Investigate a dataset Project 1

August 21, 2022

0.1 Project: Investigate A DataSet NCIS Gun data And Census Data

0.2 Table of Content

0.3 INTRODUCTION

This data is based on the federal firearms licences. This is to determine whether the buyer is eligible to procure explosives or firearms. Before a firearm or an explosive is procured, the cashier needs to run a background check via the FBI, to make sure that there isnt't any record of any criminal activity. These FBI however in other states does not include background checks in private gun sales. Nics numbers are accepted wildly as the best proxy for total gun sales.

0.4 Source: https://ipython.readdocs.io/en/stable/interactive/magics.html

0.5 Data Descrption

- We have an Excel Xlx File that we are going to analyze.

0.6 Question(s)for analysis

U.S Census data & Gun data

- How many states do not do pre-permit checks? • Which privtae state that does not include a background check? • Which buyer is eligible to procure firearms and explosives? • Is there any record of any criminal activity from the customers?

```python
[75]: import pandas as pd
      import numpy as np
      import matplotlib.pyplot as plt
      import seaborn as snb
      %matplotlib inline
      df = pd.read_csv
      plt.show()
```

0.7 DATA WRANGLING

```python
[6]: dataset = pandas.read_excel("gun_data.xlsx")
```

```python
[48]: dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 12485 entries, 0 to 12484
Data columns (total 27 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   month                   12485 non-null  object
 1   state                   12485 non-null  object
 2   permit                  12461 non-null  float64
 3   permit_recheck          1100 non-null   float64
 4   handgun                 12465 non-null  float64
 5   long_gun                12466 non-null  float64
 6   other                   5500 non-null   float64
 7   multiple                12485 non-null  int64
 8   admin                   12462 non-null  float64
 9   prepawn_handgun         10542 non-null  float64
 10  prepawn_long_gun        10540 non-null  float64
 11  prepawn_other           5115 non-null   float64
 12  redemption_handgun      10545 non-null  float64
 13  redemption_long_gun     10544 non-null  float64
 14  redemption_other        5115 non-null   float64
 15  returned_handgun        2200 non-null   float64
 16  returned_long_gun       2145 non-null   float64
 17  returned_other          1815 non-null   float64
 18  rentals_handgun         990 non-null    float64
 19  rentals_long_gun        825 non-null    float64
 20  private_sale_handgun    2750 non-null   float64
 21  private_sale_long_gun   2750 non-null   float64
 22  private_sale_other      2750 non-null   float64
 23  return_to_seller_handgun  2475 non-null   float64
 24  return_to_seller_long_gun 2750 non-null   float64
 25  return_to_seller_other  2255 non-null   float64
 26  totals                  12485 non-null  int64
dtypes: float64(23), int64(2), object(2)
memory usage: 2.6+ MB
```

[80]: `dataset.duplicated().sum()`

[80]: 3

[63]: `dataset.describe`

[63]: <bound method NDFrame.describe of   U.S
    Census data \
    0   Fact
    1   Population estimates, July 1, 2016, (V2016)
    2   Population estimates base, April 1, 2010, (V2…
    3   Population, percent change - April 1, 2010 (es…

```
4                          Population, Census, April 1, 2010
..                                                         …
81                                                        FN
82                                                       NaN
83                                                         S
84                                                         X
85                                                         Z


                                                 Unnamed: 1 Unnamed: 2 Unnamed: 3  \
0                                                 Fact Note    Alabama     Alaska
1                                                       NaN  4,863,300    741.894
2                                                       NaN  4,780,131    710.249
3                                                       NaN      1.70%      4.50%
4                                                       NaN  4,779,736    710.231
..                                                      …          …          …
81                 Footnote on this item in place of data        NaN        NaN
82                                          Not available        NaN        NaN
83      Suppressed; does not meet publication standards        NaN        NaN
84                                         Not applicable        NaN        NaN
85   Value greater than zero but less than half uni…        NaN        NaN


    Unnamed: 4 Unnamed: 5  Unnamed: 6 Unnamed: 7   Unnamed: 8 Unnamed: 9  …  \
0      Arizona   Arkansas  California   Colorado  Connecticut   Delaware  …
1    6,931,071  2,988,248  39,250,017  5,540,545    3,576,452    952.065  …
2    6,392,301  2,916,025  37,254,522  5,029,324    3,574,114    897.936  …
3        8.40%      2.50%       5.40%     10.20%        0.10%      6.00%  …
4    6,392,017  2,915,918  37,253,956  5,029,196    3,574,097    897.934  …
..         …          …           …          …            …          …  …
81         NaN        NaN         NaN        NaN          NaN        NaN  …
82         NaN        NaN         NaN        NaN          NaN        NaN  …
83         NaN        NaN         NaN        NaN          NaN        NaN  …
84         NaN        NaN         NaN        NaN          NaN        NaN  …
85         NaN        NaN         NaN        NaN          NaN        NaN  …


    Unnamed: 42 Unnamed: 43 Unnamed: 44 Unnamed: 45 Unnamed: 46 Unnamed: 47  \
0   South Dakota   Tennessee        Texas        Utah     Vermont    Virginia
1         865454     6651194  27,862,596   3,051,217     624.594   8,411,808
2         814195     6346298  25,146,100   2,763,888     625.741   8,001,041
3          0.063       0.048      10.80%      10.40%      -0.20%       5.10%
4         814180     6346105  25,145,561   2,763,885     625.741   8,001,024
..           …           …           …           …           …           …
81           NaN         NaN         NaN         NaN         NaN         NaN
82           NaN         NaN         NaN         NaN         NaN         NaN
83           NaN         NaN         NaN         NaN         NaN         NaN
84           NaN         NaN         NaN         NaN         NaN         NaN
85           NaN         NaN         NaN         NaN         NaN         NaN
```

```
     Unnamed: 48    Unnamed: 49 Unnamed: 50 Unnamed: 51
0     Washington   West Virginia   Wisconsin     Wyoming
1      7,288,000       1,831,102   5,778,708     585.501
2      6,724,545       1,853,011   5,687,289     563.767
3          8.40%          -1.20%       1.60%       3.90%
4      6,724,540       1,852,994   5,686,986     563.626
..           ...             ...         ...         ...
81           NaN             NaN         NaN         NaN
82           NaN             NaN         NaN         NaN
83           NaN             NaN         NaN         NaN
84           NaN             NaN         NaN         NaN
85           NaN             NaN         NaN         NaN

[86 rows x 52 columns]>
```

[52]: `dataset.isnull()`

[52]:
```
     U.S Census data  Unnamed: 1  Unnamed: 2  Unnamed: 3  Unnamed: 4  \
0              False       False       False       False       False
1              False        True       False       False       False
2              False        True       False       False       False
3              False        True       False       False       False
4              False        True       False       False       False
..               ...         ...         ...         ...         ...
81             False       False        True        True        True
82              True       False        True        True        True
83             False       False        True        True        True
84             False       False        True        True        True
85             False       False        True        True        True

     Unnamed: 5  Unnamed: 6  Unnamed: 7  Unnamed: 8  Unnamed: 9  ... \
0         False       False       False       False       False  ...
1         False       False       False       False       False  ...
2         False       False       False       False       False  ...
3         False       False       False       False       False  ...
4         False       False       False       False       False  ...
..          ...         ...         ...         ...         ...  ...
81         True        True        True        True        True  ...
82         True        True        True        True        True  ...
83         True        True        True        True        True  ...
84         True        True        True        True        True  ...
85         True        True        True        True        True  ...

     Unnamed: 42  Unnamed: 43  Unnamed: 44  Unnamed: 45  Unnamed: 46  \
0          False        False        False        False        False
1          False        False        False        False        False
2          False        False        False        False        False
```

```
3      False      False      False      False      False
4      False      False      False      False      False
..      …          …          …          …          …
81      True       True       True       True       True
82      True       True       True       True       True
83      True       True       True       True       True
84      True       True       True       True       True
85      True       True       True       True       True

        Unnamed: 47  Unnamed: 48  Unnamed: 49  Unnamed: 50  Unnamed: 51
0      False        False        False        False        False
1      False        False        False        False        False
2      False        False        False        False        False
3      False        False        False        False        False
4      False        False        False        False        False
..      …            …            …            …            …
81      True         True         True         True         True
82      True         True         True         True         True
83      True         True         True         True         True
84      True         True         True         True         True
85      True         True         True         True         True

[86 rows x 52 columns]
```

[53]:
```python
#any missing values?
dataset.isnull().values.any()
```

[53]: True

[57]:
```python
#Total missing values
dataset.isnull().sum()
```

[57]:
```
U.S Census data       5
Unnamed: 1           57
Unnamed: 2           20
Unnamed: 3           20
Unnamed: 4           20
Unnamed: 5           20
Unnamed: 6           20
Unnamed: 7           20
Unnamed: 8           20
Unnamed: 9           20
Unnamed: 10          20
Unnamed: 11          20
Unnamed: 12          20
Unnamed: 13          20
Unnamed: 14          20
```

```
Unnamed: 15         20
Unnamed: 16         20
Unnamed: 17         20
Unnamed: 18         20
Unnamed: 19         20
Unnamed: 20         20
Unnamed: 21         20
Unnamed: 22         20
Unnamed: 23         20
Unnamed: 24         20
Unnamed: 25         20
Unnamed: 26         20
Unnamed: 27         20
Unnamed: 28         20
Unnamed: 29         20
Unnamed: 30         20
Unnamed: 31         20
Unnamed: 32         20
Unnamed: 33         20
Unnamed: 34         20
Unnamed: 35         20
Unnamed: 36         20
Unnamed: 37         20
Unnamed: 38         20
Unnamed: 39         20
Unnamed: 40         20
Unnamed: 41         20
Unnamed: 42         20
Unnamed: 43         20
Unnamed: 44         20
Unnamed: 45         20
Unnamed: 46         20
Unnamed: 47         20
Unnamed: 48         20
Unnamed: 49         20
Unnamed: 50         20
Unnamed: 51         20
dtype: int64
```

```python
>>> dataset.fillna(method="ffill")
```

```
[20]:                                   U.S Census data  \
      0                                              Fact
      1        Population estimates, July 1, 2016,  (V2016)
      2    Population estimates base, April 1, 2010,  (V2…
      3    Population, percent change - April 1, 2010 (es…
      4                    Population, Census, April 1, 2010
```

```
..                                                             …
81                                                            FN
82                                                            FN
83                                                             S
84                                                             X
85                                                             Z

                                                   Unnamed: 1 Unnamed: 2 Unnamed: 3  \
0                                                    Fact Note    Alabama     Alaska
1                                                    Fact Note  4,863,300    741.894
2                                                    Fact Note  4,780,131    710.249
3                                                    Fact Note      1.70%      4.50%
4                                                    Fact Note  4,779,736    710.231
..                                                         …          …          …
81               Footnote on this item in place of data         "01"       "02"
82                                        Not available         "01"       "02"
83   Suppressed; does not meet publication standards         "01"       "02"
84                                       Not applicable         "01"       "02"
85  Value greater than zero but less than half uni…        "01"       "02"

   Unnamed: 4 Unnamed: 5  Unnamed: 6 Unnamed: 7  Unnamed: 8 Unnamed: 9  … \
0     Arizona   Arkansas  California   Colorado Connecticut   Delaware  …
1   6,931,071  2,988,248  39,250,017  5,540,545   3,576,452    952.065  …
2   6,392,301  2,916,025  37,254,522  5,029,324   3,574,114    897.936  …
3       8.40%      2.50%       5.40%     10.20%       0.10%      6.00%  …
4   6,392,017  2,915,918  37,253,956  5,029,196   3,574,097    897.934  …
..          …          …           …          …           …          …  …
81       "04"       "05"        "06"       "08"        "09"       "10"  …
82       "04"       "05"        "06"       "08"        "09"       "10"  …
83       "04"       "05"        "06"       "08"        "09"       "10"  …
84       "04"       "05"        "06"       "08"        "09"       "10"  …
85       "04"       "05"        "06"       "08"        "09"       "10"  …

   Unnamed: 42 Unnamed: 43 Unnamed: 44 Unnamed: 45 Unnamed: 46 Unnamed: 47  \
0   South Dakota   Tennessee        Texas        Utah     Vermont    Virginia
1         865454     6651194  27,862,596   3,051,217     624.594   8,411,808
2         814195     6346298  25,146,100   2,763,888     625.741   8,001,041
3          0.063       0.048      10.80%      10.40%      -0.20%       5.10%
4         814180     6346105  25,145,561   2,763,885     625.741   8,001,024
..             …           …           …           …           …           …
81          "46"        "47"        "48"        "49"        "50"        "51"
82          "46"        "47"        "48"        "49"        "50"        "51"
83          "46"        "47"        "48"        "49"        "50"        "51"
84          "46"        "47"        "48"        "49"        "50"        "51"
85          "46"        "47"        "48"        "49"        "50"        "51"

    Unnamed: 48   Unnamed: 49 Unnamed: 50 Unnamed: 51
```

```
0    Washington    West Virginia    Wisconsin        Wyoming
1    7,288,000         1,831,102    5,778,708        585.501
2    6,724,545         1,853,011    5,687,289        563.767
3        8.40%            -1.20%        1.60%          3.90%
4    6,724,540         1,852,994    5,686,986        563.626
..          …                 …            …              …
81        "53"              "54"         "55"           "56"
82        "53"              "54"         "55"           "56"
83        "53"              "54"         "55"           "56"
84        "53"              "54"         "55"           "56"
85        "53"              "54"         "55"           "56"

[86 rows x 52 columns]
```

```
[25]: >>> values = {"A":1, "B":2, "C":4 ,"D":5}
      >>> dataset.fillna(value=values)
```

```
[25]:                                         U.S Census data  \
      0                                                  Fact
      1            Population estimates, July 1, 2016,  (V2016)
      2        Population estimates base, April 1, 2010,  (V2…
      3        Population, percent change - April 1, 2010 (es…
      4                    Population, Census, April 1, 2010
      ..                                                    …
      81                                                   FN
      82                                                  NaN
      83                                                    S
      84                                                    X
      85                                                    Z

                                              Unnamed: 1 Unnamed: 2 Unnamed: 3  \
      0                                         Fact Note    Alabama      Alaska
      1                                              NaN  4,863,300     741.894
      2                                              NaN  4,780,131     710.249
      3                                              NaN      1.70%       4.50%
      4                                              NaN  4,779,736     710.231
      ..                                               …          …           …
      81          Footnote on this item in place of data        NaN         NaN
      82                                   Not available        NaN         NaN
      83     Suppressed; does not meet publication standards       NaN         NaN
      84                                  Not applicable        NaN         NaN
      85  Value greater than zero but less than half uni…        NaN         NaN

         Unnamed: 4 Unnamed: 5  Unnamed: 6 Unnamed: 7   Unnamed: 8 Unnamed: 9  …  \
      0     Arizona   Arkansas  California   Colorado  Connecticut   Delaware  …
      1   6,931,071  2,988,248  39,250,017  5,540,545    3,576,452    952.065  …
      2   6,392,301  2,916,025  37,254,522  5,029,324    3,574,114    897.936  …
```

```
3        8.40%      2.50%      5.40%     10.20%         0.10%      6.00%  …
4    6,392,017  2,915,918  37,253,956  5,029,196     3,574,097    897.934  …
..         …          …          …          …           …         …  …
81        NaN        NaN        NaN        NaN          NaN        NaN  …
82        NaN        NaN        NaN        NaN          NaN        NaN  …
83        NaN        NaN        NaN        NaN          NaN        NaN  …
84        NaN        NaN        NaN        NaN          NaN        NaN  …
85        NaN        NaN        NaN        NaN          NaN        NaN  …

      Unnamed: 42 Unnamed: 43 Unnamed: 44 Unnamed: 45 Unnamed: 46 Unnamed: 47  \
0    South Dakota   Tennessee        Texas        Utah     Vermont     Virginia
1          865454     6651194  27,862,596   3,051,217     624.594    8,411,808
2          814195     6346298  25,146,100   2,763,888     625.741    8,001,041
3           0.063       0.048      10.80%      10.40%      -0.20%        5.10%
4          814180     6346105  25,145,561   2,763,885     625.741    8,001,024
..            …           …          …           …           …            …
81            NaN         NaN         NaN         NaN         NaN          NaN
82            NaN         NaN         NaN         NaN         NaN          NaN
83            NaN         NaN         NaN         NaN         NaN          NaN
84            NaN         NaN         NaN         NaN         NaN          NaN
85            NaN         NaN         NaN         NaN         NaN          NaN

      Unnamed: 48    Unnamed: 49 Unnamed: 50 Unnamed: 51
0      Washington  West Virginia   Wisconsin     Wyoming
1       7,288,000      1,831,102   5,778,708     585.501
2       6,724,545      1,853,011   5,687,289     563.767
3           8.40%         -1.20%       1.60%       3.90%
4       6,724,540      1,852,994   5,686,986     563.626
..          …              …           …           …
81          NaN            NaN         NaN         NaN
82          NaN            NaN         NaN         NaN
83          NaN            NaN         NaN         NaN
84          NaN            NaN         NaN         NaN
85          NaN            NaN         NaN         NaN

[86 rows x 52 columns]
```

[67]: `dataset.head(5)`

[67]:
```
                                         U.S Census data Unnamed: 1 Unnamed: 2  \
0                                                   Fact  Fact Note    Alabama
1            Population estimates, July 1, 2016,  (V2016)       NaN  4,863,300
2    Population estimates base, April 1, 2010,  (V2…       NaN  4,780,131
3    Population, percent change – April 1, 2010 (es…       NaN      1.70%
4                   Population, Census, April 1, 2010       NaN  4,779,736

  Unnamed: 3 Unnamed: 4 Unnamed: 5  Unnamed: 6 Unnamed: 7   Unnamed: 8  \
```

```
0    Alaska    Arizona   Arkansas  California   Colorado   Connecticut
1   741.894  6,931,071  2,988,248  39,250,017  5,540,545    3,576,452
2   710.249  6,392,301  2,916,025  37,254,522  5,029,324    3,574,114
3     4.50%      8.40%      2.50%       5.40%     10.20%        0.10%
4   710.231  6,392,017  2,915,918  37,253,956  5,029,196    3,574,097

   Unnamed: 9  …  Unnamed: 42 Unnamed: 43 Unnamed: 44 Unnamed: 45  \
0   Delaware   …  South Dakota   Tennessee        Texas        Utah
1    952.065   …        865454     6651194  27,862,596   3,051,217
2    897.936   …        814195     6346298  25,146,100   2,763,888
3      6.00%   …         0.063       0.048      10.80%      10.40%
4    897.934   …        814180     6346105  25,145,561   2,763,885

   Unnamed: 46 Unnamed: 47 Unnamed: 48    Unnamed: 49 Unnamed: 50 Unnamed: 51
0     Vermont    Virginia  Washington  West Virginia   Wisconsin     Wyoming
1     624.594   8,411,808   7,288,000      1,831,102   5,778,708     585.501
2     625.741   8,001,041   6,724,545      1,853,011   5,687,289     563.767
3      -0.20%       5.10%       8.40%         -1.20%       1.60%       3.90%
4     625.741   8,001,024   6,724,540      1,852,994   5,686,986     563.626

[5 rows x 52 columns]
```

[65]: `dataset.dropna()`

```
[65]:                                         U.S Census data  \
0                                                      Fact
13          White alone, percent, July 1, 2016,  (V2016)
14  Black or African American alone, percent, July…
15  American Indian and Alaska Native alone, perce…
16          Asian alone, percent, July 1, 2016,  (V2016)
17  Native Hawaiian and Other Pacific Islander alo…
19  Hispanic or Latino, percent, July 1, 2016,  (V…
41  Total accommodation and food services sales, 2…
42  Total health care and social assistance receip…
43       Total manufacturers shipments, 2012 ($1,000)
44     Total merchant wholesaler sales, 2012 ($1,000)
45                 Total retail sales, 2012 ($1,000)
46                 Total retail sales per capita, 2012
51                 Total employer establishments, 2015
52                             Total employment, 2015
53             Total annual payroll, 2015 ($1,000)
54       Total employment, percent change, 2014-2015

                                Unnamed: 1  Unnamed: 2 Unnamed: 3  \
0                                Fact Note     Alabama     Alaska
13                                     (a)      69.30%     66.10%
14                                     (a)      26.80%      3.80%
```

```
15                                                    (a)          0.70%         15.20%
16                                                    (a)          1.40%          6.30%
17                                                    (a)          0.10%          1.30%
19                                                    (b)          4.20%          7.00%
41                                                    (c)      7,576,462      2,221,335
42                                                    (c)     26,039,632      6,375,483
43                                                    (c)    124,809,759              D
44                                                    (c)     57,746,565      5,216,303
45                                                    (c)     58,564,965     10,474,275
46                                                    (c)        $12,145        $14,320
51   Includes data not distributed by county.              98.54         20.907
52   Includes data not distributed by county.           1,634,391        267.999
53   Includes data not distributed by county.          67,370,353     15,643,303
54   Includes data not distributed by county.               1.90%          0.40%
```

```
       Unnamed: 4  Unnamed: 5   Unnamed: 6   Unnamed: 7    Unnamed: 8  \
0         Arizona    Arkansas   California     Colorado   Connecticut
13         83.30%      79.40%       72.70%       87.50%        80.60%
14          4.90%      15.70%        6.50%        4.50%        11.80%
15          5.40%       1.00%        1.70%        1.60%         0.50%
16          3.40%       1.60%       14.80%        3.30%         4.70%
17          0.30%       0.30%        0.50%        0.20%         0.10%
19         30.90%       7.30%       38.90%       21.30%        15.70%
41     13,996,635   4,307,264   90,830,372   13,617,654     9,542,068
42     37,055,881  15,792,628  248,953,592   29,488,161    29,573,119
43     51,243,473  62,712,925  512,303,164   50,447,098    55,160,095
44     69,437,272  31,256,110  666,652,186   77,034,971   161,962,244
45     84,716,542  36,815,256  481,800,461   67,815,200    51,632,467
46        $12,927     $12,483      $12,665      $13,073       $14,381
51        136.352      65.175       908.12      161.737        89.232
52      2,295,186   1,003,113   14,325,377    2,253,795     1,503,102
53    102,671,393  39,451,191  856,954,246  117,539,555    92,555,072
54          2.40%       1.10%        3.50%        3.30%         1.20%
```

```
       Unnamed: 9  …   Unnamed: 42 Unnamed: 43  Unnamed: 44 Unnamed: 45  \
0         Delaware  …  South Dakota   Tennessee        Texas        Utah
13          70.10%  …         0.852       0.787       79.40%      91.10%
14          22.60%  …          0.02       0.171       12.60%       1.40%
15           0.60%  …          0.09       0.004        1.00%       1.60%
16           4.00%  …         0.015       0.018        4.80%       2.50%
17           0.10%  …         0.001       0.001        0.10%       1.00%
19           9.20%  …         0.037       0.052       39.10%      13.80%
41       2,148,437  …       1873699    12499013   54,480,811   4,789,281
42       7,003,251  …       6211731    42383683  145,035,130  14,521,857
43      22,597,384  …      16882647   139960482  702,603,073  50,046,429
44       5,628,914  …      20411059   111718421  691,242,607  30,927,885
45      14,456,001  …      13791827    91641605  356,116,376  38,024,486
```

46	$15,763	…	16550	14194	$13,666	$13,317
51	24.852	…	26511	133344	569.091	75.463
52	397.385	…	353540	2507205	10,239,710	1,203,954
53	21,305,227	…	13812997	110481280	521,095,797	51,453,266
54	1.50%	…	0.016	0.022	3.20%	4.90%

	Unnamed: 46	Unnamed: 47	Unnamed: 48	Unnamed: 49	Unnamed: 50 \
0	Vermont	Virginia	Washington	West Virginia	Wisconsin
13	94.60%	70.00%	80.00%	93.60%	87.50%
14	1.30%	19.80%	4.10%	3.60%	6.60%
15	0.40%	0.50%	1.90%	0.20%	1.10%
16	1.80%	6.60%	8.60%	0.80%	2.80%
17	Z	0.10%	0.80%	Z	0.10%
19	1.90%	9.10%	12.40%	1.50%	6.70%
41	1,564,272	17,795,901	14,297,278	4,036,333	10,303,256
42	4,457,996	47,705,003	43,966,889	12,259,395	40,680,625
43	9,315,494	96,389,872	131,530,601	24,553,072	177,728,926
44	6,450,076	86,613,641	83,313,366	14,295,437	77,066,883
45	9,933,751	110,002,385	118,924,049	22,637,923	78,201,822
46	$15,868	$13,438	$17,243	$12,201	$13,656
51	21.121	197.384	182.913	36.993	139.5
52	266.363	3,198,718	2,602,408	565.435	2,503,532
53	10,615,093	165,788,897	149,258,789	22,159,084	112,406,494
54	2.00%	1.20%	2.90%	-1.70%	2.20%

	Unnamed: 51
0	Wyoming
13	92.80%
14	1.30%
15	2.70%
16	1.00%
17	0.10%
19	10.00%
41	1,644,844
42	3,291,478
43	10,783,794
44	5,597,891
45	9,446,043
46	$16,388
51	21.04
52	219.881
53	10,094,010
54	FN

[17 rows x 52 columns]

1 explanation of the dirty and messy data from the above column

South Dakota and Tennesse don't have currency signs on their amounts. South Dakota and Tenesse don't have percentages on the total employment percentage, the data is messu because the are large errors and missing entries. West virginia and Vermont have Z values, which means they are null, making the data messy. Wyoming has an FN missing value. Alaska has a missing Value which is indicated by the letter D. Total retail sales per capita 2012 are missing currency values in column 46. west virginia has a negative one point seventy amount which is not valid.

```
[57]: dataset.shape
```

```
[57]: (86, 52)
```

```
[79]: dataset.duplicated().sum()
```

```
[79]: 3
```

```
[101]: dataset.isnull()
```

```
[101]:      U.S Census data  Unnamed: 1  Unnamed: 2  Unnamed: 3  Unnamed: 4  \
       0             False       False       False       False       False
       1             False        True       False       False       False
       2             False        True       False       False       False
       3             False        True       False       False       False
       4             False        True       False       False       False
       ..              ...         ...         ...         ...         ...
       81            False       False        True        True        True
       82             True       False        True        True        True
       83            False       False        True        True        True
       84            False       False        True        True        True
       85            False       False        True        True        True

           Unnamed: 5  Unnamed: 6  Unnamed: 7  Unnamed: 8  Unnamed: 9  …  \
       0        False       False       False       False       False  …
       1        False       False       False       False       False  …
       2        False       False       False       False       False  …
       3        False       False       False       False       False  …
       4        False       False       False       False       False  …
       ..         ...         ...         ...         ...         ...  …
       81        True        True        True        True        True  …
       82        True        True        True        True        True  …
       83        True        True        True        True        True  …
       84        True        True        True        True        True  …
       85        True        True        True        True        True  …

           Unnamed: 42  Unnamed: 43  Unnamed: 44  Unnamed: 45  Unnamed: 46  \
       0         False        False        False        False        False
       1         False        False        False        False        False
```

2	False	False	False	False	False
3	False	False	False	False	False
4	False	False	False	False	False
..	…	…	…	…	…
81	True	True	True	True	True
82	True	True	True	True	True
83	True	True	True	True	True
84	True	True	True	True	True
85	True	True	True	True	True

	Unnamed: 47	Unnamed: 48	Unnamed: 49	Unnamed: 50	Unnamed: 51
0	False	False	False	False	False
1	False	False	False	False	False
2	False	False	False	False	False
3	False	False	False	False	False
4	False	False	False	False	False
..	…	…	…	…	…
81	True	True	True	True	True
82	True	True	True	True	True
83	True	True	True	True	True
84	True	True	True	True	True
85	True	True	True	True	True

[86 rows x 52 columns]

[42]:
```python
dataset.melt()
```

[42]:

	variable	value
0	U.S Census data	Fact
1	U.S Census data	Population estimates, July 1, 2016, (V2016)
2	U.S Census data	Population estimates base, April 1, 2010, (V2…
3	U.S Census data	Population, percent change - April 1, 2010 (es…
4	U.S Census data	Population, Census, April 1, 2010
…	…	…
4467	Unnamed: 51	NaN
4468	Unnamed: 51	NaN
4469	Unnamed: 51	NaN
4470	Unnamed: 51	NaN
4471	Unnamed: 51	NaN

[4472 rows x 2 columns]

[66]:
```python
dataset.shape
```

[66]: (86, 52)

[ ]:
```python
## Data Cleaning
```

```
[116]: dataset.describe()
```

```
[116]:         U.S Census data Unnamed: 1 Unnamed: 2 Unnamed: 3 Unnamed: 4 Unnamed: 5  \
       count               81         29         66         66         66         66
       unique              81         16         66         65         65         65
       top               Fact        (c)    Alabama      7.30%     50.30%     50.90%
       freq                 1          6          1          2          2          2

              Unnamed: 6 Unnamed: 7 Unnamed: 8 Unnamed: 9  …    Unnamed: 42  \
       count          66         66         66         66  …             66
       unique         64         65         64         65  …             66
       top         6.80%      3.30%      0.10%     51.60%  …   South Dakota
       freq            2          2          2          2  …              1

              Unnamed: 43 Unnamed: 44 Unnamed: 45 Unnamed: 46 Unnamed: 47  \
       count           66          66          66      66.000          66
       unique          65          65          65      64.000          66
       top          0.048      50.40%       2.50%     625.741     Virginia
       freq             2           2           2       2.000           1

              Unnamed: 48 Unnamed: 49 Unnamed: 50 Unnamed: 51
       count           66          66          66          66
       unique          66          65          66          65
       top      Washington       1.50%   Wisconsin       7.10%
       freq             1           2           1           2

       [4 rows x 52 columns]
```

1.1 Exploratory Data Analysis

```
[130]: import matplotlib.pyplot as plt
```

```
[131]: dataset = pd.read_excel("U.S-Census-data.xlsx")
```

```
[132]: dataset = pd.read_excel("gun_data.xlsx")
```

```
[26]: type (dataset)
```

```
[26]: pandas.core.frame.DataFrame
```

```
[60]: dataset.dtypes
```

```
[60]: month                      object
      state                      object
      permit                    float64
      permit_recheck            float64
      handgun                   float64
```

```
long_gun                        float64
other                           float64
multiple                          int64
admin                           float64
prepawn_handgun                 float64
prepawn_long_gun                float64
prepawn_other                   float64
redemption_handgun              float64
redemption_long_gun             float64
redemption_other                float64
returned_handgun                float64
returned_long_gun               float64
returned_other                  float64
rentals_handgun                 float64
rentals_long_gun                float64
private_sale_handgun            float64
private_sale_long_gun           float64
private_sale_other              float64
return_to_seller_handgun        float64
return_to_seller_long_gun       float64
return_to_seller_other          float64
totals                            int64
dtype: object
```

[137]: `dataset.head()`

[137]:

	U.S Census data	Unnamed: 1	Unnamed: 2	\
0	Fact	Fact Note	Alabama	
1	Population estimates, July 1, 2016, (V2016)	NaN	4,863,300	
2	Population estimates base, April 1, 2010, (V2…	NaN	4,780,131	
3	Population, percent change - April 1, 2010 (es…	NaN	1.70%	
4	Population, Census, April 1, 2010	NaN	4,779,736	

	Unnamed: 3	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7	Unnamed: 8	\
0	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	
1	741.894	6,931,071	2,988,248	39,250,017	5,540,545	3,576,452	
2	710.249	6,392,301	2,916,025	37,254,522	5,029,324	3,574,114	
3	4.50%	8.40%	2.50%	5.40%	10.20%	0.10%	
4	710.231	6,392,017	2,915,918	37,253,956	5,029,196	3,574,097	

	Unnamed: 9	…	Unnamed: 42	Unnamed: 43	Unnamed: 44	Unnamed: 45	\
0	Delaware	…	South Dakota	Tennessee	Texas	Utah	
1	952.065	…	865454	6651194	27,862,596	3,051,217	
2	897.936	…	814195	6346298	25,146,100	2,763,888	
3	6.00%	…	0.063	0.048	10.80%	10.40%	
4	897.934	…	814180	6346105	25,145,561	2,763,885	

```
      Unnamed: 46 Unnamed: 47 Unnamed: 48   Unnamed: 49 Unnamed: 50 Unnamed: 51
    0     Vermont     Virginia  Washington  West Virginia    Wisconsin      Wyoming
    1     624.594    8,411,808   7,288,000      1,831,102    5,778,708      585.501
    2     625.741    8,001,041   6,724,545      1,853,011    5,687,289      563.767
    3      -0.20%        5.10%       8.40%         -1.20%        1.60%        3.90%
    4     625.741    8,001,024   6,724,540      1,852,994    5,686,986      563.626

    [5 rows x 52 columns]
```

[196]: `dataset.melt()`

[196]:
```
            variable     value
    0          month   2017-09
    1          month   2017-09
    2          month   2017-09
    3          month   2017-09
    4          month   2017-09
    ...           ...       ...
    337090    totals        24
    337091    totals       361
    337092    totals       408
    337093    totals       241
    337094    totals       107

    [337095 rows x 2 columns]
```

[167]: `dataset.tail()`

[167]:
```
              month           state  permit  permit_recheck  handgun  long_gun  \
    12480   1998-11         Virginia     0.0             NaN     14.0       2.0
    12481   1998-11       Washington     1.0             NaN     65.0     286.0
    12482   1998-11   West Virginia     3.0             NaN    149.0     251.0
    12483   1998-11        Wisconsin     0.0             NaN     25.0     214.0
    12484   1998-11          Wyoming     8.0             NaN     45.0      49.0

            other  multiple  admin  prepawn_handgun  …  returned_other  \
    12480     NaN         8    0.0              NaN  …             NaN
    12481     NaN         8    1.0              NaN  …             NaN
    12482     NaN         5    0.0              NaN  …             NaN
    12483     NaN         2    0.0              NaN  …             NaN
    12484     NaN         5    0.0              NaN  …             NaN

            rentals_handgun   rentals_long_gun   private_sale_handgun  \
    12480               NaN                NaN                    NaN
    12481               NaN                NaN                    NaN
    12482               NaN                NaN                    NaN
    12483               NaN                NaN                    NaN
```
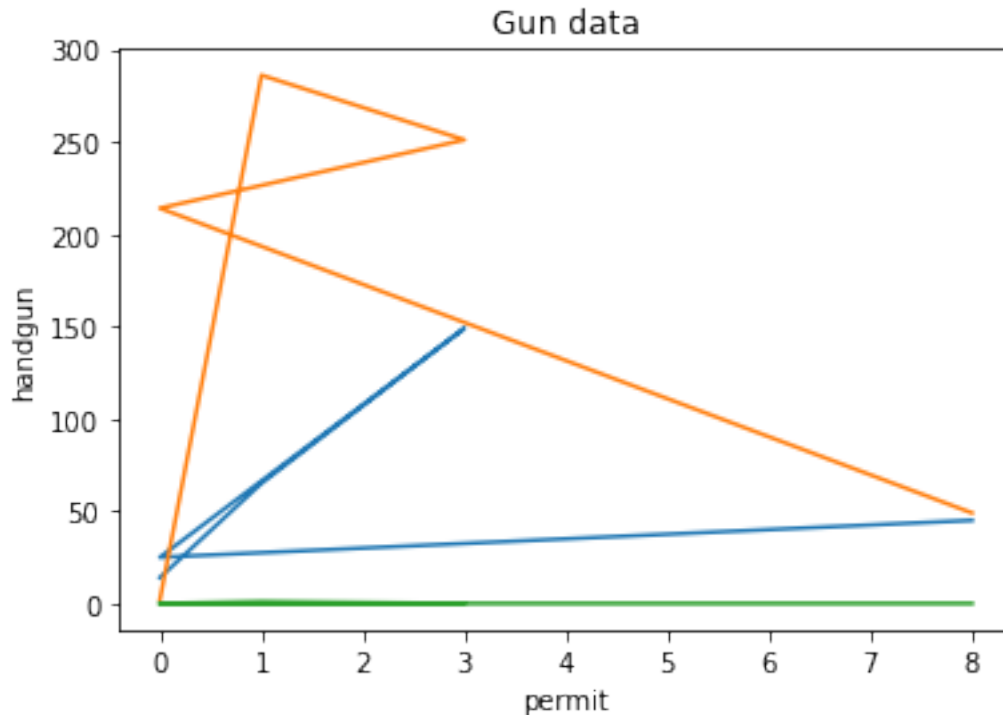
```
12484              NaN              NaN                NaN

        private_sale_long_gun  private_sale_other  return_to_seller_handgun  \
12480                     NaN                 NaN                       NaN
12481                     NaN                 NaN                       NaN
12482                     NaN                 NaN                       NaN
12483                     NaN                 NaN                       NaN
12484                     NaN                 NaN                       NaN

        return_to_seller_long_gun  return_to_seller_other  totals
12480                         NaN                     NaN      24
12481                         NaN                     NaN     361
12482                         NaN                     NaN     408
12483                         NaN                     NaN     241
12484                         NaN                     NaN     107

[5 rows x 27 columns]
```

```python
[8]:  import pandas as pd
      import matplotlib.pyplot as plt
      %matplotlib inline
```

```python
[177]:  permit = [0, 1.0, 3.0, 0, 8.0]
        handgun = [14.0, 65.0, 149.0, 25.0, 45.0]
        long_gun = [2.0, 286.0, 251.0, 214.0, 49.0]
        admin = [0, 1.0, 0, 0, 0]
        Totals = [24, 361, 408, 241, 107]
```

```python
[194]:  plt.xlabel("permit")
        plt.ylabel("handgun")
        plt.title("Gun data")

        plt.plot(permit, handgun)
        plt.plot(permit, long_gun)
        plt.plot(permit, admin)
```

```
[194]:  [<matplotlib.lines.Line2D at 0x7fed081548e0>]
```

Gun data

```
[ ]:  #The information above displays gun data from 1998-11
```

```
[138]:  dataset.shape
```

```
[138]:  (86, 52)
```

1.2 Conclusions

There are multiple pre-permit checks per month in each state. And there are also monthly NICS background chekcks which sum up to the total of 24 years. Monthly NICS background checks started in the year 1998 on the month of November. And the findings above are an accumulation of those years.federal firearm licenses rely on the FBI for all firearm background checks by accessing the NICS electronically. There are thirty seven states that do not have (POC)point-of-contact status. There are thirteen full POC states that act on behalf of the NICS in a full POC capacity.There are four partial POC states that conduct handgun background checks and the FFLs contact the FBI for long gun background checks. Two partial POC states issue handgun permits used for handgun back ground checks, And the FFLs contact the FBI for long gun background checks.The federal firearms licenses has rules about firearms and explosives being procured and these rules are displayed where peopple go to procure handguns and explosives. The gun control act (GCA) which has categories which were established for persons who are prohibited from receiving firearms, was enacted by Congress as part of an effort to control gun violence. the following prohibits the transfer of firearms: • Persons who are convicted of a crime punishable by solitary confinement for a term exceeding a year, even if the sentence received was shorter. •Persons who are fugitives. Persons who have renounced their citizenship in the U.S, • Persons who are the subject of certain

protection orders. • Persons who have been discharged from the U.S armed forces. These are a few rules from the federal licenses manual that prohibit customers from procuring explosives and gun. from the data that was gathered, these are the findings.

1.3 Limitations

• Findings regarding this data was challenging, as a data analyst you need look thoughroughly look at data, the slihghtest mistake makes the whole data innacurate. Missing values should be looked so that data can be cleaned accordingly.

1.4 Source: nics-firearms-licensee-manual-111811.pdf

1.5 Source 2: nics-participation-map-august-2021.pdf