

```
In [1]: #importing libraries
import pandas as pd
import numpy as np
import os
import matplotlib.pyplot as plt
import seaborn as sns
import scipy
```

```
In [2]: #defining path
path = r'C:\Users\msyeu\Hate Crime Analysis'
```

```
In [3]: #executing path
path
```

```
Out[3]: 'C:\\Users\\msyeu\\Hate Crime Analysis'
```

```
In [4]: #import hate crime data using os
df_hatecrime = pd.read_csv(os.path.join(path, 'Data', 'Original Data', 'hate_crime.
```

```
In [5]: df_hatecrime.head()
```

```
Out[5]:
```

| | INCIDENT_ID | DATA_YEAR | ORI | PUB_AGENCY_NAME | PUB_AGENCY_UNIT | AGENC |
|--|-------------|-----------|-----|-----------------|-----------------|-------|
|--|-------------|-----------|-----|-----------------|-----------------|-------|

| | | | | | | |
|---|------|------|-----------|--------|-----|--|
| 0 | 3015 | 1991 | AR0040200 | Rogers | NaN | |
|---|------|------|-----------|--------|-----|--|

| | | | | | | |
|---|------|------|-----------|------|-----|--|
| 1 | 3016 | 1991 | AR0290100 | Hope | NaN | |
|---|------|------|-----------|------|-----|--|

| | | | | | | |
|---|----|------|-----------|------------|-----|--|
| 2 | 43 | 1991 | AR0350100 | Pine Bluff | NaN | |
|---|----|------|-----------|------------|-----|--|

| | | | | | | |
|---|----|------|-----------|------------|-----|--|
| 3 | 44 | 1991 | AR0350100 | Pine Bluff | NaN | |
|---|----|------|-----------|------------|-----|--|

| | | | | | | |
|---|------|------|-----------|------------|-----|--|
| 4 | 3017 | 1991 | AR0350100 | Pine Bluff | NaN | |
|---|------|------|-----------|------------|-----|--|

5 rows × 28 columns



```
In [7]: df_hatecrime.dtypes
```

```
Out[7]: INCIDENT_ID          int64
DATA_YEAR          int64
ORI                object
PUB_AGENCY_NAME    object
PUB_AGENCY_UNIT    object
AGENCY_TYPE_NAME   object
STATE_ABBR         object
STATE_NAME         object
DIVISION_NAME      object
REGION_NAME        object
POPULATION_GROUP_CODE  object
POPULATION_GROUP_DESC object
INCIDENT_DATE      object
ADULT_VICTIM_COUNT  float64
JUVENILE_VICTIM_COUNT float64
TOTAL_OFFENDER_COUNT int64
ADULT_OFFENDER_COUNT float64
JUVENILE_OFFENDER_COUNT float64
OFFENDER_RACE      object
OFFENDER_ETHNICITY object
VICTIM_COUNT       int64
OFFENSE_NAME       object
TOTAL_INDIVIDUAL_VICTIMS float64
LOCATION_NAME       object
BIAS_DESC          object
VICTIM_TYPES       object
MULTIPLE_OFFENSE   object
MULTIPLE_BIAS      object
dtype: object
```

```
In [8]: df_hatecrime['INCIDENT_ID']=df_hatecrime['INCIDENT_ID'].astype('str')
```

```
In [9]: #checking shape
df_hatecrime.shape
```

```
Out[9]: (201403, 28)
```

```
In [10]: #checking info
df_hatecrime.info()
```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 201403 entries, 0 to 201402
Data columns (total 28 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   INCIDENT_ID                          201403 non-null object
1   DATA_YEAR                           201403 non-null int64
2   ORI                                  201403 non-null object
3   PUB_AGENCY_NAME                      201403 non-null object
4   PUB_AGENCY_UNIT                      5594 non-null  object
5   AGENCY_TYPE_NAME                     201403 non-null object
6   STATE_ABBR                           201403 non-null object
7   STATE_NAME                           201403 non-null object
8   DIVISION_NAME                        201403 non-null object
9   REGION_NAME                          201403 non-null object
10  POPULATION_GROUP_CODE                201403 non-null object
11  POPULATION_GROUP_DESC                201403 non-null object
12  INCIDENT_DATE                        201403 non-null object
13  ADULT_VICTIM_COUNT                   35973 non-null float64
14  JUVENILE_VICTIM_COUNT                 35496 non-null float64
15  TOTAL_OFFENDER_COUNT                 201403 non-null int64
16  ADULT_OFFENDER_COUNT                 33952 non-null float64
17  JUVENILE_OFFENDER_COUNT              33945 non-null float64
18  OFFENDER_RACE                        201384 non-null object
19  OFFENDER_ETHNICITY                  18150 non-null object
20  VICTIM_COUNT                         201403 non-null int64
21  OFFENSE_NAME                         201403 non-null object
22  TOTAL_INDIVIDUAL_VICTIMS             199797 non-null float64
23  LOCATION_NAME                       201403 non-null object
24  BIAS_DESC                           201403 non-null object
25  VICTIM_TYPES                         201403 non-null object
26  MULTIPLE_OFFENSE                     201403 non-null object
27  MULTIPLE_BIAS                       201403 non-null object
dtypes: float64(5), int64(3), object(20)
memory usage: 43.0+ MB

```

In [11]: `df_hatecrime.describe()`

```

Out[11]:

```

| | DATA_YEAR | ADULT_VICTIM_COUNT | JUVENILE_VICTIM_COUNT | TOTAL_OFFENDER_ |
|--------------|---------------|--------------------|-----------------------|-----------------|
| count | 201403.000000 | 35973.000000 | 35496.000000 | 201403 |
| mean | 2004.200906 | 0.504656 | 0.064683 | 0 |
| std | 7.804374 | 0.972267 | 0.396970 | 1 |
| min | 1991.000000 | 0.000000 | 0.000000 | 0 |
| 25% | 1998.000000 | 0.000000 | 0.000000 | 0 |
| 50% | 2004.000000 | 0.000000 | 0.000000 | 1 |
| 75% | 2011.000000 | 1.000000 | 0.000000 | 1 |
| max | 2018.000000 | 80.000000 | 40.000000 | 99 |

```
In [12]: #checking for missing values
df_hatecrime.isnull().sum()
```

```
Out[12]: INCIDENT_ID          0
DATA_YEAR                    0
ORI                          0
PUB_AGENCY_NAME              0
PUB_AGENCY_UNIT             195809
AGENCY_TYPE_NAME             0
STATE_ABBR                   0
STATE_NAME                   0
DIVISION_NAME                0
REGION_NAME                  0
POPULATION_GROUP_CODE        0
POPULATION_GROUP_DESC        0
INCIDENT_DATE                0
ADULT_VICTIM_COUNT           165430
JUVENILE_VICTIM_COUNT         165907
TOTAL_OFFENDER_COUNT         0
ADULT_OFFENDER_COUNT          167451
JUVENILE_OFFENDER_COUNT       167458
OFFENDER_RACE                 19
OFFENDER_ETHNICITY           183253
VICTIM_COUNT                  0
OFFENSE_NAME                  0
TOTAL_INDIVIDUAL_VICTIMS      1606
LOCATION_NAME                   0
BIAS_DESC                     0
VICTIM_TYPES                  0
MULTIPLE_OFFENSE              0
MULTIPLE_BIAS                 0
dtype: int64
```

```
In [13]: df_hatecrime.dropna(subset=['TOTAL_INDIVIDUAL_VICTIMS'], inplace = True)
```

```
In [15]: #dropping columns that are irrelevant or have more than 95% missing values.
df_hatecrime.drop(columns=['PUB_AGENCY_UNIT', 'OFFENDER_ETHNICITY', 'ADULT_VICTIM_C
```

Out[15]:

| | INCIDENT_ID | DATA_YEAR | ORI | PUB_AGENCY_NAME | AGENCY_TYPE_NAME |
|--|-------------|-----------|-----|-----------------|------------------|
|--|-------------|-----------|-----|-----------------|------------------|

| | | | | | |
|--------|--------|------|-----------|---------------|--------------|
| 0 | 3015 | 1991 | AR0040200 | Rogers | City |
| 1 | 3016 | 1991 | AR0290100 | Hope | City |
| 2 | 43 | 1991 | AR0350100 | Pine Bluff | City |
| 3 | 44 | 1991 | AR0350100 | Pine Bluff | City |
| 4 | 3017 | 1991 | AR0350100 | Pine Bluff | City |
| ... | ... | ... | ... | ... | .. |
| 201398 | 466130 | 2018 | WV0540100 | Parkersburg | City |
| 201399 | 466159 | 2018 | WV0540100 | Parkersburg | City |
| 201400 | 508677 | 2018 | WV0540200 | Vienna | City |
| 201401 | 463503 | 2018 | WVWSP2400 | State Police: | State Police |
| 201402 | 544359 | 2018 | WVWSP3300 | State Police: | State Police |

199797 rows × 22 columns



```
In [16]: df_dups = df_hatecrime[df_hatecrime.duplicated()]
```

```
In [17]: df_dups
```

Out[17]:

| INCIDENT_ID | DATA_YEAR | ORI | PUB_AGENCY_NAME | PUB_AGENCY_UNIT | AGENCY_TYPE_ |
|-------------|-----------|-----|-----------------|-----------------|--------------|
|-------------|-----------|-----|-----------------|-----------------|--------------|

0 rows × 28 columns



```
In [20]: # checking for mixed data types
for col in df_hatecrime.columns.tolist():
    weird = (df_hatecrime[[col]].applymap(type) != df_hatecrime[[col]].iloc[0].apply(
        if len (df_hatecrime[weird]) > 0:
            print (col)
```

```
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aFrame.applymap has been deprecated. Use DataFrame.map instead.
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PUB_AGENCY_UNIT
```

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OFFENDER_RACE
OFFENDER_ETHNICITY
```

```

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ype)).any(axis = 1)

```

```
In [21]: df_hatecrime['OFFENDER_RACE'] = df_hatecrime['OFFENDER_RACE'].astype('str')
```

```
In [22]: # checking for mixed data types
for col in df_hatecrime.columns.tolist():
    weird = (df_hatecrime[[col]].applymap(type) != df_hatecrime[[col]].iloc[0].apply(
        if len (df_hatecrime[weird]) > 0:
            print (col)
```



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PUB_AGENCY_UNIT
```

```
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```
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```

```
OFFENDER_ETHNICITY
```

```
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```
    weird = (df_hatecrime[[col]].applymap(type) != df_hatecrime[[col]].iloc[0].apply(t
ype)).any(axis = 1)
```

```
In [23]: df_hatecrime.to_csv(os.path.join(path, 'Data', 'Prepared Data', 'hate_crime_wrangle
```

```
In [ ]:
```