62, 0, 'Problem with a purchase or transfer'),
Text(63, 0, 'Making/receiving payments, sending money'),
Text(64, 0, 'Closing/Cancelling account'),
Text(65, 0, 'Unauthorized transactions or other transaction problem'),
Text(66, 0, 'Using a debit or ATM card'),
Text(67, 0, 'Credit decision / Underwriting'),
Text(68, 0, 'Improper use of my credit report'),
Text(69, 0, 'APR or interest rate'),
Text(70, 0, 'Unexpected or other fees'),
Text(71, 0, 'Problem getting a card or closing an account'),
Text(72, 0, 'Credit monitoring or identity protection'),
Text(73, 0, 'Taking out the loan or lease'),
Text(74, 0, 'Struggling to pay your bill'),
Text(75, 0, 'Repaying your loan'),
Text(76, 0, 'Late fee'),
Text(77, 0, 'Customer service / Customer relations'),
Text(78, 0, "Problem with a company's investigation into an existing issue"),
Text(79, 0, 'Problem with the payoff process at the end of the loan'),
Text(80, 0, 'Delinquent account'),
Text(81, 0, 'Credit determination'),
Text(82, 0, 'Advertising and marketing'),
Text(83, 0, 'Rewards'),
Text(84, 0, 'Getting the loan'),
Text(85, 0, "Charged fees or interest I didn't expect"),
Text(86, 0, 'Credit card protection / Debt protection'),
Text(87, 0, 'Transaction issue'),
Text(88, 0, 'Other service problem'),
Text(89, 0, 'Billing statement'),
Text(90, 0, 'Confusing or missing disclosures'),
Text(91, 0, 'Problem with customer service'),
Text(92, 0, 'Payoff process'),
Text(93, 0, 'Other fee'),
Text(94, 0, 'Credit line increase/decrease'),
Text(95, 0, 'Getting a line of credit'),
Text(96, 0, 'Shopping for a loan or lease'),
Text(97, 0, 'Repossession'),
  Text(98, 0, 'Unsolicited issuance of credit card'),
  Text(99, 0, 'Getting a loan'),
  Text(100, 0, 'Credit reporting'),
  Text(101, 0, 'Problem with additional add-on products or services'),
  Text(102, 0, 'Other transaction issues'),
  Text(103, 0, 'Confusing or misleading advertising or marketing'),
  Text(104, 0, 'Unauthorized transactions/trans. issues'),
  Text(105, 0, 'Wrong amount charged or received'),
  Text(106, 0, 'Identity theft protection or other monitoring services'),
  Text(107, 0, 'Managing, opening, or closing account'),
  Text(108, 0, 'Balance transfer'),
  Text(109, 0, "Can't contact lender"),
  Text(110, 0, 'Electronic communications'),
  Text(111, 0, 'Collection practices'),
  Text(112, 0, "Received a loan you didn't apply for"),
  Text(113, 0, 'Collection debt dispute'),
  Text(114, 0, 'Trouble accessing funds in your mobile or digital wallet'),
  Text(115, 0, "Can't contact lender or servicer"),
  Text(116, 0, 'Managing the line of credit'),
  Text(117, 0, 'Problem adding money'),
  Text(118, 0, "Received a loan I didn't apply for"),
  Text(119, 0, 'Forbearance / Workout plans'),
  Text(120, 0, "Can't stop withdrawals from your bank account"),
  Text(121, 0, 'Application processing delay'),
  Text(122, 0, "Loan payment wasn't credited to your account"),
  Text(123, 0, 'Other service issues'),
  Text(124, 0, "Can't stop charges to bank account"),
  Text(125, 0, 'Privacy'),
  Text(126, 0, 'Account terms and changes'),
  Text(127, 0, 'Lost or stolen check'),
  Text(128, 0, 'Payment to acct not credited'),
  Text(129, 0, 'Bankruptcy'),
  Text(130, 0, 'Lost or stolen money order'),
  Text(131, 0, 'Vehicle was repossessed or sold the vehicle'),
  Text(132, 0, 'Advertising'),
  Text(133, 0, 'Money was taken from your bank account on the wrong day or for
the wrong amount'),
  Text(134, 0, 'Arbitration'),
  Text(135, 0, 'Applied for loan/did not receive money'),
  Text(136, 0, 'Sale of account'),
  Text(137, 0, 'Excessive fees'),
  Text(138, 0, "Was approved for a loan, but didn't receive the money"),
  Text(139, 0, "Didn't provide services promised"),
  Text(140, 0, 'Shopping for a line of credit'),
  Text(141, 0, 'Charged bank acct wrong day or amt'),
  Text(142, 0, 'Customer service/Customer relations'),
  Text(143, 0, 'Cash advance'),
  Text(144, 0, 'Fees'),
  Text(145, 0, 'Balance transfer fee'),
  Text(146, 0, 'Credit limit changed'),
  Text(147, 0, 'Overlimit fee'),
  Text(148, 0, 'Incorrect/missing disclosures or info'),
  Text(149, 0, 'Adding money'),
  Text(150, 0, 'Cash advance fee'),
  Text(151, 0, 'Problem with cash advance'),
  Text(152, 0, 'Charged upfront or unexpected fees'),
  Text(153, 0, 'Convenience checks'),
  Text(154, 0, 'Incorrect exchange rate'),
  Text(155, 0, 'Unauthorized withdrawals or charges'),
  Text(156, 0, 'Vehicle was damaged or destroyed the vehicle'),
  Text(157, 0, 'Problem with overdraft'),
  Text(158, 0, 'Overdraft, savings, or rewards features'),
  Text(159, 0, 'Unexpected/Other fees'),
  Text(160, 0, 'Lender repossessed or sold the vehicle'),
  Text(161, 0, 'Advertising, marketing or disclosures'),
  Text(162, 0, "Was approved for a loan, but didn't receive money"),
  Text(163, 0, 'Overdraft, savings or rewards features'),
  Text(164, 0, 'Disclosures'),
  Text(165, 0, 'Problem with credit report or credit score'),
  Text(166, 0, 'Issues with repayment'),
  Text(167, 0, 'Issue where my lender is my school'),
  Text(168, 0, 'Issue with income share agreement'),
  Text(169, 0, 'Problems receiving the advance'),
  Text(170, 0, 'Unexpected fees'),
  Text(171, 0, 'Property was sold'),
  Text(172, 0, 'Problem with an overdraft'),
  Text(173, 0, 'Lender damaged or destroyed vehicle'),
  Text(174, 0, 'Property was damaged or destroyed property'),
  Text(175, 0, 'Lender sold the property'),
  Text(176, 0, 'Lender damaged or destroyed property'),
  Text(177, 0, 'Lost or stolen refund')])
```



```
[23]: unique_value_counts = df['Issue'].value_counts().reset_index()
      unique_value_counts.columns = ['Issue', 'Count']

      # Single line code to draw a box plot
      sns.boxplot(x='Issue', y='Count', data=unique_value_counts)

      # Show the plot
      plt.show()
```



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

[26]:
```python
def find_length_of_lcis(arr):
    if not arr:
        return 0

    max_length = 1
    current_length = 1

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

    return max_length

# Input:
arr = list(map(int, input().replace(',', ' ').split()))
print(find_length_of_lcis(arr))
```

```
 1,3,5,4,7
```

```
3
```

[27]:
```python
# Example 1:
# Input: [1,3,5,4,7]
# Output: 3
```

```
print(find_length_of_lcis([1,3,5,4,7]))
```

```
3
```

[28]:

```
# Example 2:
# Input: [2,2,2,2,2]
# Output: 1
print(find_length_of_lcis([2,2,2,2,2]))
```

```
1
```

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

[29]:

```
from functools import cmp_to_key

def compare(a, b):
    if a + b > b + a:
        return -1
    elif a + b < b + a:
        return 1
    else:
        return 0

def largest_number(nums):
    # Convert integers to strings for easy comparison
    nums = list(map(str, nums))

    # Sort using the custom comparator
    nums.sort(key=cmp_to_key(compare))

    # Join the sorted numbers
    result = ''.join(nums)

    # Edge case: if the largest number is '0', the result should be '0'
    return result if result[0] != '0' else '0'

# input
nums=list(map(int,input().replace(',', ' ').split()))
print(largest_number(nums))
```

```
 10,2
```

```
210
```

[30]:

```
# Example 1:
#   Input: [10,2]
#   Output: &quot;210&quot;
print(largest_number([10,2]))
```

```
210
```

[31]:

```
# Example 2:
# Input: [3,30,34,5,9]
# Output: &quot;9534330&quot;
print(largest_number([3,30,34,5,9]))
```

```
9534330
```

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

[32]:

```
import json
import csv

# Load JSON data from file
with open('sample.json', 'r') as file:
    data = json.load(file)

# Extract servlet information
servlets = data['web-app']['servlet']

# Prepare the data for CSV
csv_data = []
for servlet in servlets:
    name = servlet.get('servlet-name')
    class_name = servlet.get('servlet-class')
    if name and class_name:
        csv_data.append({'servlet-name': name, 'servlet-class': class_name})

# Write the data to a CSV file
with open('servlets.csv', 'w', newline='') as csvfile:
    fieldnames = ['servlet-name', 'servlet-class']
    writer = csv.DictWriter(csvfile, fieldnames=fieldnames)

    writer.writeheader()
    for row in csv_data:
        writer.writerow(row)

print("CSV file 'servlets.csv' has been created with servlet-name and␣
 ↪servlet-class.")
```

```
CSV file 'servlets.csv' has been created with servlet-name and servlet-class.
```

[34]:

```
import pandas as pd
df= pd.read_csv("servlets.csv")
df
```

[34]:

```
  servlet-name                   servlet-class
0     cofaxCDS         org.cofax.cds.CDSServlet
1   cofaxEmail       org.cofax.cds.EmailServlet
```

```
2   cofaxAdmin       org.cofax.cds.AdminServlet
3  fileServlet        org.cofax.cds.FileServlet
4   cofaxTools  org.cofax.cms.CofaxToolsServlet
```

[ ]:

```
```

[ ]:

```
```